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EDITORIAL

WHY SHOULD WE PUBLISH OUR WORK

Medical council of India considers academic writings essential for academic carrier. Most of the orthopaedic surgeons feel publication is a work for doctors working in medical colleges and they do not need publications and neither do they need journals.

With advancement in medical knowledge and equipment, the only way to keep abreast with information is medical journals. If you read them you get to know the subject but if you try to publish your work you really read and prepare the subject in thus make it more acceptable to your collogues.Youtry to search newer methods and knowledge, you get to know alternate methods and you master the work you are publishing.

I request you all to try to publish some of your work in scientific journals, get a practical exposure to difficulties in publishing and enjoy its fruitsthereafter.

Prof. Dr. Alok C. Agrawal
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AGRICULTURE HAND INJURIES AND THEIR OUTCOME - AN OVERVIEW

Vyas G.S.* **Mehta R.P.**** **Bansaria R.*****

INTRODUCTION

India is an agriculture dominated country. Now a day, with mechanization in agricultural field hand injuries is very common.

Hand is not only an organ for grasp or hook but also an organ for communication of ideas and expression of transmitting feelings and of giving shape of what brain is thinking. It is the organ that comes most often in contact with other people and in one's own view. Hence function and cosmesis are equally important.

Young males who are mostly the working members of the family are most commonly affected with these injuries and hence it results in great economic losses. Unless treated promptly and properly severe disabilities may result.

Also there is paucity of reliable data on farm workers diseases and injuries in India because of low surveillance system.

The management of hand injuries forms an important part of the hospital accident and emergency service, and early recognition and informed management are essential for a favorable outcome.[1]

For an acutely injured hand, restoration of function is the goal of treatment. It is necessary to prevent infection, salvage injured parts, and promote primary healing.

If the injury and wound conditions permit, tendons and nerves should be repaired at the time of primary or secondary skin closure. Although nerves and tendons may be repaired in the primary phase of care, their management is secondary in importance to thorough cleansing and debridement, correct stabilization of fractures and dislocations, and wound closure or coverage with skin grafts or skin flaps.[2,3]

AIMS AND OBJECTIVES

- To study the magnitude of problems of management of mutilating agricultural hand injuries.
- To assess various functions of injured hand.
- To evaluate the extent and incidence of stiffness of the hand in these injuries with routine treatment.

SUBJECTS AND METHODS

The study was carried out in department of orthopaedics of various tertiary care centres after obtaining permission from the ethical committee of the institution. All patients of agricultural hand injuries were included in the study.

Patients with vascular injury were excluded.

After admission we asked a detailed history focusing specially to the duration after injury and mode of injury and a thorough local clinical examination was carried out to find out the extent and depth of injury along with distal neurovascular status. Intactness of tendons was also evaluated.

All patients were given Inj. Tetanus toxoid 0.5 intramuscular stat, swab from wound for culture and sensitivity was send followed by a thorough wash with hydrogen peroxide, betadine and normal saline and injectable broad spectrum antibiotic coverage. After sterile dressing temporary splint was given.

Radiological evaluation in the form of x-ray was done and patient injuries were classified as follows:

Table 1
Anatomically

Region	SurfaceSide (Lt./ Rt.)
Finger	Dorsal
	Volar
Hand	Dorsal
	Volar
Hand & forearm	Dorsal
	Volar

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Biomechanically

We classified the injuries as follows

Table 2

Type	Injuries
I	Skin de-gloving only.
II	Type-I + muscle, tendon or phalanx/ metacarpal involvement.
III	Type-II + carpal and wrist involvement.
IV	Type III + forearm involvement.

Routine pre-operative blood investigations were done. After complete assessment the patient was shifted to emergency operation theatre. Under Regional anaesthesia and under tourniquet wound irrigation with savlon, hydrogen peroxide and normal saline was done followed by a thorough debridement.

Skeletal stabilisation with K-wire &/ external fixator was done according to the type of injury.

Primary closure was done only in type - I non-contaminated wounds. Tendon repair was done for tears. Regular daily sterile dressings of other type of injuries was done till healthy wound was seen followed by secondary procedures like skin grafting or flaps depending on the type of injury.

IV antibiotics were given based on the c/s reports for at least 7 days.

Every case was subjected to attend OPD for follow-up weekly for assessment of wound healing and start of physio-therapy.at later stage the patient was followed up at 6 week, 3rd month, 6th month and at the end of one year.

At every follow-up range of motion, active and passive grip strength and complications if any were assessed. Grip strength was taken by asking the patient to press the sphygmomanometer cuff containing air up to 200 mm of Hg by his\ her involved hand and to hold it for 30 seconds.[4]

Functional outcome was assessed with Quick DASH score.

OBSERVATION AND RESULTS

Our study included 35 patients of all different age groups with different agriculture injuries studied between 2010 and 2016. Minimum age of 5 years and maximum of 45 years (average: 34.7 years).

Injuries due to thresher machine contributed majority of the cases (20 cases) mainly in wheat reaping season from April to June. Other injuries were reported from fodder chopper and from Pankhi (Husk Blower Fan) and other hand tools. Higher incidence of injuries was seen among males (31 cases) indicating that mostly males are engaged in outdoor activities while females in domestic works. Minimum duration of follow-up was two months and maximum was 10 months with average follow-up of 5 months.

After complete assessment we observed that biomechanically there were 11 type-IV injuries, 9 type-III injuries, 11 type-II injuries and 4 type-I injuries.

Digital amputations were the commonest type found in 60% of cases. Index finger (22.2%), middle finger (14%), ring finger (5.6%), little finger (2.8%) and thumb (2.8%).

Untidy injuries with dominant element of crushing and contamination constituted 80%. Mainly from thresher and husk blower (pankhi) and 20% were tidy injuries, mainly from fodder chopper and other hand tools.

25 cases in our study had comminuted fractures 29.5% inmetacarpal and 22.2% in phalanx.

11.1% of the patients had minor injury with minimal soft tissue damage treated by soft tissue coverage and dressings.

Rate of total active motion (TAM) of involved ray up to their last follow up was as follows:

Table 3

Score	TAM	No. of cases	Percentage
1	<80°	7	20
2	80°-210°	14	40
3	211°-250°	9	25.71
4	251°-270°	5	14.285

Grip strength recorded was as follows:

Table 4

Score	Grip strength	No. of cases	Percentage
1.	<100 mm Hg	06	17.142
2.	100- 149 mm Hg	14	40
3.	150- 199 mm Hg	12	34.28
4.	>200 mm Hg	03	8.57

Grip strength was directly related to stiffness and it gradually improved with physiotherapy.

Complications

Table 5

Sr. No.	Complication	No. of cases	Percentage
1.	Scar and contracture	05	14.285
2.	Infection	04	11.428
3.	Joint stiffness	07	20
4.	Amputations	18	51.428
5.	Non-union	Nil	Nil
6.	Mal-union	06	17.143

Quick DASHscore was as follows:

Table 6

Quick DASH score	Thresher injury	Fodder cutter injury	Pankhi injury
Minimum	18.2	9.3	6.8
Maximum	52.3	45.5	52.3
Average	35.9	17.033	20.066

Thresher injuries were more severe (mostly type IV and type III) and had poorer TAM and Grip strength as compared to fodder cutter, pankhi and other hand tool injuries. Also the functional outcome as evaluated by the Quick DASH score of thresher injuries was poorer (Avg. 35.9) as compared to fodder cutter (Avg. 17.033) and other injuries.

Stiffness was overcome by assisted physiotherapy, dynamic physiotherapy splint and by active and passive physiotherapy.

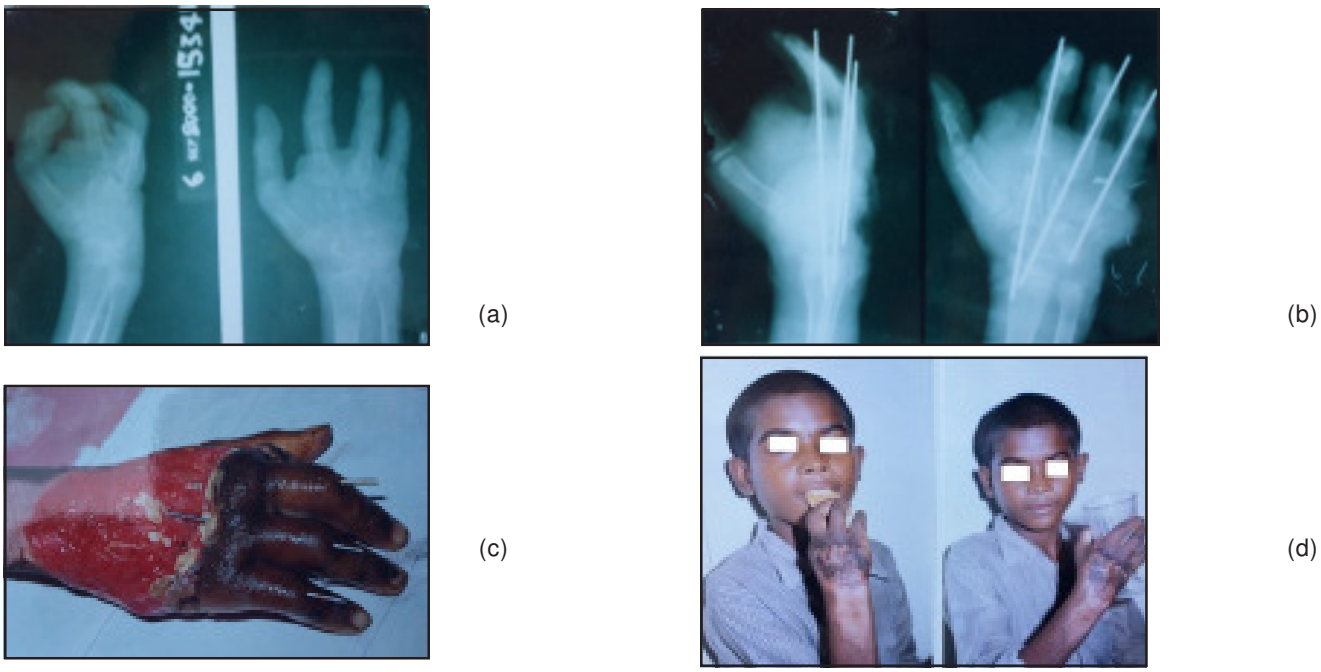
Case-1:

(a) (b)

Fodder cutter injury in a 16 year old male child with amputation of all four fingers with metacarpal heads as well as the thumb (type II injury).

Case-2:

Thresher injury to right hand (type III injury) in a 14 year child, amputation of index finger, contaminated wound, fixed with k-wires followed by skin grafting. Figure d showing the functional outcome.



(a) (b) (c) (d)

Case-3:

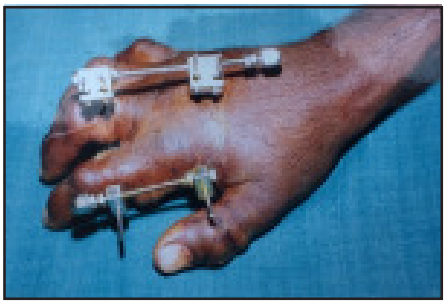
Fodder chopper injury (type II injury) in a 36 year male with compound fracture of base of proximal phalanx of index and middle finger treated with JESS fixator. Figure-f shows the functional outcome.

(a)

(b)

(c)

(d)



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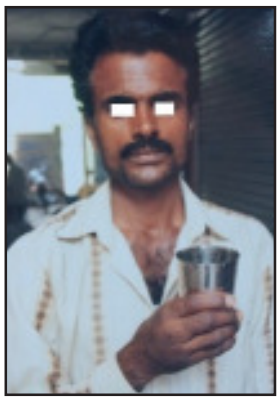
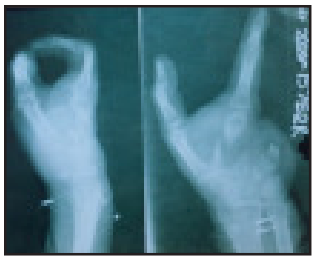


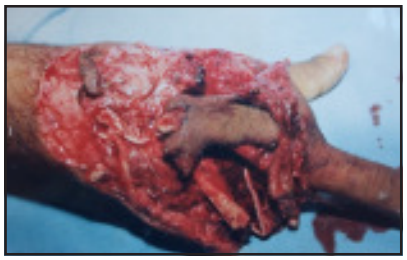
(f)

Case-4:

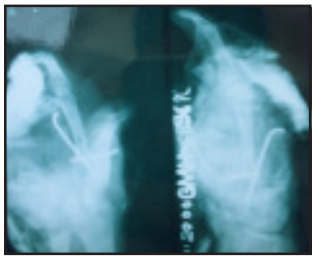
Thresher injury in a 54 year male patient with involvement of all four rays and carpals (type III injury), sparing the thumb. Index finger could be preserved. Figure-e showing the functional outcome.



(a)



(b)



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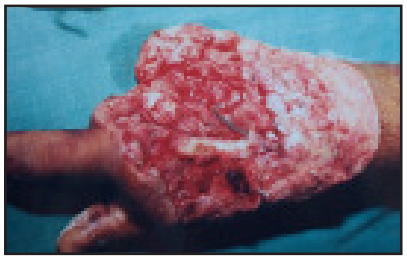
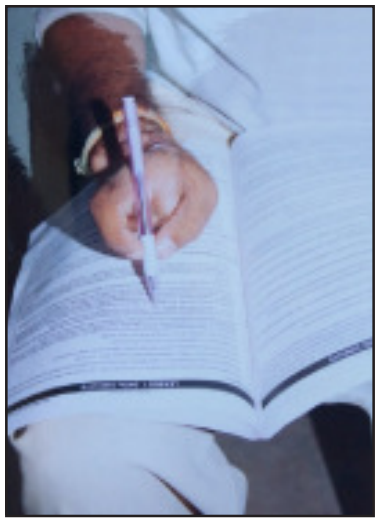


(d)



(e)

Image showing different types of agriculture hand injuries

DISCUSSION

A large proportion of work force is engaged in agriculture or related occupations. Injury related to the agriculture equipment is a significant cause of morbidity and mortality in developing countries like India. Accidental injuries to the hand are unfortunately common. These injuries account for major financial loss from time away from work and medical expenses, in addition to permanent deformities and dysfunction of the hand, if not attended to in a manner of trepidation.

There are no studies in literature showing correlation between types of hand injuries caused by different agricultural instruments and machines, and the functional outcome in different types of such hand injuries.

Agricultural machine related injuries involved all age groups. Farmers, unlike industrial workers, work as long as they can along with their family members irrespective of age. Hansen reported that in younger age group injuries result because "a child going for fun with his father or they are naïve about power present in machinery and fail to give due respect". In older age groups reasons for injuries reported were economic necessity, slow reflexes, carelessness with increased experience, physiological impairments and other age related reasons5.This is the only profession where injuries occur in all age groups.[6]

Mohan and Patel (1992) recorded that fodder cutter and thresher caused 13% of total agricultural injuries, 11% by fodder cutting machines and 2% by threshers in India. In fodder cutting machine injuries, 45% of victims were children between 0-14 years.[7]

Similarly fodder cutting machines caused 6% and threshers 16% of injuries in Pakistan.[8]

This show that previously hand tool injuries and not the machinery farming constituted the major bulk of agricultural injuries.

Mechanization in agriculture has resulted to an increase in the use of farm machinery as compared to hand tools. Farm mechanization has resulted in extensive use of wheat threshers on Indian farms. Injuries are mostly of the upper limb and amputations accounted for most of these.[9]

The mechanical threshers, chaff cutters and winnowers are known for its high accident risks, due to lack of adhering to safety gadgets on the machinery.[10]

The leading external causes of farm injury were hand tools (64.7%)), farm machinery (29.1%) and others (6.2%).[11]

In our study also we encountered 74% farm machinery related injuries and only 26% pankhi and hand tool injuries which co-relates with the increased mechanization in Indian farming. The distribution of injuries was among all age groups with male predominance.

Approaching the injured hand with a logical and systematic diagnostic plan allows surgeons to recognize the location and severity of the injury portfolio and direct comprehensive treatment. Fracture healing in hand is not an isolated goal. The functional end result is of paramount importance. Tissues other than bone are always damaged and early motion is needed to prevent adhesions of tendons, ligaments and capsule.[12] K-Wires, External fixation (JESS) and hybrid fixation are known and preferred modalities of treatment in hand injuries.

There are different methods of grading hand injury severity, but a simpler and easier method is that we have used in this study based on the bio-mechanical location and soft tissue involvement.

CONCLUSION

Agricultural injuries are serious problems in developing countries like India.

Usually only major injuries are reported to the hospital and minor not. Equipments like thresher that operate at higher energy levels appear to be associated with severe injuries as compared to pankhi, fodder chopper or other hand tool injuries.

With increasing mechanization, incidence of farming machine related injuries is increasing as compared to hand tool injuries.

Type III and type IV injuries had poorer functional

outcomes as compared to type I & II.

A good functional outcome and not the bone healing should be the primary aim in treating hand injury.

Registry of such disabling injuries should be maintained at national level so that the annual interpretation of such information can help to lay certain guidelines in their prevention and treatment, and also need of change in the specific machineries to reduce the incidence of such injuries.

DRAWBACKS OF THE STUDY

The sample size is small. For conclusion on the utility of the Bio-mechanically based classification, a study with larger sample size and and longer duration of follow-up is required.

The study was carried out in Madhya-Pradesh state of India, but different areas of the country have different levels of mechanization which should also be taken into consideration.

Conflict of interest: Nil.

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A BRIEF REPORT ON AMPUTEES FROM NORTH EAST INDIA: A TERTIARY CARE HOSPITAL BASED STUDY

Borgohain B.* **Khonglah T.G.**** **Marbaniang B.*****

ABSTRACT

BACKGROUND: Amputation can be devastating disability since loss of an extremity has considerable economical, social and psychological impact on its victim and his/her family, but at the same time it is an opportunity to offer the best rehabilitative measures to prevent their social isolation and improve the compromised quality of life. There is dearth of data on amputees from the north-eastern region (NER) of India.

METHODS: While undertaking a DBT funded twinning project we recorded the clinical details of the amputees in a tertiary care teaching institute located in the north-eastern region of India from 2013-2015. A total of 43 cases of amputations of various etiologies were obtained by a qualified prosthetist from the records of our artificial limb centre after having obtained approval from the Institute. Data included demographic factors and general patient characteristics including age, sex etc and the residual stump characteristic etc. We also analysed out elective orthopaedic operation list of the last five year period to understand the incidence and cause of new amputations. Since it was a retrospective study that involved reviewing the medical records only, no informed consent was separately required.

RESULTS: Data included demographic factors and general patient characteristics including age, sex etc and the residual stump characteristic etc.. The average age was 33.3 years (Range 3-65 years). Trauma is the leading cause of these amputations. Nearly 70% amputees were between 19-45 years, suggesting its profound effect on the most productive population of our society. Most cases were active adult males between 19-45 years. Only 5/43 cases (11.6%) were females. Only 4/43 cases were children below 18 Yrs (9.3%).

CONCLUSION: This snapshot indicates the need to create public awareness about road safety, injury prevention at workplace and calls for implementation of more stringent road safety measures by the law enforcement agencies. Developing awareness programs and ensuring early accessibility to user friendly and affordable prosthesis for rehabilitation are crucial for formulating long term support network for their community integrationto prevent the amputee population from becoming a permanent burden on the state.

Key word: Amputation, amputees, amputation stumps, disability, RTA, prevention

INTRODUCTION

The amputation of a limb is one of the oldest and serious surgical procedures where mortality was a major issue. In ancient India, Sushruta advocated amputation as high as wrist or ankle for life threatening complications of ascending infection after thorn injuries of hand or foot.[1] A major operative innovation was use of artery forceps by Paré during the sixteenth century. Lowdham (1679), Verduyn (1696), and Langenbeck (1810) used a soft-tissue flap to cover the bone without tension ("flap amputation").[2] French barber surgeon Morell introduced the use of a tourniquet to reduce the bleeding. Its evolution parallels the maturation process of surgery, with the major developments in the technique happening from the 16th to the 18th century.[3] In the beginning of the 21st century, limb amputation started becoming safe operation ending up with a functional stump. Since then morbidity reduction and early rehabilitation of amputees took centre stage.

The indications for amputations may depend and vary according to geography, culture and economy. Rommers et al. after multicentric study in Netherlands reported chronic vascular diseases as indication for amputation in 90% of patients and just 3% had it following acute trauma.[3] Similarly, in Taiwan just about 12.2% amputations were due to trauma, whereas 72% had vascular etiology (diabetic and nondiabetic) in the lower limb amputations.[4] However, in the developing countries with unplanned urbanization and sudden rise in the numbers of vehicles with lack of infrastructures and

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poor adherence to proper safety measures, acute trauma and industrial injuries are the prime cause leading to major amputations.In 2000, India topped the world with the highest number of people with diabetes mellitus (31.7 million) followed by China (20.8 million) and this co-morbidity will soon compound this problem further especially in the elderly.[5] Indeed a recent report from south India has confirms this concern.[6] Trauma, although lower down the list, as far as the indication for amputation is concerned, is the most common reason for amputation in younger individuals. The reason for trauma was road traffic accidents and accidents in their workplace. Complications of diabetes mellitus and vascular insufficiency were the most common indications for limb amputations in older age group in this study.[6]

MATERIALS AND METHODS

While developing a novel nanotechnology based four bar linkage artificial limb with IIT Guwahati, under a funded project we recorded the clinical details of the amputees in a tertiary care teaching institute located in the north-eastern region of India from 2013-2015. The data were obtained by a qualified prosthetist from the records of our artificial limb centre after having obtained approval from the Institute. Data included demographic factors and general patient characteristics including age, sex etc and the residual stump characteristic etc. We also analysed out elective orthopaedic operation list of the last five year period to understand the incidence and cause of new amputations. A total of 43 cases of healed amputations of various etiologies who registered in prosthetic orthotic clinic and artificial limb centre after wound healing of stump were recorded and analyzed.Since it was a retrospective study that involved reviewing the medical records only, no informed consent was separately required.

RESULTS

In our study, annually out of all elective orthopaedic surgeries performed from 2011-16, about 2.6% (78/2922) were amputations, mostly due to trauma related incidents. The average rate of elective amputations performed was 1.3 cases per month. Only rarely amputations were performed for non-traumatic conditions like advanced malignant bone tumors. About 15% (14/94) of all patients who attended dedicated prosthetic cum orthotic clinic for various musculoskeletal disabilities came purely for prosthetic limb fitting. The average age of the cohort was 33.3 years (Range 3-65 years). Most cases (70%) are productive adult malesbetween 19-45 years (Table 1, Figure 1).

Table 1
Profile of amputees (n=43) : North-East India

Age (In years)	Number of amputees	%	Male	Female
03-18	4	9.3	2	2
19-29	17	39.5	17	0
30-45	13	30.2	11	2
>45 to <60	7	16.3	7	0
60>	2	4.6	1	1
Total	**43**	**100**	**38**	**5**

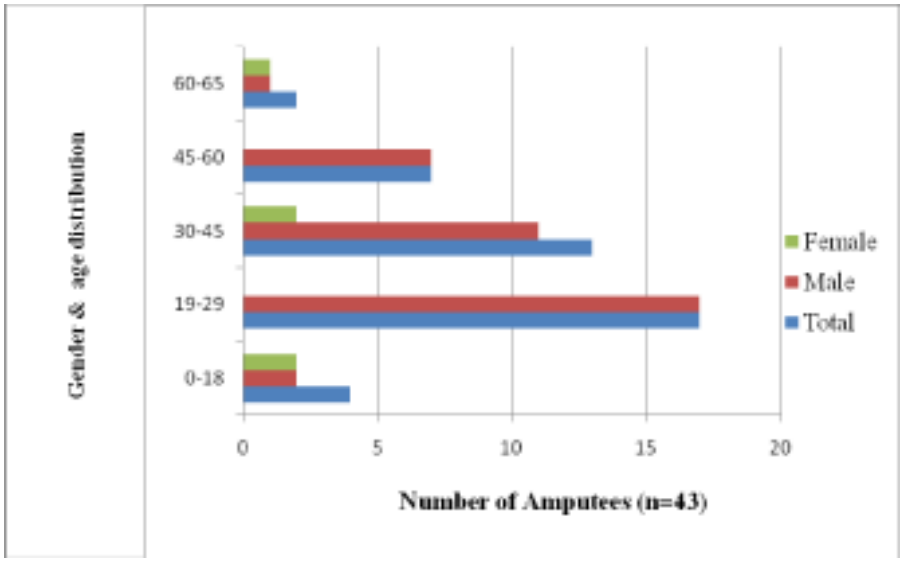

Fig. 1 : Gender and age distribution of the amputees of N.E. India (n=43)

Males outnumbered females by a ratio of 8:1. Adult to child amputee ratio was 10:1. Only five out of 43 cases (11.6%) were females and four out of 43 cases (9.3%) were children below 18 Yrs. A major lower limb amputation (LLA) was 44% followed by major upper limb amputation (28%) signifying unsafe occupational activities and high post-amputation morbidity (Table 2, Figure 2). Transfemoral and transtibial LLA were equally prevalent in this cohort.

Table 2
Profile of amputations: North-East India

Level of Amputation	Number	Bilateral/ Multiple/ Thumb Great toe Amputations
Above Knee/ Transfemoral	09	0
Below Knee/ Transtibial	09	1
Through Knee	01	0
Above Elbow/ AE	02	0
Below Elbow/ BE	10	1
Finger Amputation	4	2
Foot Amputation	4	1
Below ankle/ Syme's	1	0
Below wrist	1	0
Toe amputations	2	1

On qualitative analysis by both authors, the amputation stumps werefound far from ideal for prosthetic fitting in 17/35. Only twenty five percent cases had an ideal amputation stump for fitting conventional prosthesis (Table 3, Figure 3).

Table 3
Qualitative analysis of the amputation stumps (n=35)

Stump type	Stump Attributes	Number	Remarks
Very Poor	Unacceptable Bony prominence, Scar or Contracture	9	Preventable by adhering to good surgical techniques
Poor	Undue bony prominence needing revision or major socket modification	4	Preventable by adhering to good surgical techniques
Fair	Mild contracture with or without bony prominence (Mild) yielding to physiotherapy	4	Preventable by adhering to good surgical techniques and physiotherapy guidance
Good	Ideal length, Good range of motion, No contracture or bony prominence	7	Low morbidity after use of prosthesis
Good - Excellent	Most Ideal stump	11	Reduces time to prosthetic fitting or return to work
Cannot comment	Not well recorded	8	Objective check list/Proforma is lacking.

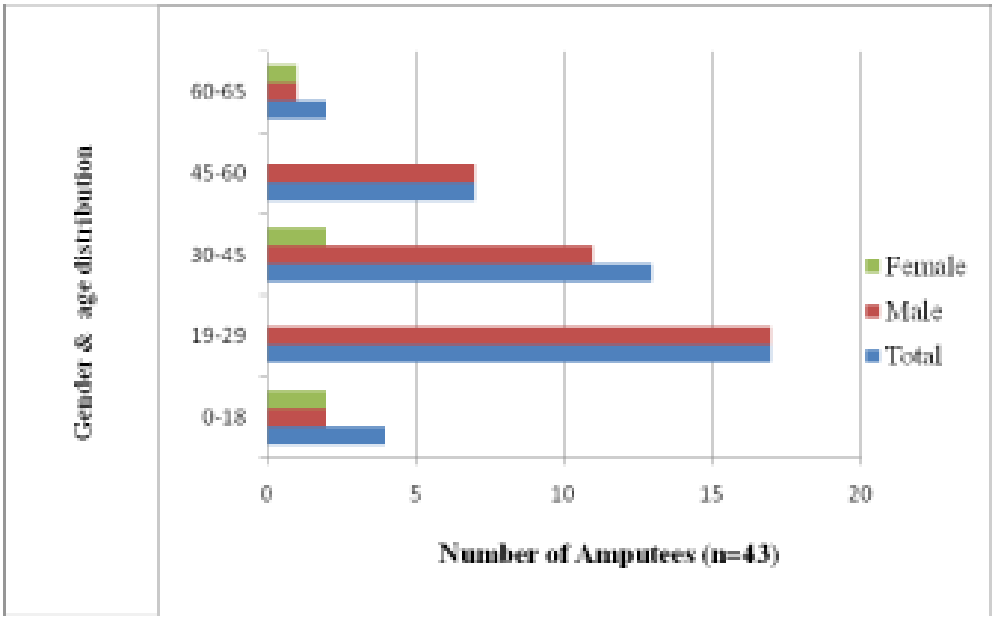

Fig. 2 : Types of amputations: North-East India

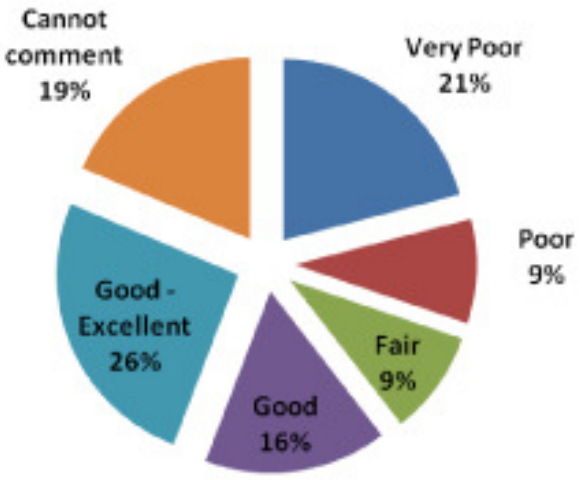

Fig. 3 : Qualitative analysis of the amputation stumps (n=35)

DISCUSSION

The general surgery department performs amputations for diabetic foot and peripheral vascular diseases thus limiting our study data to mainly cases of major trauma, acute vascular thrombosis and musculoskeletal tumor. Hazmy et al[7] reported a study on 204 amputees of which 65.7% were male and 34.3% were female. The mean age was 39.7 years old. Non traumatic amputations dominated (85.8%) the scenario: mainly due to diabetic ulcers or gangrene (91%) followed by peripheral vascular disease (7%) and malignancy (2%). Traumatic amputations (14.2%) due to RTA was the major cause (82.8%) followed by industrial accident (17.2%). Lower limb amputations (97.5%), below knee amputations being the commonest (72%), followed by above knee amputations (27%) and Syme amputations (1%). Five patients had upper limb amputations; four below elbow amputations while one had forequarter amputation. They reported alarming increasing trends of traumatic amputation. The three main risk factors for major limb amputations were diabetes mellitus, male gender and road traffic accident.

Obalum et al reported [8] a total of 68 lower limb amputations (LLA) performed on 64 patients were studied. All were closed amputations. Ages 2 to 76 years were affected with a mean of 36.0 +/- 16.2 years and peak age in the 21-30 year group. There were 44 (68.8%) males and 20 (31.2%) females, showing a male to female ratio of 2:2.1. Trauma was the most common indication accounting for 42 (61.8%). Motorcycle related accidents were implicated in 26 (61.9%) of the trauma related cases followed by 8 (19.0%) pedestrians involved in RTA, while 30 (71.4%) of the patients with trauma had visited traditional bone setters before presenting at the hospital. Below knee amputation was done in 51 (75.0%) of cases and stump wound infection was found in 18 (26.5%). Three (4.7%) patients died. Fifty-five (77.9%) amputation stumps healed by primary intention. Postoperative hospital stay ranged from 21 to 72 days. LLA were done on young adult males and were mostly due to trauma, predominantly from motorcycle accidents. Majority of the stumps healed by primary intention. Mortality was highest in diabetic related amputations.

Chalya et al reported[9] a total 162 amputee cohort between 2-78 years of age (mean 28.30±13.72?days). Males outnumbered females by a ratio of 2:1. The majority of patients (76.5%) were uneducated or unemployed (69.1%). The most common indication for major limb amputation was diabetic foot complications in 41.9%, followed by trauma in 38.4% and vascular disease in 8.6% respectively. Lower limbs were involved in 86.4% of cases and upper limbs in 13.6% of cases giving a lower limb to upper limb ratio of 6.4:1 Below knee amputation was the most common procedure (46.3%). There was no bilateral limb amputation. There was a high degree of post-operative complication rate (33.3%) and surgical site infection was the most common (21.0%). The mean length of hospital stay was 22.4 days and mortality rate was 16.7%. Complications of diabetic foot ulcers and trauma resulting from road traffic crashes were the most common indications for major limb amputation in our environment. Revision amputation rate was 29.6%. The most common additional procedures performed were wound debridement, secondary suture and skin grafting in 42.3%, 34.5% and 23.2% respectively. Two-stage operation was required in 45.4% of patients. The majority of these amputations are preventable by provision of health education, early presentation and appropriate management.

Pooja et al reported epidemiology of amputees in Kolkata, India involving 155 amputees who had undergone prosthetic training at a teaching hospital.[10] The commonest cause of amputation was trauma (70.3%), followed by peripheral vascular disease. Nearly 70% cases were below the age of 40 years. Lower limb amputations were more common (94.8%) than upper limb amputations. Liu et al[11] reports that stump problems secondary to traumatic lower limb amputation had crucial influence on amputees' ability to return to living and work, appropriate evaluation and timely surgical revision showed excellent results. In their series, stump problems secondary to traumatic lower limb amputation produced an effect on amputees' ability to return to living and work, appropriate evaluation and timely surgical revision showed excellent results. In leg amputations without

myodesis and myoplasty, the tibial end tend to protrude under the skin, cause heavy scar and weight bearing becomes painful. Surgical revision for osteoplasty, myodesis and scar excision are needed for attaining satisfactory weight-bearing.

Even though certain evaluation criteria of stump problems are proposed from time to time there is no universally accepted and practiced format.[12] Classification, measurement and comparison of the consequences of amputations has been impeded by the limited availability of internationally, multiculturally standardized instruments in the amputee setting. The introduction of the International Classification of Functioning, Disability and Health (ICF) by the World Health Assembly in May 2001 provides a globally accepted framework and classification system to describe, assess and compare function and disability.[13] In order to facilitate the use of the ICF in everyday clinical practice and research, ICF core sets have been developed that focus on specific aspects of function typically associated with a particular disability. Multi-center studies for clinical applicability of such tools in India are limited.

Skin problems at the stump result in a reduction in walking distance without a break and a reduction in prosthesis use. Study shows a high prevalence of 36% skin problems among lower limb amputation stumps.[14] Revision rate of primary amputations stands high despite of maximum care at tertiary care centers. Kumar et al studied 34 amputees to establish cause for the revision, identify preventable cause and to assess outcome of revision amputation surgery. Poor stump formation at the time of initial amputation and infection are the most common cause of failure needing revision surgery.[15] These are the preventable causes and every effort should be made to alleviate these as well as other preventable causes. Care for the patient with amputation (traumatic and non-traumatic) is complex and requires multiple medical, surgical, and rehabilitation specialties. An interdisciplinary team approach to limb amputation rehabilitation remains vital. A good amputee care service include management pain, residual limb care, patient education, treatment of medical co-morbidities and behavioral health (psychological and cognitive aspects) besides formulating a follow up plan for a long term support network and community integration.[16] One limitation of our study is that our observations are on not based on the standard formula for stump classification constructed by the International Society for Prosthetics and Orthotics. Persson and Liedberg in 1983 and Wall in 1988 proposed the fundamental parameters of classification for stumps as follows.[17]

Table 4
Basic parameters of classification for stumps(Persson and Liedberg, 1983, Wall, 1988) [17]

Sl. No.	Parameters	Examples of Description (From ideal to ascending severity of problem)
1	Stump dimensions	Ordinary, short, long
2	Stump shape	Conical, cylindrical, club-shaped
3	The scar on the stump	Well healed, adherent, bone exposed
4	The condition of the skin on the stump	Undamaged, blister, eczema, infected ulcer.
5	The firmness of the stump	Firm, soft, edematous
6	The condition of the end of the stump	Rounded, pointed
7	Mobility of the stump (proximal joint)	Normal, limited extension, limited flexion
8	Pain	None, significant(local), significant (diffuse)
9	Certain features of the contralateral leg	Normal, edematous amputated

All amputations must be rehabilitation oriented and there is a need to follow surgical standards by all surgeons while performing definitive amputation, so that such surgery is likely leave behind an ideal or near ideal stump for future prosthetic fitting. There is a need to adopt an objective evaluation and international classification of amputation stumps for comparison.[18] Wall stressed on application of the basic parameters and a modified version of the standard form to the stumps of a series of Finnish lower limb amputees. The different clinics might use a standardised form of stump description and general acceptance of such a system would also be of interest to epidemiologists and government health officials.[18] Study supports the usefulness of the ISPO standard form and classification of amputation stumps. However, many descriptions are determined in practice by inspection, palpation and questionnaire on pain. In order to make the system of stump classification more comparable it may be necessary to develop more definite scales for some elements in the description.[17] The Dutch guideline 2012,[19] which is an evidence-based multidisciplinary guideline on amputation and prosthetics of the lower extremityis now being increasingly used for lower limb amputees. This guideline provides recommendations in support of daily practice and is based on the results of scientific research and further discussions focused on establishing good medical practice. Part 2 focuses on rehabilitation process and prosthetics.

CONCLUSION

There is dearth of data on amputees from the NER of India. Socio-economically productive male victims (between 19-45 years) dominated the cohort, who was the main earning member of the family. Trauma due to RTA was the leading cause of these amputations. Major amputations limited productivity and social life in the prime of their age which might add to further economic burden on the state. There was a high incidence of major upper limb amputations (28%) that is associated with much disability. Most such post traumatic amputations could have been avoided. This small hospital based study on amputees from the NER indicates the need to create awareness about prevention of RTA, workplace safety, and to implement more stringent road safety measures. Further, developing awareness programs for early rehabilitation as well as accessibility to user friendly, affordable and early prosthetic fitting can prevent the amputee population from becoming permanent burden on the state due to isolation from the community.

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EVALUATION OF ARTHROSCOPY VERSUS MRI IN ANTERIOR CRUCIATE LIGAMENT AND MENISCAL INJURIES

Singh M.* **Pal C.P. **** **Hussain A.*****

ABSTRACT

Aims: The study endeavors to determine the role of MRI in diagnosing ligamentous injuries of the knee in comparison to diagnostic arthroscopy in Indian population.

Methods and Material: This prospective study was carried out in the Department of Radio diagnosis in collaboration with the Department of ORTHOPAEDICS (sports injury center) TERTIARY Hospital.32 patients presenting with instability and pain of the knee joint and clinically suspected of ligamentous injuries included in the study. Two patients lost to follow-up hence, were excluded from the survey. These patients underwent MR imaging. Informed and written consent was taken from the patient before they included in the study. All 30 patients were subsequently followed up by arthroscopy/clinically examinations and correlated with findings on MR imaging.

Results: Sensitivity of MRI in the diagnosis of ACL injuries is high (96.6%) however specificity is low. Sensitivity and specificity were as high as 100% in PCL, MCL, and LCL injuries. FSE sagittal T2 and coronal PD and STIR sequences were found to be more sensitive to the spectrum of cruciate ligament tears and coronal sequences for other ligament injuries. STIR sequences were useful to evaluate associated bone contusions.

Conclusions: MRI has confirmed as the ideal approach for primary diagnosis of traumatic intra-articular knee lesions. It is noninvasive, fast, can be done on the outpatient basis and is free of complications as compared to diagnostic arthroscopy. But Arthroscopy still remains gold standard for ACL tear diagnosis.

Key words: MAGNETIC RESONANCE IMAGINE (MRI), ARTHROSCOPY, ANTERIOR CRUCIATE LIGAMENT (ACL)

INTRODUCTION

The knee is an important weight-bearing joint, capable of performing complex and extensive movements. It is frequently subjected to direct trauma due to its anatomical configuration and because it is the largest joint in the human body.[1] Therefore it is one of the most affected joints by traumatic conditions.

Knee pain is a complaint in 20% of the general adult population and trauma; knee accounts second most common complaint. Sports-related activities account for approximately 60% of knee injuries producing ligament laxity. The incidence of knee injuries has increased in countries where sporting activities such as skiing, soccer, and baseball are in popularity. Pain and related symptoms may derive from damage to one or more of the soft tissues structures that stabilize and cushion the knee joint which include the ligaments, muscles, tendon, and menisci or from trauma to the bones forming the joint.

Most injuries to bones can easily diagnose on the plain x-ray. However, soft tissues injuries of the knee are one of the most common and clinically challenging musculoskeletal disorders in patients presenting to the emergency department. Therefore establishing clear-cut diagnostic and therapeutic objectives for these injuries are important. Accurate and timely diagnosis increases the likelihood of fully restoring, regular and pain-free use of the affected knee. Misdiagnosis or mismanagement of damage to supporting structures of the knee may lead to chronic knee instability with subsequent development of degenerative joint disease and loss of knee function. In general, most injuries to knee arise from high-energy trauma such as motor vehicle accidents and sports. Therefore, patients tend to be young men. Ligamentous and Meniscal Injuries are most likely in young and middle-aged adults whereas children and adolescents are more susceptible to osseous damage.

Magnetic resonance imaging has nowadays

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become the mainstay in the diagnosis of soft tissue injuries in and around the knee joint thus helping in alleviating patient's agony. The most significant advances in knee imaging have made in the realm of Magnetic Resonance Imagine (MR imaging). Since then, because of its improved Signal to Noise Ratio (SNR), higher resolution, reduced artifacts and shorter imaging times and improved accuracy of MRI, it has clearly emerged as the primary imaging tool in the workup of knee joint pathology. It has changed the traditional algorithm for knee joint pathology, particularly when meniscal and cruciate ligament tears in cases of twisting injuries to the knee are suspected, and MRI has made it possible to look into the injured knee non-invasively thereby avoiding invasive procedures and further morbidity. Soft tissue discrimination with MR imaging is excellent and definite differences can make between cortex, marrow, ligaments, tendons, muscle, synovium, vascular and cartilaginous elements.[2] Additional advantages of MR Imaging are multi-planar and thin section capabilities and the ability to evaluate subchondral bone and marrow. Kinematic and dynamic MR techniques provide an improved perspective for assessing the biomechanics of the patellofemoral joint and the standard functions of the ligamentous structures of the knee.

Arthroscopy has a dual advantage of being both diagnostic and therapeutic. But the use of anesthesia and requirement for hospital stay has become an important drawback in diagnostic ability of arthroscopy.

MRI being the new non-invasive screening modality in ligamentous injuries of the knee and hence can reduce the increasing load of diagnostic arthroscopy.

MATERIAL AND METHOD

This prospective study was carried out in the Department of Radiodiagnosis in collaboration with the department of orthopedics (sports injury center) Tertiary Hospital. 32 patients presenting with instability and pain of the knee joint and clinically suspected of ligamentous injuries included in the study. Two patients lost to follow-up hence, were excluded from the survey. These patients underwent MR imaging. Informed and written consent was taken from the patient before they included in the study. Patients age Between 15 to 45 yrs with having a history of pain, swelling and instability trauma and On clinical examination indicating ligamentous injuries, includes in study. Patients Not consenting for imaging study as per protocol, Unable to undergo MRI due to pacemakers aneurysm clip, metallic foreign body in or Near the joint,having a contraindication to arthroscopy with previous history of knee surgery and having severe osteoarthritis, with a known history of joint disease e.g. rheumatoid arthritis etc. exclude from study.

RESULT

A set of 30 patients (23 male and 07 female) presenting with instability and pain of the knee joint and clinically suspected of ligamentous injuries included in the study. These patients underwent a physical examination, plain x-ray MR imaging and subsequent arthroscopy/clinical follow-up. Findings tabulated as follows -

Maximum patients belonged to age group between 15-25 years accounting of 14 patients (46.6%). 26-35 years constituted the next major group. Youngest patient was 15 years old, and oldest was 42 yrs. (Table 1). Twisting injury was the predominant mode of injury accounting for more than half of patients (53.3%). The anterior blow was the following common way of damage (Table 2). ACL tear was most common injury among all cases; they comprised of 26 cases (86.6%) out of total 30 cases. Second most common site of involvement was MCL, tears of which constituted 4 (13.3%) out of 30 cases. PCL and LCL constituted of 2 (6.6%) and 1 (3.3%) cases respectively (Table 3). Maximum sensitivity if MRI noted in diagnosing ACL injuries of about 96% however, specificity was only 25%. In cases of PCL, MCL and LCL injuries sensitivity and specificity as documented as 100% (Table 4). Joint effusion was most common associated finding in the case of post-traumatic knee seen in 86.6%. The second most common finding was marrow edema in surrounding bones noted in 56.6% cases (Table 5).

Table 1
Distribution according to age

Age (Years)	No. of Patients	Precentage
15-25	14	46.6%
26-35	12	40%
36-45	4	13.3%
TOTAL	**30**	**100%**

Table 2
According to mechanism of injury

Mechanism of Injury	No. of Patients
TWISTING INJURY	16
ANTERIOR BLOW	8
FALL	3
VALGUS	2
VARUS	1
TOTAL	**30**

Table 3
SPECTRUM OF LIGAMENT INJURY IN POSTTRUAMATIC KNEE MRI

LESIONS OBSERVED ON MRI	NUMBER
ACL	26
PCL	2
MCL	4
LCL	1

Table 4
MRI SENSTIVITY AND SPECIFICITY IN EVALUATION OF LIGAMENT INJURIES OF KNEE JOINT

MRI DIAG-NOSIS	TRUE +VE	TRUE -VE	FALSE +VE	FALSE FALSE-V	ESENSI TIVITY	SPECIFI CITY
ACL Tears	23	3	3	1	96%	25%
PCL Tears	2	28	0	0	100%	100%
MCL Tears	4	26	0	0	100%	100%
LCL Tears	1	29	0	0	100%	100%

Table 5
ASSOCIATED FINDINGS

FINDINGS	NO. OF PATIENTS
MEDIAL MENISCUS TEAR	5
LATERAL MENISCUS TEAR	4
JOINT EFFUSION	24
EDEMA	17
GEODE	2

While maximum arthroscopy number of patients had ACL injury of frequency 63.3% and LCL injury was least commonly seen in about 5% of cases on arthroscopic evaluation (Table 6).

Table 6
FINDINGS ON ARTHROSCOPY

TYPES OF INJURIES	PATIENTS
ACL	13
PCL	2
MCL	4
LCL	1

DISCUSSION

In the age range of 15 to 45 with a mean age of 30 years. Maximum number patients 56.6% were of the age group of 15-25 years. It included 23 men and seven female patients who comprised of 76.6% and 23.3% respectively. It indicated people are seen to be more commonly affected rather female because of their increased incidence of physical activity in them. Our findings are seen to have discordance when compared to study conducted by Gwinn DE et al[3] in 2007 which examined the relative incidence of anterior cruciate ligament injury in men and women at the United States Naval Academy ,who found that women athletes had 3.96 times more chances of injuries as compared to their male counterparts. The study was conducted in active population and compared only the incidence of ACL injuries which is the reason of discordance between the findings. Our study includes all types of patients irrespective of the profession and has studied all kinds of ligament injuries. Anterior cruciate ligament tear noted in 26 patients. 19 cases showed mid-substance tears; five patients had tears at the femoral attachment and two at the tibial attachment. Bergquist et al. in 1991 in their study reported mid-substance tears as the commonest type (90%).[4] In 1985 David A Turner et al. also in their published findings indicating mid-substance being the most common site of injury in 4 out of 6 cases.[5] Abnormality of ACL contours on sagittal images is the most important initial sign indicative if its injury which noted in 26 cases. These findings are seen to be in concordance with G A Tung et al. in 1993 as quoted this conclusion to have the highest sensitivity and specificity with values of 96% (48 out of 50 examinations) and 94% (50 out of 53%) on sagittal images.[6] In secondary signs, bone contusion was the most common finding found in our study in 5 cases (19.2%) followed by PCL abnormalities which were seen to collaborate with TR McCauley in 1994 who found bone contusion in 61 out 68 patients.[7] However, E.A. Brandser et al. in 1996 found no difference in diagnostic performance when only initial signs used and when both primary and secondary signs used by comparing the area under receiving operating curve values being 0.80 for secondary and 0.93 for the primary. They found out that the secondary signs like the bone contusion, anterior translation of the tibia, and an uncovered posterior horn of the lateral meniscus to be the most useful for diagnosis.[8] There was three false positive cases cause of which could be due to physiological ligament laxity. T2 weighted images showed the signal intensity changes seen in these tears as excellent contrast provided by a low signal strength of ligaments. Mink et al. in 1988[9] In tears of anterior cruciate ligament the sensitivity and specificity were found to be 96% and 25% respectively which is found partly corresponding to Fischer et al. in 1991 study as the precise nature of is low in our study.[10] Study by Rezaei Y et al. in 2007 also showed a low sensitivity and specificity 73% and 77% respectively. The diagnostic accuracy of MRI vs. clinical/arthroscopy was studied by and found results to be just above 90% in both the evaluations.[11] The difference in the results could be due

to small sample size. J.K. Lee et al. in 1988 found the sensitivity and specificity of MR imaging was 94% (17 of 18) and 100% on comparison with arthroscopy and clinical test. Two cases of PCL tears were detected accurately both by MRI and arthroscopy.[12] The use of MRI to identify PCL tears has proven to be extremely accurate, and this might expect because the PCL is usually very easily visualized as homogenous, continuous low signal structure. In our study sensitivity and specificity was 100%. Gross ML et al. in 1992 have reported sensitivity and specificity to be 99-100% in investigating the efficacy of MRI in the diagnosis of PCL injuries which is similar to our studies.[13] In cases of PCL injuries, mid-substance signal intensity change as a most common location found in 100% cases which are by and large in comparison to A.H. Sonin et al. in 1995 who also found mid-substance as the most common site of injury in 63% of patients. The medial collateral ligament found to torn in 4 which confirmed on follow-up.[14] MRI had sensitivity and specificity as 100 %.M E Schweitzer et al. found grade II MCL injury in 80 and grade III in 64 patients out 152 patients. However, we found an equal number of patients having grade I and II injuries.[15] Such discrepancy in findings could again be because of a small sample. The presence of fluid in suprapatellar bursa is the most important associated finding in ligament injuries of knee joint seen in 86.6% of patients which seem to be comparable to study conducted by Ruth Crawford et al. in 2007.[16]

The sensitivity of MRI in the diagnosis of ACL injuries is high (96.6%) however, specificity is low. Sensitivity and specificity were as high as 100% in PCL, MCL, and LCL injuries. FSE sagittal T2 and coronal PD and STIR sequences were found to be more sensitive to the spectrum of cruciate ligament tears and coronal sequences for other ligament injuries. STIR sequences were useful to evaluate associated bone contusions. Arthroscopy is considered as "the gold standard" for the diagnosis of traumatic intraarticular knee lesion having an accuracy as high 95-98%, however it is an invasive and expensive tool that requires hospitalization and regional or general anesthesia.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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QUADRICEPS V-Y PLASTY IN 28 YEAR OLD MALE WITH CONGENITAL BILATERAL QUADRICEPS CONTRACTURE : CASE REPORT

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INTRODUCTION

Congenital quadriceps contracture is rare disorder. Contractures can develop in almost any muscle group. Contractures in infants often follow intramuscular antibiotic injections. The etiology of quadriceps contracture is divided between congenital and acquired types and in some cases a mixture of both types. The most common symptom is progressive, painless limitation of knee flexion. Hyperextension and subluxation of the knee may occur with continued growth. Early recognition and prevention of quadriceps contracture through passive exercise in children receiving intramuscular injections is crucial. When the scar contracture is well established, however, surgical treatment is indicated to prevent late changes in the femoral condyle and the patella.

MATERIAL AND METHOD

28 year old male presented with difficulty in flexion of both knee and inability to sit cross leg and squat since birth. Patient walk with knee in extended position. He has no history of intramuscular injection. The deformity is appears to be congenital quadriceps contracture. We have treated surgically in form of quadriceps V-Y lengthening of quadriceps contracture and patella excision.

RESULT

We have gained 90 degree flexion at knee and patient is able walk with knee flexion. Patient is able to sit cross leg

CONCLUSION

Late presented quadriceps contracture can be treated by V-Y quadriceps lengthening and patella excision. This treatment has to be supplemented by aggressive physiotherapy to maintain flexion and prevent recontracture. Selection of patient for V-Y quadriceps plasty is crucial one as this treatment required best patient compliance. After care in quadricepsplasty is very much important, persistent, and prolonged. Success of late presenting congenital quadriceps contracture depends on determined patient, determined doctor and first class rehabilitation unit.

Quadriceps contracture in infancy and childhood were appears to be first congenital or secondary to progressive idiopathic fibrosis of vastus intermedius.[1] Here we are presenting a case male 28 year who had completely ignored the quadriceps contracture since childhood. He and his parents did not give significant history of intramuscular injections in to thigh. Patient managed to walk with stiff knee (extended knee), unable sit. Patient came to us to have flexion at knee.

Patient had jog flexion movements at both knees with sudden stop of flexion. With duration patient developed atrophied thigh and muscles appear like cord on palpation. There was loss of anterior crease on knee. X arrays of both knees were normal but patella lying high. There was no articular irregularity.

We had done quadriceps lengthening and patellectomy. Quadriceps muscle appeared to be atrophied and they were looking like cords. We had operated both sides at one time under tourniquet.

Post operatively patient was kept admitted nearly for month. Suture removal was done on 14 th post operative day. Sutures were healthy and no evidence of infection. Later aggressive physiotherapy started. Every alternate 2 day straight extension slab and flexion 50 degree posterior slab were applied. Then extremity was placed in continuous passive motion machine. Patient was keep admitted till flexion up to 80 degrees. Early few months of follow up patient developed extensor lag of 10 degree on both side which was improved with continued quadriceps strengthening exercise

DISCUSSION

The most common symptom of congenital

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Fig. (a) (b) : Left and right thigh: surgical incision ; thigh wasted .; quadriceps Muscle look like cords ;patella Alta

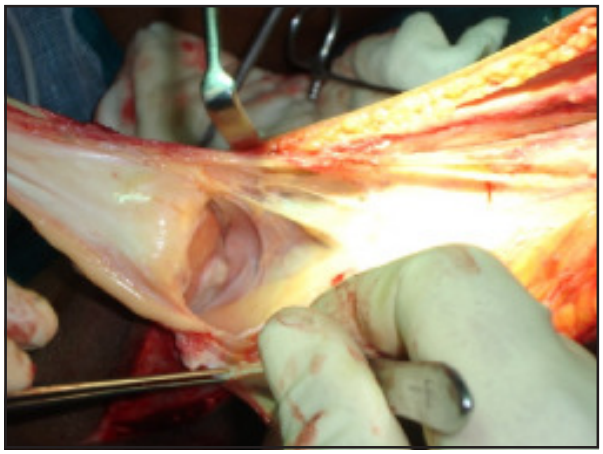



Fig. (c) : Photo shows atrophied quadriceps fig (D)Photo shows patella alta

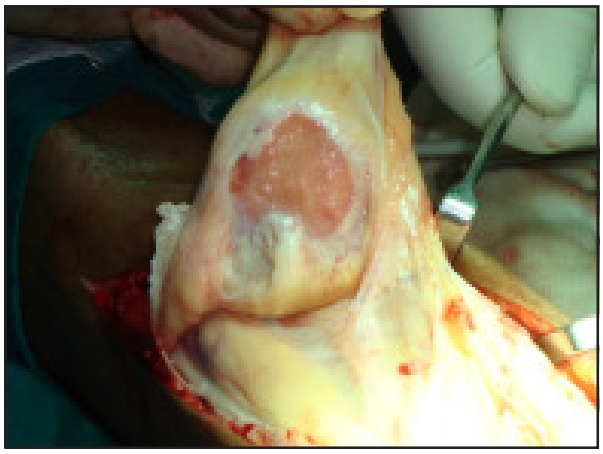
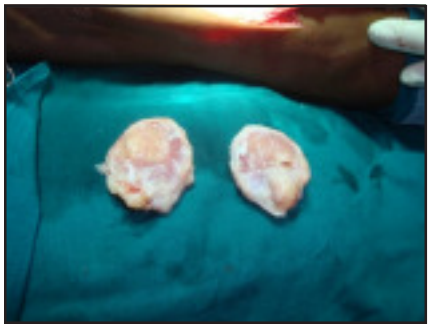



Fig. (f) : Patella lying high and articular surface deformed fig (g) quads lengthening an patella excision



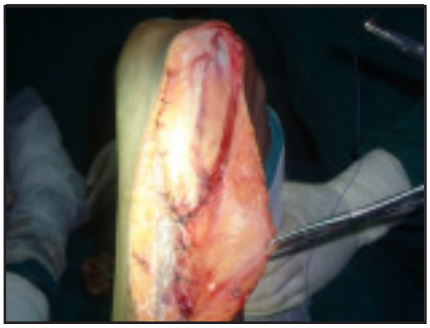


Fig. (h) : Both patella removed. Fig (i) V-Y quadriceps lengthening and knee flexion Fig. (j) : Incision closed with suctions drain in situ

Fig. (k) : Patient could able to do assisted flexion about 20 degrees on 15th post op day.

Fig. (L) : 2 month follow up: active flexion up to 40 degrees

Fig. (M) : 6 month follow up : patient is able to sit cross leg and squat

quadriceps contracture is progressive, painless limitation of knee flexion. Hyperextension and subluxation of the knee may occur with continued growth.[2] Normal skin creases over the knee may be absent, and a characteristic dimple may be present over the area of fibrosis, especially when the knee is flexed. Habitual dislocation of the patella is common. Jackson and Hutton reported patella alta, fragmentation of the inferior pole of the patella, and hypo plastic patellae.[1]

Radiographic changes are not apparent early, but if left untreated, the muscle contracture can cause changes in the soft tissues and in the articular cartilage of the femur and tibia. Progressive displacement and hypoplasia of the patella can occur with long-standing quadriceps contracture. In older children with early onset of symptoms but delayed treatment, flattening of the femoral condyles, genu recurvatum, anterior dislocation of the tibia, and gross degenerative changes in the joint can be seen. Vastus intermedius is very much prone for damage in traumatic knee stiffness following fracture of femur. This muscle becomes fibrotic and inextensible and through its deep attachment to rectus femoris it anchor patella like check rein. This tethering action is clearly seen in idiopathic contracture of vastus intermedius in children.[3]

Early recognition of quadriceps contracture is crucial in infantile period.[1] Prevention of contracture in infants receiving multiple intramuscular injections has to be done by passive flexion and extension movement at knee. Surgical treatment is indicated early in patients with habitual dislocation of the patella. Nicoll[3] suggested that the following may be involved in quadriceps contracture: (1) fibrosis of the vastus intermedius muscle tying down the rectus femoris to the femur in the suprapatellar pouch and proximally, (2) adhesions between the patella and the femoral condyles, (3) fibrosis and shortening of the lateral expansions of the vasti and their adherence to the femoral condyles, and (4) actual shortening of the rectus femoris muscle. Thompson devised an operation known as quadricepsplasty.[4] Thompson suggested success of quadricepsplasty depend upon condition of rectus femoris and how well this muscle can be developed in active use. Sengupta recommended proximal release in early stage of contracture so as to avoid extensor lag and haemartheosis.[4]

The extremity is immobilized in a splint in about 50 degrees less than the maximal flexion obtained during surgery; this is maintained for 2 to 3 days. The extremity is then placed in a continuous passive motion machine, range of motion is begun, and the patient remains hospitalized until 90 degrees of passive flexion is achieved. Passive and active exercises for the quadriceps and hamstrings continue and are crucial to the success of this procedure. The patient should expect slow return of active quadriceps extension2.

CONCLUSION

Quadricepsplasty in long standing quadriceps contracture is rewarding operation3. Patient presenting in middle age with quadriceps contracture may have secondary changes in patella, femoral condyles and muscle can become too much atrophic. So cause and pathological anatomy must be analysed before quadriceps plasty. Selection of patient for V-Y quadriceps plasty is crucial one as this treatment required best patient compliance. After care in quadricepsplasty is very much important, persistent, and prolonged. Success of late presenting congenital quadriceps contracture depends on determined patient, determined doctor and first class rehabilitation unit.

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A PROSPECTIVE STUDY COMPARING INTRALESIONAL CORTICOSTEROID VERSUS PLATELET RICH PLASMA INJECTION IN TREATMENT OF RESISTANT LATERAL EPICONDYLITIS ON BASIS OF ULTRASONOGRAPHIC AND CLINICAL PARAMETERS

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ABSTRACT

Introduction: Lateral epicondylitis (LE) is a prevalent musculoskeletal disorder of the common extensor tendon, pathophysiology of which is not well understood. Recently biological agents (PRP) have showed favorable long-term outcome and this study evaluates long term benefits of PRP and superiority over existing standard treatment modalities.

Background: Studies have demonstrated improved pain and disability scores following intralesional PRP injection in subjects.

Method: 36 patients with resistant LE were enrolled in the study and were investigated for routine blood tests and pre-treatment x ray and USG Changes in affected elbow. Pre-treatment VAS score and Oxford Elbow Score were assessed for all patients. Patients were randomised in two equal size groups. Group A patient received 1 ml of local autologous PRP injection whereas; group B patients were injected with 1 ml (40 mg/ml) local methylprednisolone. USG of affected elbow was repeated, and VAS and Oxford elbow score were reassessed in follow up at 3 and 6 months interval.

Results: At baseline, the PRP and corticosteroid groups were comparable in terms of age, sex, duration of symptoms, VAS for pain and oxford elbow score. Both the groups demonstrated significant improvement in both VAS and oxford scores at the end of 6 months, but the mean improvement in oxford score was better in PRP group than corticosteroid group (68 % vs. 58%). Similarly tendon oedema and probe induced tenderness significantly improved in PRP group as compared to corticosteroid group. There were no complications related to the use of intralesional PRP or corticosteroids.

INTRODUCTION

Lateral epicondylitis (LE) is a prevalent musculoskeletal disorder of the common extensor tendon characterized by degeneration of the tendon, and pain at the lateral aspect of the elbow is frequently reported.[1,2] In addition, biomechanical and sensorimotor deficits can occur and adversely impact upper extremity function.[3,4] These functional deficits may interfere with occupational tasks and activities of daily living resulting in significant individual and occupational costs.[5,6] Because the pathophysiology of LE is not well understood, treatment remains challenging and LE is prone to recurrence.[7,8]

Tendon changes due to LE include dense populations of fibroblasts, vascular hyperplasia, and disorganized collagen.[9,10,11] The common extensor tendon origin in individuals with LE is usually thickened and shows increased signal intensity on magnetic resonance images (MRI). The region of greatest signal abnormality is usually at the origin of the extensor carpi radialis brevis tendon from the lateral epicondyle of the humerus. The areas of increased signal intensity within the diseased tendon usually correspond to areas of mucoid degeneration and neovascularization on histopathologic analysis.[11,12,13] Ultrasound also has been used to study LE, and findings include the presence of intratendinous calcification, tendon thickening, adjacent bone irregularity, focal hypoechoic regions, and diffuse heterogeneity of the common extensor tendon.[14,15,16]

Pain is the primary symptom of LE.[1] The pain experience in patients with LE may be due to changes in the nervous system as a result of neuronal tissue changes as well as nociceptive and non-nociceptive processes.[8,17] In patients with LE, pain can be assessed using pressure-pain threshold and self-reported measures such as the visual analog scale and the Patient-rated Tennis Elbow Evaluation (PRTEE).[18,19,20,21]

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The disability caused by disease process can be assessed by various tools like the Oxford Elbow score or Disabilities of the Arm, Shoulder and Hand Scale (DASH).

Platelet activation plays a key role in the process of wound and soft tissue healing. The use of Platelet rich plasma (PRP), a portion of the patient's own blood having a platelet concentration above baseline, to promote healing of injured tendons, ligaments, muscles, and joints, can be applied to various musculoskeletal problems.

PRP injections are prepared from one to a few tubes of the patient's own blood with strict aseptic technique. After being centrifuged, the activated platelets are injected into the abnormal tissue, releasing alpha granules and growth factors (VEGF and TGF-b) that recruit and increase the proliferation of reparative cells. The side effects of PRP injections are very limited as the patient is utilizing their own blood, which they should have no reaction to. On the other hand, intralesional steroids are comparatively faster acting but resulted in limited improvement over extended periods of time. More so ever, long term steroids injections are associated with various adverse effects.

This randomised controlled trial evaluated the changes in the clinical and ultrasonographic parameters after injecting PRP or CS in tennis elbow patients.

MATERIAL AND METHODS

The study was carried out at Department of Orthopaedics and Traumatology, M.G.M. Medical College and M.Y. Hospital, Indore for a period of 2 years (September 2015 till September 2017). It was a Randomized controlled trial study with 36 patients (18 in each treatment group).

Patients aged between 18-60 years were included in the study that were suffering from resistant Lateral epicondylitis not responding after three months of conservative treatment with analgesics and anti-inflammatory drugs (NSAIDs) and physiotherapy. Patient Aged <18 or >60, were excluded and so were patients with symptoms of carpal tunnel syndrome or cervical radiculopathy, patient with systemic disorders (diabetes, rheumatoid arthritis, or hepatitis), patients in whom systemic corticosteroid are contraindicated, patients who had undergone surgery or local CS injection in the past 6 months or patient with local skin disease at elbow.

Patients presenting with clinical signs and symptoms of tennis elbow were evaluated and those fulfilling the criteria were included in the study. All the routine blood investigations were done, with clinical assessment of range of motion, and radiographs of the involved elbow were taken. Ultrasonography of the involved elbow was done to evaluate tear at the common extensor origin, oedema, cortical erosion, thickness and fraying of the common extensor tendon and probe induced thickness. Pre injection pain was assessed on VAS and oxford score was calculated for functional disability.

Patients were randomised into group A (corticosteroid group) and group B (PRP group) depending on even or odd number, with odd number grouped in corticosteroid group A and even number into PRP group B. In group A, 1 ml of methylprednisolone (40 mg /ml) was injected at the most tender point over lateral epicondyle under strict aseptic precautions by peppering technique. In group B, 20 ml of blood was collected in an acid citrate dextrose vacutainer and centrifuged at 1500 rpm for 15 minutes to separate the blood into layers of red blood cells, buffy-coat of leucocytes, and plasma. Under all aseptic precautions, 1 ml of PRP was injected at the most tender point over the lateral epicondyle of the humerus by the peppering technique.

After injection, patients were advice rest for 30 minutes and were advised against massage or hot fomentation. Ice packs or oral paracetamol were advised for discomfort.

Post injection patients' outcomes were assessed using the visual analogue scale (VAS) for pain and Oxford Elbow Score at 2 weeks, 6 weeks, 3 months, and 6 months. Ultrasonography of the involved elbow was performed before and after treatment at 3 and 6 months by an experienced musculoskeletal Ultrasonologist to evaluate for tear at the common extensor origin, oedema at the common extensor origin, cortical erosion, probe-induced tenderness, and thickness of the tendon.

RESULTS

The VAS score and oxford elbow score, both improved after treatment in PRP and CS groups after 6 months, but the change was greater in PRP group as compared to Corticosteroid group.

Similarly, at the end of six months, number of patients with positive findings in USG decreased in both the groups; however PRP group demonstrated better results as compared to Corticosteroid group. None of the patient showed improvement in cortical erosion at the end of 6 month follow up.

Table 1
VAS score and Oxford Elbow score values

Assessment	VAS Score		Oxford Elbow Score	
	Pre injection	Post injection	Pre injection	Post injection
PRP Group	5.8	1.8 (p<0.001)	16	40 (p<0.001)
Corticosteroid Group	6.5	3 (p<0.001)	26	32 (p<0.01)

Table 2
No. of patients with positive USG findings

Assessment	Tear of the common extensor tendon		Edema of the common extensortendon		Reduced thicknessof the common extensor tendon		Probe-induced tenderness		Cortical erosionat the lateral epicondyle	
	Pre injection	Post injection	Pre injection	Post injection	Pre injection	Post injection	Pre injection	Post injection	Pre injection	Post injection
PRP Group	0	0	14	2	-	0	15	4	4	4
Corticosteroid Group	0	0	13	5	-	0	16	7	2	2

DISCUSSION

Corticosteroid injection used to be the treatment of choice for lateral epicondylitis. Corticosteroids exert an anti-inflammatory effect by inhibiting Phospholipase A2. PRP on the other hand, inhibiting inflammation at first, appears to enable biological healing of the lesion at later stages by local release of cytokines and growth factors. After six months of treatment, intralesional PRP has showed better prospective than corticosteroid. The functional improvement as measured by VAS score and Oxford elbow score, was better in PRP group. Post injection, PRP resulted in increased tendon vascularity and improved tendon morphology as indicated by USG studies. As such, PRP appears to more beneficial for chronic and recalcitrant tennis elbow cases.

CONCLUSION

Intralesional PRP could replace the corticosteroids, as the primary treatment for chronic tennis elbow cases as indicated by studies. The primitive data indicates the need for further long term follow up of the cases for further strengthening of results. Role of PRP in other chronic tendon disorders as plantar facitis and medial epicondylitis needs to be evaluated.

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RESULTS OF BOTH BONE FOREARM FRACTURE TREATED WITH PLATING VS CLOSE MULTIPLE SQUARE NAILING

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ABSTRACT

Introduction: The aim of this study was to evaluate results of both bone forearm fracture treated with plating vs close multiple square nailing by jamming technique. The study compared the radiographic and functional outcomes of intramedullary nailing and plating

Method: This study includes 32 patients of which 16 were for nailing and 16 for plating. This study was conducted from April 2014 to April 2016 which was a comparative prospective study done distributing people equally and alternatively for plating and nailing.VAS score was recorded at 2nd and 6th week. DASH (disability arm shoulder and hand) score was calculated at the end of 16th week and Anderson score was recorded at last follow up.

Results: The average age of patients participating in the study group 1 was 37.5 and 38 in group 2. VAS score at 2 weeks was average of about 2.09 in group 1 and 2.24 in group 2, DASH score was an average of about 12.56 in group 1 and 13.94 in group 2. Anderson score was excellent and comparable in both groups

Conclusion: With jamming technique in nailing, additional rotatory stability provided which is very important during supination and pronation of both bone forearm fractures and giving comparable results to plating and strong fixation.

Key words: Multiple nailing, Both bone forearm, Nailing, Plating, Jamming technique

INTRODUCTION

Forearm fractures can be regarded as especially important in their functioning capability as slight deviation in the spatial orientation of the radius and ulna will significantly decrease the forearm rotational amplitude and thereby impair the positioning and function of hand. Thus, the management of these fractures and their associated injuries deserve special attention as their treatment is not the same as the treatment of other diaphyseal fractures.[1]

Fractures of the forearm bones are not uncommon. The general consensus in the treatment of fractures of both bones of the forearm in adults is for operative treatment; and there are various modes of internal fixations available, the choice of which rests with the treating surgeon.[2]

Conservative treatment of forearm fractures is brought with complications of, casting, compartment syndrome, and malunion.[2] Plate osteosynthesis is the most commonly used technique for the treatment of diaphyseal forearm fractures in adults. However, application of a plate can disrupt the periosteal blood supply and necessitates skin incisions that may be unsightly which is not biological; there is also is a risk of refracture if the implant is removed.[3]

The use of intramedullary devices to stabilize fractures is not new. Ivory pins, the Küntscher nail, the Rush nail, and Ender nails have all been in use.[4] Nailing of the forearm, beginning with Schöne, predates nailing of the femur and tibia. Its slower technical development appears to be due to anatomic problems of the radius, the interdependence of the two bones, and the strong torque loads from pronators and supinators.[5] In 1959, Dr. Sage used prebent triangular nails for the fixation of radius fractures with good results.[6] In 1959, Dr. Talwarkar designed and performed fixation of both bones of forearm fractures with flexible square nails.[7]

Intramedullary nailing comes with its own sets of advantages and disadvantages. The chances of infection are significantly decreased, as it is a closed procedure and uses the least amount of periosteal stripping which is biological. It also has lower refracture rates after implant removal. Though single nail has its disadvantage over rotational stability

Multiple square nail gives additional advantage of rotational stability by jamming technique over single nail

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as shown in this study and provides minimal invasive technique

The functional outcome was certified using "Anderson et al, scoring system". The variables taken into consideration were; a. Union of the fracture, b. range of elbow and wrist movements, and c. extent of functional capacity reached.[8]

MATERIALS AND METHOD

This prospective study was carried out in CHANDULAL CHANDRAKAR MEMORIAL HOSPITAL, Bhilai on people from Bhilai, durg and nearby small villages after getting permission from ethnic committee and all study participants. Patients were selected from coming in to emergency department and outpatient department after informed consent. This study includes 32 patients of which 16 were for nailing and 16 for plating. This study was conducted from April 2014 to April 2016.The cost for both surgeries were same during this study period.

This was comparative prospective study done distributing people equally and alternatively for plating and nailing.

Group1-plating and group 2-nailing

INCLUSION CRITERIA

All diaphyseal middle third both bone forearm fractures in adults

Age-above 18

Fracture less than 4 weeks

EXCLUSION CRITERIA

Rest other fractures excluded.

OPERATING TECHNIQUE

Nailing: Square nails are used for intramedullary nailing. Nail size is determined prior to surgery. The required length is determined by measuring the uninvolved limb directly. Ulna is measured with a tape measure from the tip of olecranon to ulnar styloid. One (1) cm was subtracted from this measurement. Radius length is determined by subtracting 2.5 cms from the ulnar measurement. Preoperatively diameter of canal is assessed on AP and lateral view of the x-ray of the fractured forearm. Image intensifier was positioned over the affected limb. For ulnar nailing less than 1 cm longitudinal incision is made over the tip of olecranon, triceps insertion is incised. Entry portal is made with the straight awl at a point 5 to 8 mm from the dorsal cortex and 5 mm from the lateral cortex over the olecranon. Nail is pushed with T-handle of smaller size than canal and hammering is not done; another nail of appropriate size inserted 2-3mm dorsal to previous nail. (Figure1a,1b) Fracture site was seen under image intensifier and counter was given by assistant during insertion to avoid the distraction at the fracture site leaving the nail 5 mm outside. Skin sutures were applied. For radius nailing 1 to 1.5 cm incision was given extending distally from the dorsal margin of joint surface at a point of Lister's tubercle. The dissection was carried out between the extensor carpi radialis longus and extensor pollicis longus tendon (Figure 1c). The entry portal was made with the straight awl directly in line with the medullary canal. At the dorsal margin of joint a straight awl is introduced at an angle of 45° to joint surface. After entering the bone 1 to 1.5 cm, the angle of the awl was dropped to the axis of bone and continued another 1 cm in line with the medullary canal of bone. Rest of the technique was same as used for the ulnar nailing except that the nail was bent regularly to approximate the bow of the radius prior to the insertion. Another nail of smaller size was introduced through radial styloid (Figure 1d), straight awl at 30° introduced to joint surface laterally after entering 1 to 1.5 cm nail was inserted in similar manner as previous nail. Acceptable reduction was seen under image intensifier.

PLATING

Following AO principle open reduction and fixation was done. Less comminuted fracture was fixed first.

Post-operative: In both methods above elbow slab is applied till suture removal. In plating group slab is discarded after suture removal and the active movement of the elbow and the wrist started with allowable pronation and supination.

In the nailing group above elbow cast is applied after suture removal for 6 to 8 weeks and cast is removed when early signs of union were noticed, and active movement of elbow, forearm (pronation and supination) and wrist started. If no signs of union seen cast was continued for 4 more week s followed to physiotherapy. Heavy and the strenuous activities were avoided till solid union occurred in all cases. Patients were regularly followed up at 2, 4, 8, 12, 16, 24 weeks and finally at 1 year. At every follow up clinical and the radiological examination was done and the movements of the elbow joint, radio ulnar joint and the wrist joint are recorded.

VAS score was recorded at 2nd and 6th week. DASH (disability arm shoulder and hand) score was calculated at the end of 16th week and Anderson score was recorded at last follow up.

Clinically union is considered when there is no tenderness at the fracture site on stressing and given physiotherapy irrespective of radiological union. Radiological union of fracture is judged to be present when on x-ray there is obliteration of fracture line with the evidence of bridging trabeculae. (Figure 2) Those fractures which required more than 6 months to unite and had no additional operative procedure performed are classified as delayed union. Those fractures which failed to unite without another operative procedure were classified as non-unions.

IMPLANTS USED

Dynamic compression plates

Dynamic compression plates of 3.5 mm screws made of stainless steel were used. (Figure 3)

Intramedullary nail

Talwarkar square nail have an advantages of a square nail in a circular medullary canal, the edge cut into the canal and impart rotational stability. The radius nail has a beveled tip and the ulna nail has a pointed tip. The opposite end has a screwed part to facilitate removal (Figure 4)

Talwarkar square nails have an advantage of square nail in a circular medullary canal; the edges cut the canal and impart rotational stability. The radius nail has beveled tip and ulna has pointed tip. Additional nail was used in a concept of providing rotational stability by jamming technique above and below isthmus. This technique prevents breakage of microvasculature at fracture site which are actually the process of callus formation. (Figure 5a, b)

OBSERVATION AND RESULTS

The age in group 1 patients varied from youngest patient 23 year to oldest 52 year with mean age of 37.5. The range of group 2 was 23 year youngest to 55 year oldest with mean of 38.there was higher incidence of male patient and bilaterally comparable in both group of patients and is 93.75% and female patient of 6.25%.in both group most common mechanism of injury is RTA in group 1 (93.75%) and 6.25% in group 2 pateints, rest had fallen at home or work place and sustained injury to outstretched hand. Most common site in forearm is midshaft region in both groups that is group 1 was 9 (56.25%) and in group 2 was 10 (6.25%). All patients were immobilized in above elbow slab for 2 weeks to 3weeks in both groups followed to above elbow cast in group 2 that is about 8 weeks. Radiological callus was seen at an average of about 5.6weeks in both groups with maximum 7 weeks and minimum of 4 weeks in both groups (Figure 6, 7)

Patient group	Range of motion after 2months	Range of motion after 5 months
Nail	Limited in 15 patient (93.75%) Moderate in 1 patient (6.25%)	Near completion in 15 patients (93.75%) Limited in 1 patient (6.25%)
plate	Moderate in 15 patients (93.75%) Near completion in 1 patient (6.25%)	Near completion in 15 patients (93.75%) and moderate in 1 patient (6.25%)

VAS score at 2 weeks was average of about 2.09 in group 1 and 2.24 in group 2, DASH score was an average of about 12.56 in group 1 and 13.94 in group 2.

Anderson score was excellent and comparable in both groups

DISCUSSION

The forearm contributes an important role in upper extremity function, facilitating positioning the hand in space, thus helping to provide the upper extremity with its unique mobility. Multiple joints of paired bone add complexity to the anatomy of forearm. Injury to forearm can seriously affect function of upper limb and activities of daily living to achieve a satisfactory functional result, a diaphyseal fracture of the radius or ulna needs a nearly anatomical reduction, as well as correction of displacements and restoration of normal length, axial alignment, and rotational alignment. Malunion and nonunion occurs more frequently because of the rotational alignment, difficulty in reducing and maintaining the reduction of parallel bones in presence of pronating and supinating muscles, that have angulatory as well as rotatory influences.

Being a rural place with developing infrastructure such injuries are a common problem. The need for this study is a low cost, biological fixation providing better rotational stability, rigid fixation less chance of nonunion, cosmetically good lead to this comparative study. The variables of this study were compared in the two groups and with some other related studies of the past.

POST-OPERATIVE IMMOBILIZATION

Dodge and cady (1972)[9] had average period of post-operative immobilization for 22 days in patients treated by plating. Anderson et al (1975)[10] had average period of post-operative immobilization for 4 to 8 weeks after plating, Rai et al (1981)[11] had average period of post-operative immobilization for 3 to 4 weeks. Smith hugh et al (1957)[12] had average period of immobilization for 10 weeks in patients treated by nailing. Talwarkar

(1967) discarded the use of external immobilization in immediate post-operative period in his series of 72 cases he performed. His results were good in all the cases.

In present series in group 1 immobilization was provided in the form of above elbow slab till suture were removed (maximum 3 weeks). After suture removal active physiotherapy was started. We have given the above elbow slab initially to minimize the pain and swelling in early postoperative period. In group I, 1 patient was given immobilization for 5 weeks, because internal fixation was not considered adequate by surgeon and no signs early callus seen after 4 weeks and patient complaint of considerable pain in this case.In group II patient were immobilization in above elbow slab till suture removal, after that above elbow cast was applied for 6 to 8 weeks in all cases to further enhance the rotational stability. Cast was discarded when callus was observed at fracture site or after 8 weeks which was earlier in follow up period.

Post-operative immobilization time (in weeks)	Nailing	Plating
Dodge and cady		3 weeks
Anderson		4 to 6 weeks
Smith	10 weeks	
Our series	8 weeks	3 weeks

COMPLICATIONS

Dodge andcady (1972) noted superficial wound infection in 25%,deep wound infection in 2.9%, delayed union in 1.6%, nonunion in 3.8%, refracture in 3.4% metal reaction in 0%, neuropraxia in 2%, synostosis in 1.2% of cases. Anderson et al (1975) noted superficial wound infection in 5.4%, deep wound infection in 5.4%, delayed union in 5.4%, non-union in2.9%, refracture in 0%, metal reaction in 2.7%, neuropraxia in 0%, synostosis in 0% of cases, Rai et al (1981) noted superficial wound infection in 5.4%, deep wound infection in 5.4%, delayed union in 5.4%, delayed union in 5.4%, non-union in 0%. Talwarkar (1967) in a series of 72 patients treated by nailing showed transient posterior interosseous nerve palsy in 2 cases, bursa over olecranon in 4 cases, discharging sinus in 2 cases, no union or delayed union.

Complications (in patients)	Nailing	Plating
Ulnar bursitis	3	
Radioulnar synostosis	1	
Hypertrophic scar		1
Nonunion		1

RESULTS

Anderson D. Lewis et al (1975) reported excellentfunctional result in 50.9%, satisfactory in 34.9%, unsatisfactory in 11.2% and failure in 2.8% in a series of 106 patients of both bone fracture treated by plating, according to the Anderson et al rating scale. Rai et al (1981) in his series of 37 patients found excellent result in 67.6%, good result in 21.6% and poor result in 10.8%. Goyal sharad et al (1997)[13] reported excellent functional result in 86%, satisfactory in 10%, unsatisfactory in 2% and poor in 2% in a series of 100 patients treated by compression plating, Marek F.M. (1961)[14] treated 32 patients by square nailing and showed the excellent result in 56%, good in 28.2% and poor in 15.6% of cases, street D M (1986) reported excellent result in 69% satisfactory in 14.5%, unsatisfactory in 8%, and failure in 8% in a series of 103 patients treated by nailing.

In present series functional results in group 1 were excellent in 15 patients (93.75%), satisfactory in 1 patients (6.25%) . There was one failure result in group 1, and in group 2 results were excellent in 15 patients (93.75%), unsatisfactory in 1 patients (20%), one failure cases. Our results are in accordance with previous literature and prospective observation. When the excellent and satisfactory and unsatisfactory results were combined (good result) there were no significant differences between two groups (p value 0.53).

Results	Nailing	Plating
Anderson	Excellent Satisfactory Unsatisfactory Failure	Excellent-50.9% Satisfactory-34.9% Unsatisfactory-11.25% Failure-2.8%
Rai et al	Excellent Good Poor	Excellent -67.6% Good -21.6% Poor -10.8%
Marek FM	Excellent- 56% Good -28% Poor -15%	Excellent Good Poor
Our series	Excellent -93.75% Satisfactory- 0% Unsatisfactory- 6.25%	Excellent -93.75% Satisfactory- 6.25% Unsatisfactory-0%

The visual analogue score was compared and recorded at 2 weeks and 4 weeks was average of about 2.09 in group 1 and 2.24 in group 2, with minimum of about 1.4 in group 1 and max 3.1, and min of about of 1.6 in group 1 and max 3.6 in group 2. DASH Score[15] was calculated after limb was immobilized for 4 months after surgery and mean low score in group 1 was12.56 and group 2 was 13.94. With max in group 1 was 26 and 31 in group 2, and minimum of 7 in group 1 and 5 in group 2. Anderson score was calculated 4 months post-surgery

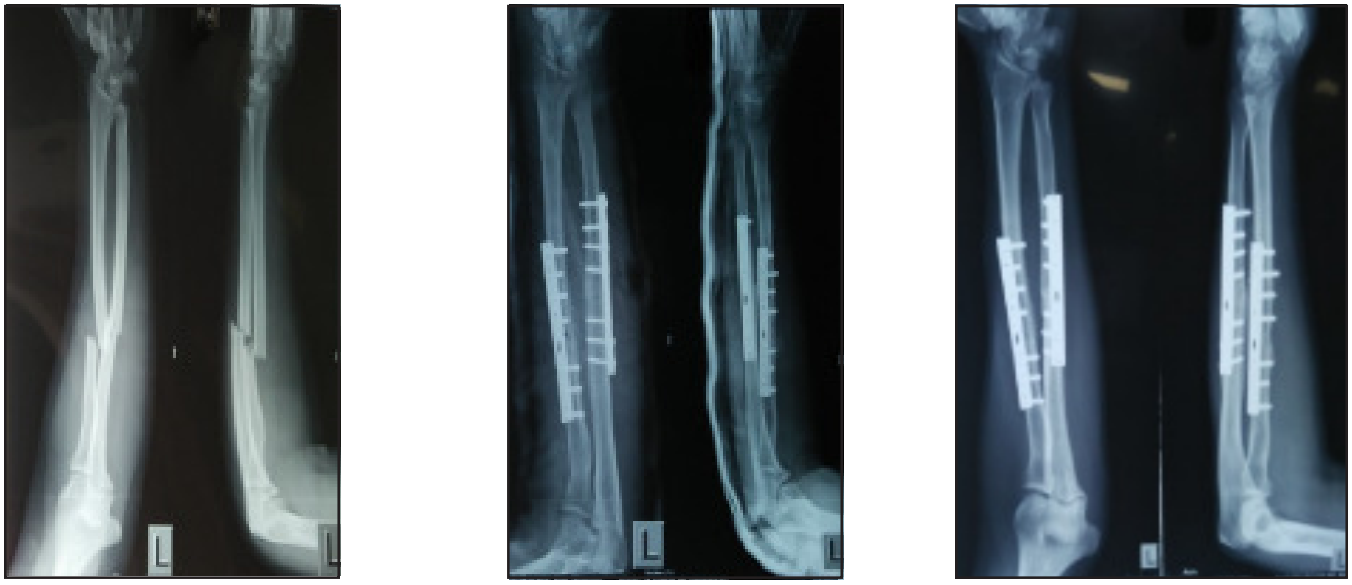

Fig. 1 : 1a 1b 1c (Preoperative) (post-operative) (Plating radius & ulna)

Fig. 2 : 6d 6e 6f (Preoperative) (Post-operative) (Nailing & ulna)

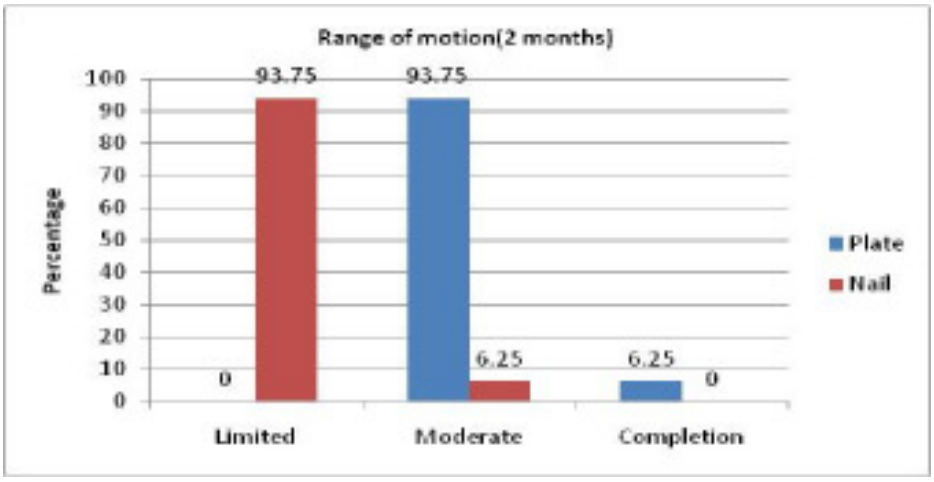

Fig. 3

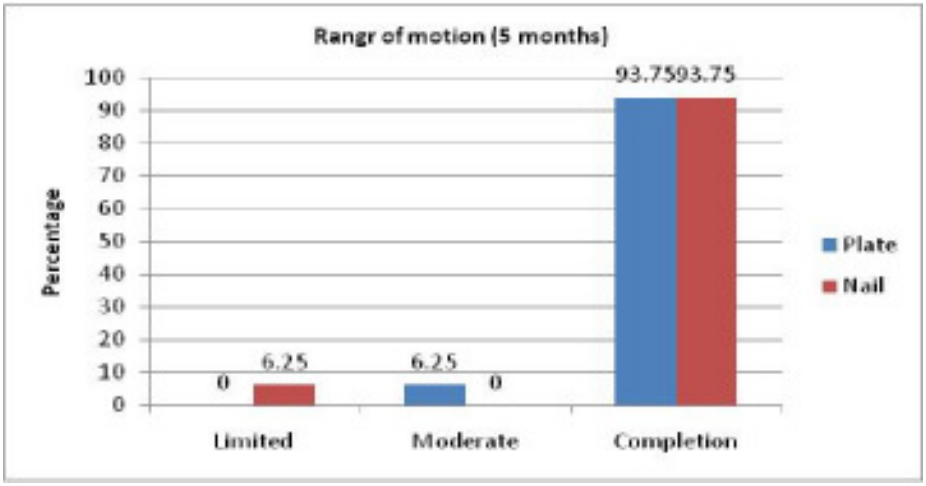

Fig. 4

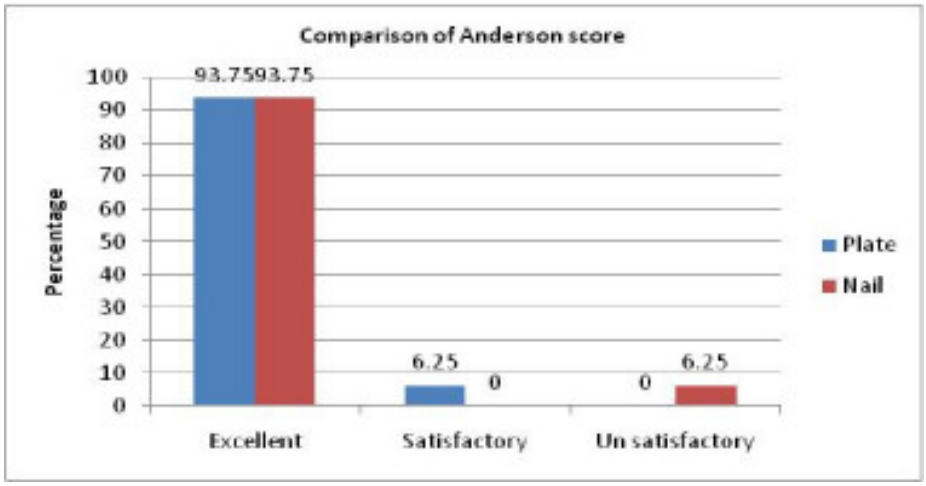

Fig. 5

was excellent and comparable in both groups, with 1 patient having satisfactory result in group 1 and one patient with unsatisfactory result in group 2 patients

The pitfall for nailing was immobilization time required is more compared to plating, range of motion observed in this study after 2 months were very limited, and after 5months the pronation and supination were comparable with continuous physiotherapy.

If canal is narrow and intraoperatively two nails cannot be inserted, then single nail is inserted, and while insertion if two nails gets stacked and cannot be manipulated that leads to open reduction. If two nails over olecranon process left more than 5 mm outside, could lead to olecranon bursitis. The radiation exposure to surgeon is more compared to single nailing and plating. After fixation there is no collapse of fracture.

The chances of refracture are less as compared to plating shown in previous studies. And removal of implant could be done on local injection and also cost effective. The two nails could be inserted in single bone fracture of forearm.

CONCLUSION

Plating gives rigid fixation, ensures early return of function, less immobilization time and avoids use of external bracing. Operative technique is more demanding due to meticulous soft tissue dissection required for exposure. Surgical scar is inconspicuous and can be unacceptable, especially to females

Nailing is more biological fixation, gives smaller surgical scar, cost effective and could be easy implant removal. It requires image guidance and more radiation exposure to surgeon in multiple nailing.

With jamming technique in nailing, additional rotatory stability provided which is very important during supination and pronation of both bone forearm fractures and giving comparable results to plating and strong fixation.

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MANAGEMENT OF CLUBFOOT ASSOCIATED WITH CONGENITAL CONSTRICTION BANDS, BY PONSETI TECHNIQUE : CASE REPORT

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ABSTRACT

Congenital talipus equinovarus with streeters dysplasia is being considerd as rigid and resistant to non surgical treatment. To assess the efficacy of Ponseti technique in correcting club feet associated with streeters dysplasia, we treated two cases with ponseti technique after releasing the constriction bands.Tenotomy was done in both patients. Although the number of casts were more. the correction was maintained in both patients as a short term results. compliance to the braces was good in both cases. Ponseti technique is effective,and may be used as primary treatment to correct and to maintain the deformity in these cases.

Keywords : amniotic band syndrome; constriction bands; Ponseti technique; club foot.

INTRODUCTION

In the 1930 Streeter described the "intrinsic model"[1] of abnormal development of germinal disc of the early embryo. In 1965 the Torpin's[2] model of the "extrinsic theory", disruptive event causes suggested a mechanical rupture and adhesion of the amnion. Club foot is associated with amniotic constriction bands in 12-56% of case.[3] Previous literature reports suggests that ctev associated with amniotic band syndrome are resistant and do not respond to casting treatment. Gomez et al[4] studied 35 children with 6% success rate for cast management and 77% required surgical correction. Recent application of ponseti method to treat these cases give good results.[3,5]

AIMS & OBJECTIVES

To assess the efficacy of Ponseti technique and to minimize the surgical and anaesthetic exposure in correcting CTEV deformity of foot associated with constriction bands.

CASE REPORT

Case-1 : 25 days old male child with bilateral club feet deformity having Pirani score of 5.5/6 on right side and 5/6 on left side with grade 3 congenital constriction band in zone 3 was treated with Ponseti casting method at weekly interval after releasing the constriction band by z plasty. total no. of 11 casts were applied. Bilateral tenotomy was performed and foot abduction braces were applied after 3 weeks of tenotomy. Followup was done (from October 2014 to November 2016) upto the age of 15 months the Pirani score was zero in bilateral foot.

Case-2 : 7 days old premature female child was evaluated. She had bilateral club feet with grade 3 congenital constriction band in zone 3 in right foot, and grade 1 constriction band in great toe of left side foot. Initial Pirani score was 5/6 in bilateral foot. Due to poor skin condition serial manipulation by mother was advised. Later on at the age of 45 days she was treated for 3 constriction band release and then clubfoot deformity was treated by Ponseti method. Total 10 serial casts were applied for deformity correction. After performimg tenotomy foot abduction braces were advised. At followup of 14 months (November 2014 to January 2016) the overall result was good.

DISCUSSION

Treating the non idiopathic club foot deformity remains a challenging task for orthopaedician.In Streeters dysplasia, associated lymphoedema may cause loose fiiting and early slippage of the cast. We didn't have this problem,and it can be avoided by keeping more flexion at the knee joint. In an attempt to apply cast more snuggly, it may lead to poor distal circulation. It happened to one of our patient which was managed by early removal of cast and applying new loose corrective cast. Associated vascular compromise may be present in form of bifurcation or trifurcation of the popliteal artery or no

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Fig. 1 : (a) & (b) Rt foot with congenital constriction ring

Fig. 2 : (a) & (b) Child in Ponseti casting & plan.... foot

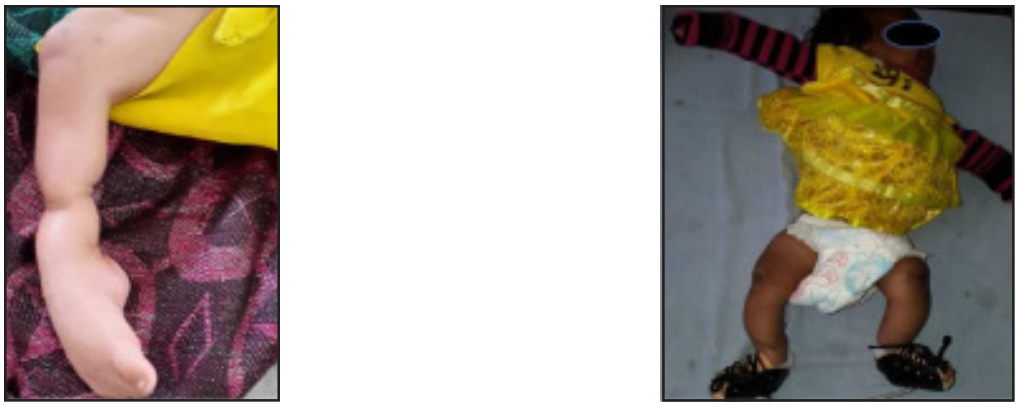

Fig. 3 : Preop foot and clinical photograph of child in foot abduction brace

discernable branches of the popliteal artery,.[6] The constriction rings should be treated primarily and clubfoot intervened later to prevent circulatory compromise.[3] We did release of constriction bands by z-plasty in both cases first and then treat the club foot deformity. The location and grading of severity of constriction bands might afftect the final outcome[7] so it should be considered in the treatment and expecting the outcome. Both of our cases had grade 3 bands in zone 2 associated with lymphoedma without any vascular compromise. A poorer outcome is expected in presence of a rigid equinovarus deformities, absent major vessels, atretic segments in the major limb arteries and absent branches neurological deficits, presence of more than 1 band in 3 extremities, deep bands located in ipsilateral distal third leg with associated secondary changes such as cyanosed extremity, superficial skin ulcers, edema, or marked calf atrophy.[4,7,8] Contrary to other studies[3,7] which recommended open tendoachillis lengthening, we did percutaneus tenotomy in both case, and achieved upto 15° of dorsiflexion. Early-term results favours the use of the Ponseti method for the initial treatment o f clubfoot deformity in streeters' dysplasia. Longer followup is required to assess the recurrence rate and further need of secondary treatment in form of surgery. Also the parents should be educated and explained about the prognosis for associated conditions[6] like intrauterine amputation, syndactyly, and acrosyndactyly (fenestrated syndactyly), polydactyly, cleft lip and cleft palate which should be treated accordingly.So we concluded from our study that Ponseti method is helpful and effective in initial management of ctev related to amniotic band syndrome. Good correction can be achieved and maintained in most of the patients, although further studies of longer followup is required. So Ponseti method should be the initial choice of treatment for clubfeet associated with constriction bands.

CONFLICT OF INTERSET

The authors declare that they have no conflict of interest. Source of support-None Informed consent : "Informed consent was obtained from both parents of all individual participants included in the study."

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SUB-MUSCULAR PLATING:-A METHOD OF CHOICE IN LENGTH UNSTABLE AND COMMUNITED DIAPHYSEAL FEMORAL FRACTURE IN CHILDREN

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ABSTRACT

Introduction: Pediatric diaphyseal femur fractures account for 1.7% of all pediatric fractures. Treatment remains a controversial. Patients under 5 years of age can largely be treated with closed reduction and spica casting. Adolescents with a closed proximal femoral physis are treated with intramedullary nailing.

Materials & method: We prospectively reviewed 10 pediatric patients with length unstable and communited diaphyseal femoral fractures treated with submuscular plating from 2015 to 2017. The average age was 8 years.Minimum followup was 6 months (average, 15.5 months; range, 6-50.6 months).

Results: All fractures healed well and all patients returned to full activity. None of the patients developed clinically important malalignment or leg length discrepancy.

Conclusion: submuscular plating provided reliable fixation and healing for length unstable and communited diaphyseal femoral fractures and can have a broader application in the orthopedic community.

Keyword: femur, diaphyseal fracture, submuscular plating, pediatric

INTRODUCTION

Pediatric diaphyseal femur fractures account for 1.7% of pediatric fractures. spica casting is still a common treatment option for patients younger than 5 years with an isolated injury and minimal shortening (< 2 cm),[25] there is an emerging trend toward surgical treatment in older children.[16,20] Elastic nails are usually used for stable fracture patterns of the middiaphysis in children weighing less than 45 kg (100 pounds).[6,7,15] Unstable middiaphyseal fractures in heavier children and fractures located in the proximal or distal 1/3 of the diaphysis are more difficult to treat reliably with elastic nails.[5-8,10,23,25] According to the current American Academy of Orthopedic Surgeons (AAOS) Clinical Practice Guidelines concerning pediatric diaphyseal femur fractures,[15] there is poorquality evidence in support of any specific surgical treatment modality. Casting for high energy injuries in children younger than 10 years needed repeated additional procedures in about ½ of the cases.[21] External fixation can be complicated by re-fracture, malunion,delayed union, pin tract infections, and unsightly scars.[1,19,22,24] External fixation has been associated with a re-fracture rate of 22%, malalignment rate of 20%, and pin tract infection rate of 70%.[19] Rigid intramedullary devices are used routinely in adults, but in children there is a serious risk of damaging the vascular supply to the femoral head, resulting in avascular necrosis of the femoral head when using piriformis fossa or even greater trochanter entry points.[2,12,13,17] Rigid nailing needs to be performed with an entrance point lateral to the tip of the trochanteric physis to avoid injury to proximal femur blood vessels and only in older patients who have a medullary canal large enough for nail passage. Very proximal and distal fractures are still difficult to treat with rigid nails.[9,13,14,17] There is a risk for growth arrest of the greater trochanter apophysis resulting in coxa valga and heterotopic bone formation when violating the trochanteric physis.[13] Classical compression plating, with a long incision and more soft tissue damage, has a higher risk of infection and delayed healing, with a reported reoperation rate of 10%.[3] Submuscular bridge plating (SBP) for diaphyseal femur fractures was first reported for adult patients in the late 1990s.[4,25] The procedure began to gain acceptance among orthopedic surgeons and has started to be used in the pediatric population. It is part of the treatment algorithm recently published in the AAOS Clinical Practice Guidelines.[15] The advantages include a

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minimally invasive soft tissue preserving approach and relative stability that allows for early ROM (no casting or bracing is required) and reliable healing. In the AAOS guidelines, SBP is an option for treatment of children aged 11 years to skeletal maturity.[15]

MATERIAL & METHOD

This Prospective case series study was conducted at Orthopedics Department of Jhalawar Hospital & Medical College between December 2015 to March 2017. We have included 10 cases with length un-stable and comminuted diahyseal femur fracture.Age of the patient 6 to 12 years.Minimum follow-up was of 6 months, with average follow up of 15.5 months range from 6 months to 50.6 months.Follow-up consisted of Clinical and Radiological assessment. Fracture type was classified according to the OTA/AO classification[18] as follows: A (simple, transverse or short oblique), B (wedgeshaped middle fragment), or C (complex, with multiple fragments). There were 3 (30%) Type A fractures, 5 (50%) Type B, and 2 (20%) Type C. We used 4.5 mm narrow dynamic compression plate (DCP) plates or 4.5 mm locking compression (LCP) plates.The plates were 8- 13 holed. Our inclusion criteria consists of 1) Age group between 6 to 12 years, 2) Comminuted and length unstable fractures, 3) Patient party willing to undergo surgery and follow up, 4) Closed fractures and open grade 1 fractures and exclusion criteria consists of 1) Age group < 6 years and > 12 years, 2) Transverse fractures and length stable fractures,3)Patient party not willing to undergo surgery, 3) Open grade 2 and 3 fractures, 4) Patients reporting late after 2 weeks. The patients were placed supine on a radiolucent plain table with both legs draped free for estimation of length and rotation.we used two incisions technique. One incision is made proximally below the greater trochanter. The other is made distally just proximal to the physeal line. The length of each incision matched the length of three subsequent screws of the plate.This way, all screws were placed under direct visualization without using fluoroscopy.In all plates proximal and distal femoral flares were carefully pre-contoured.Reduction was achieved indirectly with longitudinal traction and rotation of the leg which was confirmed by fluoroscopy. Plates were inserted submuscularly. Two 2 mm K wires were inserted distally and proximally through the plate to maintain femur length.After the surgery the fixation was evaluated radiographically by long X-rays that included the lower limb from pelvis to ankle for the estimation of leg length discrepancy and deformity analysis. No additional cast fixation was used postoperatively. Postoperative mobilization was started immediately the next day.Unsupported full weight bearing began at 8 weeks after surgery.Radiographs were taken at 0, 6, 10, 14 and 24 weeks post-operatively.

RESULTS

All fractures healed well radiologically (Figure 1-A & 1-B) & clinically (Figure 2 & 3).Mean time to fracture union was 2.6 months. All patient returned to full activity.Mean range of movement was near normal to the opposite limb.None of the patients developed any major complication like deep infection, implant failure, malalignment & leg length discrepancy.

DISCUSSION

Rozbruch et al[26] assessed the evolution of techniques used in Femoral shaft plating. According to them the best predictor of a positive outcome was the length of the plate. In length unstable fractures treated with this technique, the longer plate increases the working length of the construct and decreases the strain on the plate.

Apivat thakakul et al found this construct reduced the risk of plate failure when used to treat communited fracture as communited fracture is bridged with a long plate, the stress on the healing fracture is significantly less.

In 2003, Agus et al[27] evaluated bridge plating of comminuted femoral shaft fractures.Fourteen pediatric patients with an average age of 11.3 years were treated over a 5-year period. Their technique utilized a proximal and distance incision to the fracture with no opening of fracture site. All patients went onto union average of 12.4 weeks with no reported complications of rotational deformities or leg-length discrepancies Kanlic et al[28] in 2004 in a multicenter study evaluated the use of submuscular bridge plating for complex fracture patterns in 51 patients. They conclude that this technique offers the advantages of adequate stability for early functional treatment and predictable healing with maintenance of length and alignment for all pediatric femoral shaft fractures.

CONCLUSION

This newer method uses fluoroscopically assisted and percutaneous bridge plating through small incisions exposing the distal and proximal fragments and insertion of at least 3 bicortical screws in each fragment. The main advantage is that avoiding the need for major periosteal stripping, thereby allowing earlier and quicker biological bone healing.Submuscular plating provide a stable construct in length unstable & comminuted diaphyseal

Fig. 1A : Preoperative fracture shaft femur

Fig. 1A : Intraoperative submuscular plating

Fig. 1B : At 6 week postoperatively imposition

Fig. 1B : At 24 week post operative union

Fig. 2 : Clinical photograph of same patient

Fig. 3 : Good function after union

fractures in pre-adolscents age group allowing biological healing with early mobilization &minimal complications. This technique provides excellent healing rates, rapid return to full weight bearing ,low complications rate,and allows for simplified implant removal.Further prospective outcome and comparison studies are needed about submuscular plating for comminuted shaft femur fractures in children.

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MANAGEMENT OF PER-OPERATIVE LATERAL WALL FRACTURE IN INTER- TROCHANTERIC FRACTURE

Pandey K.K.* **Maravi L.S.***

ABSTRACT

An Orthopaedic surgeon often encounters lateral trochanteric wall fracture which makes a stable fracture to unstable. At the same time he has large void made in the head of femur by triple reaming and by putting Richard Screw. In our study we continued the same procedure with the use of higher angled barrel plate to enhance loading in valgus with judicious barrel size to have adequate length for controlled collapse to get stability of the intertrochanteric fracture with per-operative lateral wall fracture. We retrospectively analyzed results of 30 patients with per- operative lateral wall fracture in stable intertrochanteric fracture (AO A1.1 through A2.1) with mean age of 55 years (Range 45 to 75). We used 10 degree higher angled barrel plate to the measured one at the time of putting guide wire to keep fracture geometry in more valgus to enhance bony contact. Postoperatively weight bearing was avoided till union. There was union in 26 patients and failure with screw cut out in 4 cases. According to Harris Hip score, final outcome was excellent in 20 hips, good in 6 hips and poor in 4 hips. Patients with union of fracture had returned to their preoperative walking ability after three to six months

Key words: Intertrochanteric fracture, lateral wall fracture, dynamic hip screw

Objective : To know the results of intertrochanteric fracture with per-operative lateral wall fracture treated by dynamic hip Screw.

Design: Retrospective

INTRODUCTION

Intertrochantric fracture is a common old age fracture which stands the very frequently done surgery by any orthopaedic surgeon. Dynamic hip screw (DHS) is the treatment of the modality for the stable intertrochantric fracture while Proximal femoral nail (PFN) is for unstable intertrochanteric fracture.[1,2,3]

Sometimes Orthopaedic surgeon encounters lateral trochanteric wall fracture which makes stable fracture to unstable one. At the same time surgeon is with hand of large void made in the head of femur by triple reaming and by putting Richard Screw. Usually change to proximal femoral nail is not possible all the time due to large void made during triple reaming and also because learning curve associated with the proximal femoral nail.[4]

Marmor et al in their biomechanical study of unstable fracture with segmental comminution in cadaveric proximal femurs showed that load on sliding hip screw-side plate construct was significantly increased in Varus and significantly decreased in valgus.[5]

In view of that we continued the same procedure with use of higher angled barrel plate to enhance loading in valgus with judicious type of barrel to have controlled collapse for stability of unstable intertrochanteric fracture.

MATERIAL AND METHOD

We retrospectively analyzed results of 30 patients with per-operative lateral wall fracture in stable intertrochanteric fracture (AO A1.1 through A2.1) with mean age of 55 years (Range 45 to 75). We first reduced fracture anatomically in fracture table under image intensifier and followed the standard steps of the surgery. We used short barrel plate in 22 patients and long barrel plate in 8 patients. We used 10 degree higher angled barrel plate to the measured one at the time of putting guide wire to keep fracture geometry in more valgus to enhance bony contact. We judiciously used the size of barrel plate long or short to have adequate length for the settling of the fracture. A short-barrel side plate often is needed with this technique to prevent impingement of the Richard screw against the barrel in the neck of the femur. Postoperatively weight bearing was avoided till union.

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Fig. 1 : Preoperative anteroposterior view of hip joint under traction in fracture table

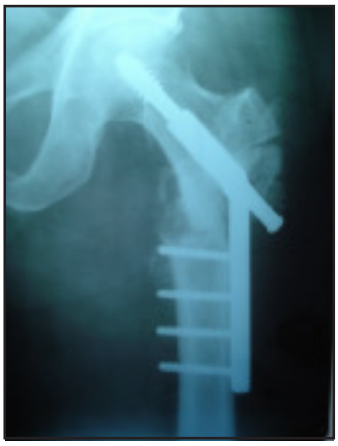

Fig. 2 : Postoperative x ray with broken lateral wall fixed with dynamic hip screw

Fig. 3 : Union at 6-month follow-up

Fig. 4 & 5 : X-rays of other patients with union of intertrochanteric fracture with lateral wall fracture

Fig. 6 : showing excessive collapse with inadequate medial structural support resulted in subsequent failure

RESULTS

There was union in 26 patients and failure with screw cut out in 4 cases. Mean time of union was 14 weeks (range 12 to 20 weeks). There was shortening of the affected limb (mean 1.2 cm) in 18 patients. The mean follow up was 4.3 years (range from 6 month to 9 years). According to Harris Hip score, final outcome was excellent in 20 hips, good in 6 hips and poor in 4 hips. Patients with union of fracture had returned to their preoperative walking ability after three to six months.

DISCUSSION

Anatomical reduction should be in fixation of intertrochanteric fracture because poor reduction is the independent reason for loss of fixation whether we use any implant.[6] We achieved strong structural support by keeping more valgus placement of the proximal fragment by higher angled barrel plate that prevented excessive medialization of shaft of femur and judicious use of barrel plate provided adequate length for collapse to convert unstable intertrochanteric fracture to stable one by settling, particularly in patients with good bone stock. Common reason for failures were osteoporotic fracture with less bone stock, less length for collapse in cases we used long barrel plate and early weight bearing.

Madsen et al in their 170 patients with unstable trochanteric femoral fractures showed use of trochanteric stabilization plate prevented medialization of the distal fragment by reducing secondary lag screw sliding as

compared to the conventional dynamic hip screw.[7]

Hsu et al concluded that intertrochanteric fracture with lateral wall thickness less than 20.5 should not treated with Dynamic hip screw due to occurrence of lateral wall fracture[8] but in our study there were good result with valgus loading of implant ,even we had lateral wall fracture intraoperatively.

Palm et al showed 22 % reoperation rate (10 out of 46) in patients with fracture lateral trochanteric wall.[9] In our study it is reduced to the 13.3 % (4 out of 30) with observation that failure is usually in patients with osteoporotic fracture with inadequate structural bony support.

Platzer et al showed in their study that femoral shortening is severe in unstable intertrochanteric fracture treated by dynamic hip screw.[10] We delayed weight bearing till union that resulted in less limb length equality, particularly in patients with good bone quality.

CONCLUSION

Use of higher angled barrel plate to enhance valgus loading on the dynamic hip screw-plate construct with short barrel maximize the stability of intertrochanteric fracture in patients having per-operative lateral wall fracture.

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FUNCTIONAL OUTCOME OF SCAPHOID FRACTURE FOLLOWING ORIF VS. PERCUTANEOUS FIXATION

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ABSTRACT

Background: Unstable or displaced fractures of the scaphoid, as well as proximal pole fractures, have an increased rate of redisplacement, delayed union, and nonunion when managed with cast immobilization alone. ORIF/Percutaneous fixation of scaphoid though demanding procedures can yield excellent results.

Objectives: To compare the functional outcome and radiological union time following ORIF vs. Percutaneous fixation of scaphoid fractures.

Methods : Twenty Scaphoid fractures treated between June 2015 to june 2017 were prospectively studied in SN Medical College, Agra. Eight were treated by percutaneous and twelve were treated by ORIF with Herbert screw. Serial radiographs were taken to assess radiographic union and functional outcome was assessed using Modified Mayo wrist score.

Results: All 20 scaphoid fractures treated by either ways united successfully with no complications. All Eight (100%) patients had excellent results with percutaneous fixation. Five (41.67%) patients had excellent results with Six (50%) patients had good results and one (8.33%) patient had fair result with ORIF. Radiological union was confirmed postoperatively in all patients treated with percutaneous fixation at 8.8 week(range 7-12 week) and ORIF 12.1 week (range 8-16 week) respectively.

Conclusion: Both close reduction and percutaneous fixation or open reduction and internal fixation are options to reliably diminish the incidence of nonunion and malunion that occur with cast immobilization in scaphoid fracture. But percutaneous fixation leads to early union and early return to functional activity and lesser complications as compared to open reduction and internal fixation.

Key words: scaphoid fracture, percutaneous fixation, closed reduction.

INTRODUCTION

The name scaphoid comes from the Greek word "skaphos" meaning boat, a reference to the shape of the bone.[1] Displaced, comminuted, and unstable fractures of the scaphoid are routinely managed with surgical intervention. Much of the current controversy surrounds the undisplaced or minimally displaced acute fractures. Current opinion is that patients with undisplaced fractures of the scaphoid need protection and cast immobilization for 6 to 12 weeks, accounting for a considerable loss of time and productivity in a predominantly young and active population.[2,3,4,5,6] Advocates for early operative intervention claim that screw fixation not only limits the need for a cast, but may also allow earlier return to sports and work.[7,8,9,10]

Nonunion is said to occur in approximately 10% of all scaphoid waist fractures, but the rate is much lower for non displaced fractures and approaches zero when a non displaced fracture is adequately treated and protected.[11,12] Displaced fractures have a 50% nonunion rate, with an increased rate also seen with proximal pole fractures.[13,14,15,16,17] This leads to altered carpal biomechanics with resultant pain, diminished motion of wrist, grip strength, and carpal arthritis.

Unstable or displaced fractures of the scaphoid, as well as proximal pole fractures, have an increased rate of redisplacement,[18] delayed union, and nonunion19 when managed with cast immobilization alone.[20,21] McLaughlin[22] was the first to report the use of primary ORIF for fractures of the scaphoid, and subsequently positive results have been reported in many studies.[23] Displaced fractures are treated with either ORIF or arthroscopically assisted percutaneous fixation. For undisplaced or minimally displaced fractures, percutaneous fixation is superior to ORIF providing superior union rates, faster functional recovery, and reduced surgical morbidity; for example, scar, complex

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regional pain syndrome (CRPS).[24,25,26] Percutaneous fixation is a simple technique and can be performed through either a volar or a dorsal approach, with neither reported to provide a superior outcome.[27,28,29,30]

The benefit of percutaneous Herbert screw fixation lie in the fact that; fracture reduction and fixation can be accomplished without further injury to the scaphoid blood supply and stabilizing ligament of the wrist.[31,32]

Our study was intended to review clinical, radiological and functional Outcome Following open reduction vs Percutaneous fixation with Herbert Screw in scaphoid fractures.

METHODS

Between june 2015 and june 2017, 22 cases of scaphoid fracture were treated with Herbert screw in our centre which included cases of acute scaphoid fracture, patients with delayed union or fractures which showed no signs of healing after 12 weeks wearing plaster cast and fracture presenting late; four weeks to three months after injury. We excluded patients with tuberosity fracture, trans-scaphoid perilunate dislocation; Dorsal intercalated segmental instability deformity (DISI), osteonecrosis of proximal scaphoid fragment, previous wrist injury or any other associated fracture around the wrist.

Out of 22 patients, 20 met our inclusion criteria and were included in our prospective study. Scaphoid radiographs included, postero anterior view, lateral view, semipronation oblique and antero posterior view with wrist in ulnar deviation. Injuries were graded according to Herbert and Fisher Classification (Table 1).

Table 1
Herbert and Fisher Classification

Type	Description
A: acute, stable	A1: fracture of the tubercle A2: nondisplaced incomplete fracture in the waist
B: acute, unstable	B1: oblique fracture in the distal third B2: displaced or mobile fracture in the waist B3: fracture of the proximal pole B4: fracture with dislocation B5: comminuted fracture
C: delayed union	>6 weeks
D: established non-union	D1: fibrous D2: sclerotic

All fractures were first tried for percutaneous fixation using volar approach if adequate reduction was not achieved we opted for ORIF except patient with time of admission was 150 days after injury and was treated directly with ORIF and bone grafting. For ORIF of fracture sacphoid volar approach was used.For the percutaneous fixation volar approach.

In all cases scaphoid cast was applied post operatively. Two weeks post operatively; sutures were removed and cast continued for another four weeks. At six weeks, cast was removed and replaced with removable wrist immobilizer brace for another four weeks along with physiotherapy. Hand grip strengthening exercise with active assisted range of motion exercise of wrist was started. All patients were evaluated at two weeks interval until fracture united. At each follow up, patients were subjected to clinical as well as radiological examination with scaphoid profile. Union was considered to have occurred when there was no tenderness at the anatomical snuff box or at scaphoid tubercle and there was evidence of trabeculae crossing fracture on at least two views.On final follow up clinical assessment were performed based on Modified Mayo Wrist Score (MMWS) (Table 2). The minimum follow up was twelve months.

Table 2
Modified Mayo Wrist Score (MMWS)

Category	Points
Pain (25 points)	
None	25
Mild occasional	20
Moderate (with normal use, not at rest)	10
Severe, Constant	0
Range of Motion (25 points): Flexion+ Extension (Degrees)	
> 140	25
100 - 140	20
70 - 99	15
40 - 69	10
< 40	0
Grip strength (25 points)	
Normal	25
Diminished but > 50% of normal	15
Less than 50% of normal	0
Activity (25 points)	
Same activities	25
Restricted activities caused by injured wrist	15
Change of work or sports caused by injured wrist	0

Grip strength was measured asking the patient to squeeze the examiners index finger, and the strength was compared on contralateral side. Grip strength was graded according to MRC grading. Range of motion was measured using goniometer.

RESULTS

The mean duration of presentation after injury was 17.4 days (range 2-150 days). Eight (40%) patients were operated with in first week after injury, seven (35%) patients between first and second week and three (15%) were operated in between two to four weeks. Two (10%) patients had delayed union of scaphoid waist fracture after 6 weeks of cast treatment (Table 3).

Table 3
Demographic profiles of patients and details of approach, MMWS and complication

S.No.	AGE	SEX	SIDE	HERBERT TYPE	TIME TO SURGERY (DAYS)	APPROACH	TIME TO UNION (WEEK)	MMWS (POINTS)	REMARK
1	18	F	R	B2	5	ORIF VOLAR	12	85	
2	39	M	L	B2	17	PERCUTANEOUS VOLAR	8	100	
3	44	M	R	C	150	ORIF VOLAR	14	80	BONE GRAFTING WAS DONE
4	28	M	R	C	44	ORIF VOLAR	11	70	CAST FAILURE
5	30	F	L	A2	20	PERCUTANEOUS VOLAR	9	95	
6	22	M	L	B2	3	ORIF VOLAR	8	95	
7	26	F	R	A2	14	ORIF VOLAR	9	90	
8	33	M	L	A2	4	PERCUTANEOUS VOLAR	7	90	
9	39	M	R	B2	2	ORIF VOLAR	10	85	
10	20	M	R	B2	8	PERCUTANEOUS VOLAR	12	95	
11	20	M	L	A2	10	ORIF VOLAR	16	85	
12	42	F	L	B2	8	ORIF VOLAR	14	80	
13	26	F	R	A2	4	PERCUTANEOUS VOLAR	10	95	
14	24	F	L	A2	1	PERCUTANEOUS VOLAR	8	100	
15	26	F	R	B2	12	ORIF VOLAR	12	90	
16	20	F	R	A2	5	PERCUTANEOUS VOLAR	8	95	
17	24	M	L	A2	16	ORIF VOLAR	14	85	
18	28	M	R	B2	5	ORIF VOLAR	10	90	
19	29	M	L	A2	8	PERCUTANEOUS VOLAR	9	90	
20	30	M	L	B2	7	ORIF VOLAR	14	85	

All 20 scaphoid fractures treated by either ways united successfully. Radiological union was confirmed postoperatively in all patients treated with percutaneous fixation at 8.8 week (range 7-12 week) and ORIF 12.1 week (range 8-16 week) respectively. In patients with delayed union with cast treatment, fracture union was seen at 12.5 weeks (range 11-14 weeks) post operatively. In cases with percutaneous fixation; wrist flexion averaged 630 (range 40 to 750) and wrist extension averaged 620 (range 40 to 700) and in ORIF wrist flexion averaged 580 (range 30 to 700) and wrist extension 560 (range 30 to 650). According to Modified Mayo wrist score (MMWS); the mean pain score was 21.2 (range 10 to 25) with percutaneous and 20.2 (range 10 to 25) with ORIF, mean range of motion score was 23.6 (range 15 to 25) with percutaneous and 22.5 (range 15 to 25) with ORIF, mean grip strength score was 23.9.6 (range 15 to 25) with percutaneous and 22.9 (range 15 to 25) with ORIF and activity score was 21.3 (range 15 to 25) with percutaneous and 20 (range 15 to 25) with ORIF. The mean MMWS score was 95 (range 90 to 100) for percutaneous and 85.8 (range 70 to 95) for ORIF. Accordingly 8 (100%) patients had excellent results with percutaneous fixation. 5 (41.67%) patients had excellent results with 6 (50%) patients had good results and one (8.33%) patient had fair result with ORIF (Figure A & B).

There were no perioperative complications. None of the patient had malunion. None of the patients showed signs of post traumatic osteoarthritis of the scaphoid or wrist at final follow up.

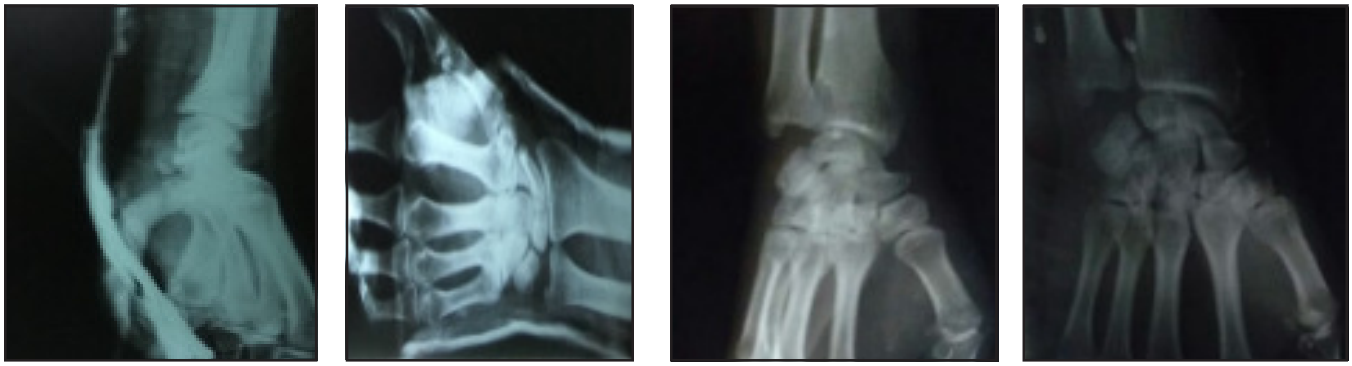

Fig. A : Figure A shows an 15 days old fracture in 39 years gentleman, who was treated with close reduction and percutaneous Herbert screw fixation. 8 week post operative radiographs showed complete union with excellent results.

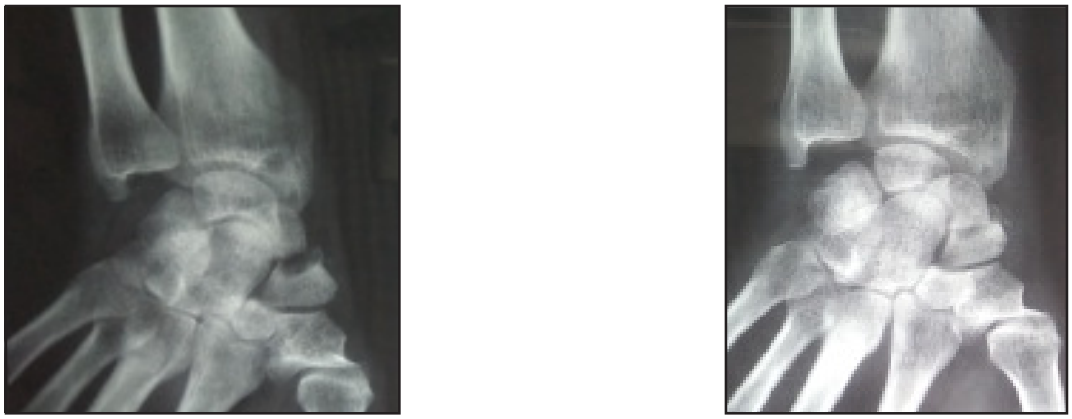

Fig. B : Figure B shows an 150 days old fracture in 44 years male , who was treated with open reduction and Herbert screw fixation with bone grafting. 9 week post operative radiographs showed complete union with excellent results.

DISCUSSION

This prospective study comprised of 20 cases with 1 year follow up. In our study twelve were males and eight female with average age of 27.45 years (range 18-44 years), finding suggests that scaphoid fracture is common in young adults. Ten patients had a right wrist and ten had left wrist injury. Out of twenty, eight were treated by percutaneous fixation and twelve were treated by ORIF.

Open reduction and internal fixation of acute fracture of the scaphoid using a compression lag screw was recommended by McLaughlin and Maudsley and Chen to allow early mobilization of wrist[33,34] and was proved in our study. As compared to Rettig ME et al evaluated 14 patients with acute displaced scaphoid waist fractures treated by open reduction and internal fixation with Herbert screw and K wires using either volar approach or dorsal approach, thirteen (93%) out of 14 got united within 11.5 weeks (range 8-20 weeks) with good function 10. In our study all cases got united within 10.8 weeks (range 7 to 16) with eight cases of percutaneous fixation united within 8.4 weeks (range 7 to 12) and ORIF united within 12.1 week (range 8 to 16). As seen in studies conducted by Aguilella L and Albertsen J the benefit of percutaneous Herbert screw fixation lie in the fact that; fracture reduction and fixation can be accomplished without further injury to the scaphoid blood supply and stabilizing ligament of the wrist[31,32] was confirmed by earlier radiological healing and less union time taken by fractures treated by percutaneous method. As compared to Shin AY et al found that the fracture union occurred at an average of 7.1 week compared to 11.6 weeks with cast treatment using volar percutaneous fixation for stable scaphoid fracture[36] our study has average union time of 9 weeks for undisplaced fractures. Compared to Naranje S et al reported 100% union rate with Percutaneous Herbert screw fixation in 32 patients involving both fresh and late scaphoid fracture presentations with dorsal approach,[35] we obtained similr result with volar approach. Also less pain, increased range of motion and grip strength was found in patients treated with percutaneous fixation as compared to ORIF. Although union was 100% in cases treated by either method but union rate and time to return to activity, pain, grip strength and movements were better in cases treated with percutaneous fixation than ORIF.

Both close reduction and percutaneous fixation or open reduction and internal fixation are options to reliably diminish the incidence of nonunion and malunion with residual carpal instability that occur with cast immobilization in scaphoid fracture. But percutaneous fixation leads to early union and early return to functional activity and lesser complications as compared to open reduction and internal fixation. We recommend use of Herbert screw for fixation with percutaneous technique for scaphoid fracture whether displaced or undisplaced for better radiological and functional outcome.

The limitation of study embody the small sample size and heterogenous group of patients within the study make firm conclusions tough as some patients presented with acute injury and some presented after 5 months and some were treated after cast failure leading to altered results due to residual stiffness of wrist due to prolonged wrist immobilization. Further in or study there was no patient with proximal pole fracture which may bias the result.

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TIBIAL TORSION IN OSTEOARTHRITIS OF KNEE

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ABSTRACT

Background: Osteoarthritis is one of the most common disabling disease and considered an inevitable sequence of aging. The pathophysiologic mechanisms are as yet poorly understood & mostly conjectural in spite of great no of studies in recent years to increased stress at focal point leading to osteoarthritis. This study endeavours to study the relationship of torsional deformity of leg with osteoarthritis of knee.

Material & Method : 200 patients of 40-80 yrs of age with 290 affected Knee with Osteoarthritis & 100 normal people of same age group with 200 knee as control were included in this study. The grade of osteoarthritis was classified as per Ahlback (1968) classification into five grades. Tibial torsion was first evaluated clinically followed by a Tropometer which was specifically designed for the purpose which was a modified version of Tropometer originally designed by Wayne-Davis. The data collected were analysed in detail & the P value was calculated.

Result : There was significant difference in external Tibial torsion for each grade of disease.it was 23.2°±4.2° in normal controls,19.02°±3.8° in Grade-I OA,16.5°±2.9° in Grade-II,14.3°±4.2° in Grade-III, 11.2°±4.8° in Grade-IV and 10.3°±6.2° in Grade-V for average of 13.7°±5.4° in all cases with significant difference in each grade. This also shows that the reduction of external Tibial torsion of the tibia grew with successive grades of disease and that there was a close relationship between progression of disease & torsional deformity

Conclusion: It is apparent from this study that there is a close relationship between decreasing external tibial torsion with radiographic grades of osteoarthritis and the reduction of torsion increases with successive grades of disease.

INTRODUCTION

Osteoarthritis is one of the most common disabling disease and considered an inevitable sequence of aging. Judged by radiological changes, 52% males & 52% females are said to suffer from osteoarthritis while it is universal in those above the age of 50.[1,8] it is one of the most common cause of pain, loss of functional mobility & loss of time from work and commonest cause of joint replacement.

While the prevalence of this disease and its burgeoning cost of management in medication & surgery has spurred the interest in uncovering the basic mechanism by which this disease affects the joints, the pathophysiologic mechanisms are as yet poorly understood & mostly conjectural in spite of great no of studies in recent years. However the recent research has demonstrated that the description of Osteoarthritis as a degenerative disease is considerably inaccurate.[6,8,9]

The classical changes of osteoarthritis have been traditionally considered to be caused due to wear & tear of the joint due to aging & mechanical factors though there is a significant inflammatory component. Importance has also being given to cellular basis of Osteoarthritis as laboratory studies strongly suggest that the primary abnormality in osteoarthritis is a defect in proteoglycan mechanism of chondrocytes which leads to cartilage breakdown.[8]

Recent attention has been given to rotational deformity of lower limb in horizontal plane which many authors suspect to be an important cause of osteoarthritis. While the normal alignment of a joint ensures evenly distributed load, in torsional deformity a complex change in load transmission occurs which predisposes the joint to increased stress at focal point leading to osteoarthritis.[4,11,12] Recently the implication of torsional deformity to osteoarthritis has led to treatment by corrective osteotomy.[2] This study endeavours to study the relationship of torsional deformity of leg with osteoarthritis of knee.

MATERIAL & METHOD

200 patients from age group 40-80 yrs. (50 in each age group from 5th to 8th decade) there were 121 male & 79 female with total no of 290 affected joints were selected for the study. For control group 100 patients

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(200 knee) of identical age group attending OPD for other causes but without any symptoms pertaining to knees were selected. Detail history, clinical & radiological examination was carried out. All secondary Osteoarthritis case were excluded from the study. The grade of osteoarthritis was classified as per Ahlback (1968) classification into five grades.[1]

Tibial torsion was first evaluated clinically followed by a Tropometer which was specifically designed for the purpose which was a modified version of Tropometer originally designed by Wayne-Davis.[13] The Tropometer consisted an adjustable wooden cradle & a main Tropometer which consisted of a protractor on which was fixed a movable marker. (Figure 1)

During measurement patient was made to lie down supine on a hard bed with the leg was placed on the Tropometer. The tip of both the malleoli were marked & the markers adjusted on them. Then the position of pointer was read on the protractor & the degree of torsion was recorded. (Figure 2)

The data collected were analysed in detail & the P value was calculated.

RESULTS

The 200 patients with 290 knees were divided into four groups 40-50, 51-60, 61-70, 71 & above. 25 normal adults of identical age group (100 cases-200 knee) were selected for comparison. The age of the patients varied from 43.5 yrs. to 84 years of age. OA was bilateral in 45% of cases 36% cases right knee & 19% only left knee was affected. Patients were divided into 5 grades basing on radiological classification criteria of Ahlback (1968). Out of the 200 patients (290 knees) there were 36 patients (18%) with 36 involved knee in Grade-1, 45 (22.5%) with 53 involved knee in Grade-II, 45 (22.5%) with 66 involved knee in Grade-III, 49(24.5%) with 87 knees in Grade-IV and 25 (12.5%) belonged to Grade-V of Osteoarthritis.

In 59% of cases there was pan articular involvement, 36.5% cases only medial compartment &4.8% cases only lateral compartment was involved.

The torsion was measured clinically followed by Tropometer. Clinical measurement gave grossly inaccurate result. There was significant difference in external Tibial torsion for each grade of disease.it was $23.2^{\circ}\pm4.2^{\circ}$ in normal controls,$19.02^{\circ}\pm3.8^{\circ}$ in Grade-I OA,$16.5^{\circ}\pm2.9^{\circ}$ in Grade-II, $14.3^{\circ}\pm4.2^{\circ}$ in Grade-III, $11.2^{\circ}\pm4.8^{\circ}$ in Grade-IV and $10.3^{\circ}\pm6.2^{\circ}$ in Grade-V for average of $13.7^{\circ}\pm5.4^{\circ}$ in all cases with significant difference in each grade. This also shows that the reduction of external Tibial torsion of the tibia grew with successive grades of disease and that there was a close relationship between progression of disease & torsional deformity. (Figure 3)

DISCUSSION

Osteoarthritis is one of the commonest &most disabling joint disorder affecting older age groups and involves any population irrespective of geographic location or climate. Osteoarthritis of knee probably has greater social cost and more associated disability than osteoarthritis of any other joint. Many important factors are incriminated for aetiology of Osteoarthritis of knee like age, varus & valgus deformity, mechanical trauma etc. but the pathophysiologic mechanism is poorly understood.[6,8,9]

Recently torsional deformity of lower limb has been incriminated to be a possible cause of Osteoarthritis knee. Though there are many studies on Tibial Torsion in children, very few studies have been conducted in adults with OA of knee.[3,4,10]

Though there is a plethora of methods to measure the torsion, Tibial torsion is difficult to measure in living human being. In adults the cadaveric measurement is most accurate but impractical method. CT gives an accurate measurement of Tibial torsion but is associated with radiation hazards & not cost effective.[5,7,11] Turner & Smillie stated that Tropometer is a simple, practical & reliable method for measurement of Tibial torsion. A modified Tropometer originally designed by Wynne-Davis was used for this study.[10,13]

Few attempts have been made to correlate Tibial torsion to pathology of knee. Ise (1976) was the first to measure the tibial torsion in OA of knee, who found decreased tibial torsion compared to normal controls. Many others like Kobayashi (1978), Turner & Smilie (1981), Yagi (1984) corroborated this findings though the exact reduction of torsion varied from author to author. Yagi (1984), Yagi& Sasaki(1985) divided Osteoarthritis to five different grades and found significant difference in Tibial torsion in each stage which decreased with increased severity of the disease.[7,10,11,12]

In the present study the Osteoarthritis cases were divided to five groups as per Ahlback1 criteria (1968) and the tibial torsion in them were as follows. Normal $23.2^{\circ}\pm4.2^{\circ}$, Grade-I $19.02^{\circ}\pm3.8^{\circ}$, Grade-II $16.5^{\circ}\pm2.9^{\circ}$, Grade-III $14.3^{\circ}\pm4.2^{\circ}$, Grade-IV $11.2^{\circ}\pm4.8^{\circ}$, Grade-V $10.3^{\circ}\pm6.2^{\circ}$ with average of $13.7^{\circ}\pm5.4^{\circ}$ external rotation. The results were significant at 1 percent level ($P<0.01$) of significance between patients as a whole and controls. This study also observes that reduction of Ext. Tibial torsion grew with each successive stages of the disease

Fig. 1 : Photo of Tropometer

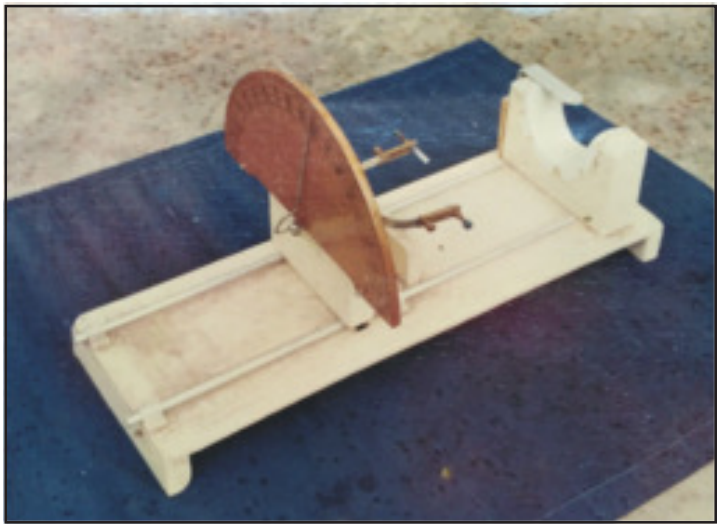

Fig. 2 : Photo of measurement of tibial torsion

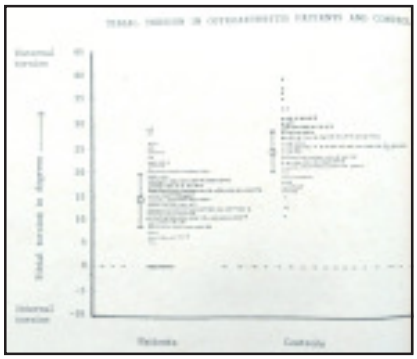

Fig. 3 : Tibial torsion in Osteoarthritis & Normal population

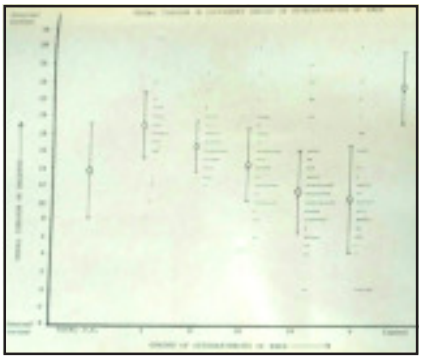

Fig. 4 : Tibial torsion in different grades of Osteoarthritis

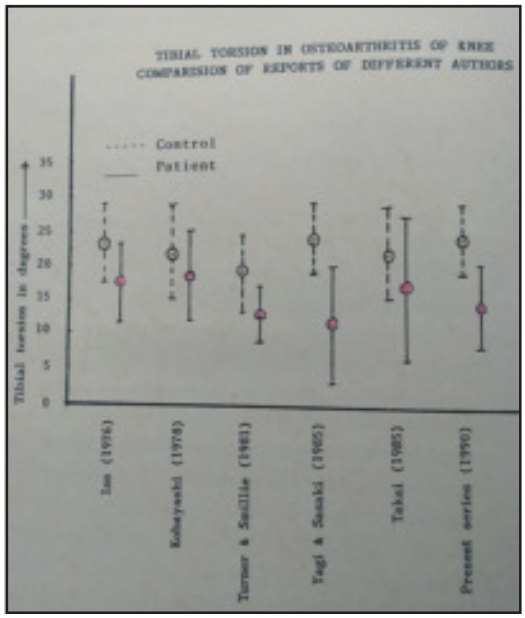

Fig. 5 : Tibial torsion by different authors

and that there was close relationship between progression of disease and torsion deformity. This corroborates findings of Yagi, Yagi & Sasaki etal (1985). (Figure 4)

There has been lot of controversy whether, decreased tibial torsion is an aetiological factor of osteoarthritis or vice versa. Coventry[2] (1985) suggested that when medial compartment deteriorates varus deformity with internal tibial torsion develops thereby increasing loading pressure on medial articular surface and thereby Osteoarthritis. Ise[3] (1975) suggested that increased internal torsion brings excessive load to medial compartment leading to Osteoarthritis. Yagi (1984) suggested a mechanism of decreased tibial torsion in Osteoarthritis of knee which was corroborated by Jacob et al (1980).[11]

CONCLUSION

It is apparent from this study that there is a close relationship between decreasing external tibial torsion with radiographic grades of osteoarthritis and the reduction of torsion increases with successive grades of disease, yet it is difficult to attribute tibial torsion as sole cause of osteoarthritis of knee & vice versa.

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EFFECTIVENESS OF CAUDAL EPIDURAL STEROID INJECTIONS IN PATIENTS WITH CHRONIC LUMBAR DISC DISEASE OR DEGENERATIVE SPINE

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ABSTRACT

Background: Low back pain is a common problem. The aim of this study was to find the therapeutic efficacy of caudal epidural injections in chronic low back pain.

Methodology: This descriptive study was conducted at Department of Orthopedics, AIIMS Rapur, from June 2016 to June 2017. Patients of 20-80 years age with chronic low back pain either due to dic lumbar disc disease or due degenerative spine with atleast 6 month duration not responding to oral medications and physiotherapy were included in the study. Caudal epidural block consisting a mixture of 12.5 ml of local anaesthetics (bupivacaine 0.125%), 2mL of methyl prednisolone 40mg (depomedrol) and 12.5 ml of distilled water was injected through sacral hiatus by using 20 Gauge spinal needle Total 27 ml of mixture was given. The initial pain response was assessed using multiple outcome measures which included Numeric Rating Scale, Oswestry Disability Index 2.0, Additional data including short-term effect (1 week) and medium-term effect (3 months), were collected by a structured proforma.

Results: Seveny six patients with LBP between ages 20-80 years were studied. Out of these 32 (43.75%) were males and 44 (56.25%) females. Twenty-six patients were in the age group of 20-40, thirty-one were in 41-60 age group and nineteen were in 61-80 age group. The mean follow-up period was 3 months. After 3 months (medium-term effect), pain relief of more than 50% persisted in 52 (67%) patients. While less than 24 (32%) of patients experienced no relevant immediate, short-term, or medium-term pain relief.Functional assessment results assessed by the ODI showed significant improvement in the functional status from baseline to 3 months. Reduction of ODI scores of at least 40% was seen in 82% of patients at one week, and 72% of patients at 6 weeks then 70% of patients at 12 weeks (3 months). No complication was seen in any case during or after caudal epidural injection.Conclusion: Caudal epidural injections of bupivacaine and steroid are effective in patients with chronic function-limiting low back pain.

Key words: Low back pain, Caudal epidural injection, Pain relief.

INTRODUCTION

Among chronic pain disorders, low back pain arising from various structures of the spine constitutes the majority of problems.[1] The prevalence of chronic low back pain has been reported as high as 80%.[1-7] Studies of the prevalence of low back pain and its impact on general health showed 25% of patients with high intensity pain also have significant disability. Historically, even though back pain research has primarily focused on younger, working adults, and disc herniation, now there is clear evidence that back pain is one of the most frequent complaints in older persons,[2,8,9,10] Further, low back pain is associated with a significant economic, societal, and health impact.[11,12]

LBP is defined as chronic after 3 months because most normal connective tissues heal within 6-12 weeks unless patho-anatomic instability persists. A slowed rate of tissue repair in the relatively avascular intervertebral disc may impair the resolution of chronic LBP. Traumatic or degenerative conditions of the spine are the most common causes of chronic LBP.[13-17] Many studies have shown significant improvement with caudal epidural injections with or without steroids in patients with chronic LBP.[18-20] In our institution we do caudal block for low back pain as a non operative procedure. Positive result was reported in many patients.

The aim of this study was to find the short and medium-term therapeutic efficacy of caudal epidural bupivacaine and steroid injections in chronic low back pain due to chronic lumbar disc disorder or degeneratives spine.

MATERIAL AND METHODS

This descriptive study was conducted in

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Department of Orthopaedics, All India Institute of Medical Sciences, Raipur over a period of 12 months, from June 2016 to June 2017. Sampling method was of convenience. Patients more than 20 years and less than 80 years with chronic function-limiting low back pain of at least 6 months duration not responding to oral medications, short wave diathermy and physiotherapy, were included in the study. Patients with evidence of disc herniation and those who had undergone and failed to show positive response to facet joint nerve blocks were excluded. Patients with low back pain due to fractured vertebrae, pressure on nerve roots in spinal canal or uncontrolled psychiatric disorders, were also excluded from the study. All patients included were examined and investigated after taking detailed history. History regarding demographic status, duration of LBP, and medications used, was recorded. The severity of backache was assessed by using pain rating scores using the Numeric Rating Scale (NRS). Similarly, work status and functional status was assessed by Oswestry Disability Index 2.0 (ODI). Informed consent was obtained from all the patients.

All injections were performed in orthopaedic operation theatre. The caudal block was performed with the patient lying prone. After appropriate disinfection, the skin over the caudal spine was anesthetized with 2-3 ml of xylocaine 2%. Subsequently, a mixture of 12.5 ml of local anaesthetics (bupivacaine 0.125%) , 2mL of methyl prednisolone 40mg (depomedrol) and 12.5 ml of distilled water was injected through sacral hiatus by using 20 Gauge spinal needle. Total 27 ml of mixture was given. The position of needle was checked by injecting 5.0 ml of air before injecting medicines in the epidural space. The patients were kept under observation for at least 15 minute after termination of the caudal epidural block. The patients were routinely followed up in the orthopaedics outpatient clinic, 6 weeks and 12 weeks. The severity of backache was assessed by using pain rating scores using the Numeric Rating Scale (NRS). Similarly, work status and functional status was assessed by Oswestry Disability Index 2.0 (ODI). The following outcome variables were considered: pain reduction 15-30 min after injection (immediate effect); pain reduction for more than 1 week (6 week usually short-term effect); and pain reduction for more than 3 months (medium-term effect). Responders were defined as those who reported a reduction in pain of more than 50%.

RESULTS

Seventy six patients with Chronic Low back pain either due to chronic lumbar disc disease or due to degenerative spine between ages 20-80 years were studied. Out of these 32 (43.75%) were males and 44 (56.25%) females. Twenty-six patients were in the age group of 20-40, thirty-one were in 41-60 age group and nineteen were in 61-80 age group. (Table 1 and Table 2)

Table 1
Distribution according to sex

Total number of patients	Males	Females
76	32	44

Table 2
Distribution according to Age

Total number of patients	20-40	41-60	61-80
76	26	31	19

The mean follow-up period was 3 months. After 3 months (medium-term effect), pain relief of more than 50% persisted in 52 (67%) patients. While less than 24 (32%) of patients experienced no relevant immediate, short-term, or medium-term pain relief. (Table 3)

Functional assessment results assessed by the ODI showed significant improvement in the functional status from baseline to 3 months. Reduction of ODI scores of at least 40% was seen in 82% of patients at one week, and 72% of patients at 6 weeks then 70% of patients at 12 weeks (3 months). (Table 4)

Table 3
Pain relief outcome of caudal epidural injection in herniated disc patients

Time of review	Total number of patients	Back pain relieved		Improvement in functional score	
		Number of patients	Percentage	Number of patients	Percentage
One week	35	27	77	28	80
6 weeks	35	25	71	25	71
12 weeks	35	23	65	25	71

Table 4
Pain relief outcome of caudal block in patients with degenerative disc disease

Time of review	Total number of patients	Back pain relieved		Improvement in functional score	
		Number of patients	Percentage	Number of patients	Percentage
One week	29	26	89	27	93
6 weeks	29	25	86	24	83
12 weeks	29	25	86	24	83

No complication was seen in any case during or after caudal epidural injection.

In patients with herniated disc pain relief of more than 50% was present in 27 (77%) patients at one week, 25 (71%) patients at 6 weeks, 23 (63%) patients at 12 weeks as shown in Table 1. Functional score improvement of >40% was seen in 28 (80%) patients at one week which gradually decreased to 25 (71%) patients at 6 weeks and 12 weeks.

significant pain relief was found in 26 (89%) patients with degenerative disc disease at one week and 25 (86%) patients at 6 weeks and 12 weeks. Improvement in functional outcome was seen in 27 (93%) patients at one week which decreased to 24 (83%) patients at 6 weeks and 12 weeks.

Out of the 12 patients with lumbar canal stenosis 8 (70%) patients had significant pain relief at one week. at 6 weeks and 12 weeks only 6 (50%) patients had significant pain relief.Functional score improvementt was found in 8 (70%) patients at one week, 7 patients at 6 weeks, 6 patients at 12 weeks. (Table 5)

DISCUSSION

Results of this study of 76 patients demonstrated significant pain relief over 12 weeks period. Similarly, ODI used for functional assessment showed significant improvement with at least 40% reduction in 82% patients in immediate 72% patients in short term and 70% in medium term. This study provides modest results with an average relief for 12 weeks with single epidural block injection. Multiple systematic reviews have shown the positive role of caudal epidural steroid injections in treatment of radicular pain from herniated lumbar intervertebral discs.[18,19] The results of this study reinforce and validate the findings of the studies documented in literature supporting the positive role of caudal epidural steroid injection in management of chronic low back pain.[20-23] The underlying mechanism of action of epidurally administered steroid and local anaesthetic injections is still not well understood. It is believed that the achieved neural blockade alters or interrupts noninceptive input, reflex mechanism of the afferent fibers, self sustaining activity of the neurons, and pattern of central neuronal activities.[24-25] Further corticosteroids have been shown to reduce inflammation by inhibiting either the synthesis or release of a number of pro-inflammatory mediators and by causing a reversible local anaesthetic effect.[24,26] Local anaesthetics have been described to provide short to long-term symptomatic relief based on various mechanisms. It has been described that multiple pathophysiologic mechanisms may be involved in chronic pain,[27] excess release of neurotransmitters causing complex central responses including hyperalgesia and phenotype changes which are also considered as part of neuronal plasticity.[28,29] Local anaesthetics provide analgesia by suppression of nociceptive discharge, the block of axonal transport, the block of reflex sympathetic arc, the block of sensitization, anti-inflammatory effect, and blockade of axonal transport of nerve fibres at lower concentrations compared with those that are necessary for a block of a nerve

Table 5
Pain relief outcome of caudal block in patients with lumbar canal stenosis Secondary to degenerative spine

Time of review	Total number of patients	Back pain relieved		Improvement in functional score	
		Number of patients	Percentage	Number of patients	Percentage
One week	12	8	70	8	70
6 weeks	12	6	50	7	60
12 weeks	12	6	50	6	50

conduction.[28,29,30] The long lasting effect of local anaesthetics in epidural injections has been demonstrated in a multitude of studies.[31] Corticosteroids have therapeutic effects on radicular symptoms caused by lumbar disc herniation due to their anti-inflammatory function. It also exert anaesthetic like action on nociceptive C fiber condition independent of anti inflammatory properties.[32] However, corticosteroids are also known to possess direct neurotoxic effects on peripheral nerve tissue[33,34] unlike local anesthetics. In 1901, Sicard introduced the injection of cocaine through the caudal route into the epidural space and ever since caudal epidural steroid injections are commonly used when dealing with chronic low back and/or radicular pain.[35,36] This approach to the epidural space is the earliest known technique for epidural steroid injection or blocks.[37] However, it did not gain universal recognition until 1925 when Viner popularized its use.[38] The ?rst published report from Evans reported good results of caudal epidural injections containing saline in patients with low back pain.[36] The results were attributed to the physical displacement of the nerves and to lysis of neuronal adhesions provided by the injected saline.[35] Since then numerous studies tried to evaluate the eficacy of caudal epidural steroid injections in patients with chronic low back pain and sciatica. Extensive literature research revealed only a few randomized, double-blind prospective studies assessing the efficacy of this injection technique[36] Dansfield et al[37] evaluated caudal epidural injection and root blocks, but concluded that both treatments were effective and had no signi?cant differences. Singh and Manchikanti[36] evaluated caudal epidural injections with limited success. Bush and Hillier[39] evaluated the injections containing steroid and saline and concluded that in the short term they were effective but the long-term potency was variable. Cuckler et al[35] did a similar study with variable results but favored steroid placement.

We assessed the efficacy of caudal epidural steroid injections containing a preparation of local anesthetic and steroid in a group of patients with chronic low back pain and sciatica.

Our results showed that 64 patients from the group responded well to the first injection itself. Recovery from symptoms was evaluated by ODI score primarily and was steadily observed from the first week following the injection. The main therapeutic result of the injection appeared during the first week itself, when an immediate decrease in the mean ODI score of the patients was noticed. Our result shows that caudal block has superior effect in patients with degenerative disc disease as compared to herniated disc in both short and medium term. Our results support the existence of both short-term and medium-term (up to 3 months) relief from symptoms for the group. The advantages of our study are the large number of patients enrolled, use of validated questionnaires as outcome measures instead of subjective criteria.

The chance of puncturing the dura appears low using the caudal method. The lumbar method carries a risk of trauma to the nerve root during needle placement and also includes the risk of paraplegia if steroid is injected into a radicular artery that supplies the anterior spinal artery.[40] Furthermore, disc infiltration can be a complication of the lumbar access route as well.

CONCLUSION

Caudal epidural steroid injections is a effective treatment method for patients with chronic low back pain. They can be performed easily, as a day-care procedure, less technically demanding, and with low complications compared with surgical treatment. Caudal epidural injections may offer an cost effective alternative approach to managing chronic low back pain.

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ARTHROSCOPIC ASSISTED ACL RECONSTRUCTION THROUGH TRANS - TIBIAL TUNNEL USING BONE - PATELLAR TENDON - BONE GRAFT : SINGLE INCISION TECHNIQUE

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ABSTRACT

Background: In spite of all the controversy, patellar tendon (B-PT-B) graft is still the author's choice being inserted through transtibial tunnel and fixing it by interference screws that too by single mini incision. The aim of this article is to describe the surgical technique and also to discuss the results.

Material & Method: 40 Patients of ACL injuries underwent Arthroscopic assisted ACL reconstruction by different method out of which the procedure of "Arthroscopic assisted ACL reconstruction through trans tibial tunnel using bone - patellar tendon - bone graft: Single incision technique" was done in 26 cases which forms the material for study.

Results: The follow-up study has revealed excellent long term results. 87% of 26 patients had negative pivot shift examination with remaining 13% having grade 1 ligament laxity. Tegner activity levels were similar to preinjury levels, Lyshome score was 91. All patients except one were satisfied with procedure.

Conclusions: Advantages in transtibial femoral tunnel are: simple to create tunnel by single incision, and by single guide pin; easy to insert graft; easy to fix the graft by interference screw. Most endoscopic technique reveals no superior differences in final outcome when compared with our technique. In conclusion, this technique is easy and reliable method with good outcome.

Kew Words: Arthroscpy, Transtibial tunnel, Bone - Patellar tendon - bone graft

INTRODUCTION

The anterior cruciate ligament reconstruction is done to improve stability and function of the knee. In spite of all the controversy, patellar tendon (B-PT-B) graft is still the author's choice being inserted through transtibial tunnel and fixing it by interference screws that too by single mini incision. The aim of this article is to describe the surgical technique and also to discuss the results.

MATERIAL & METHOD

40 Patients of ACL injuries of the Institute from April 2011 to April 2015 underwent Arthroscopic assisted ACL reconstruction by different method out of which the procedure of "Arthroscopic assisted ACL reconstruction through trans tibial tunnel using bone - patellar tendon - bone graft: Single incision technique" was done in 26 cases which forms the material for study. The inclusion criteria for selection of cases for this procedure were isolated complete tear ACL (Grade III injury) in young active patients; evidenced by MRI and clinical examination (pre-operative as well as per operative on table after anaesthesia). ACL injuries associated with other injuries (PCL, LCL, MCL or meniscal injuries) were excluded and were reconstructed by other method.

The patient is positioned supine on the operating table after spinal or general anesthesia. Under

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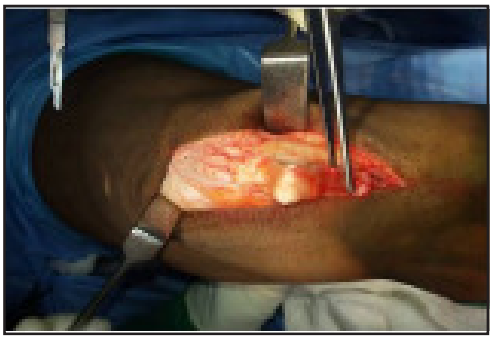
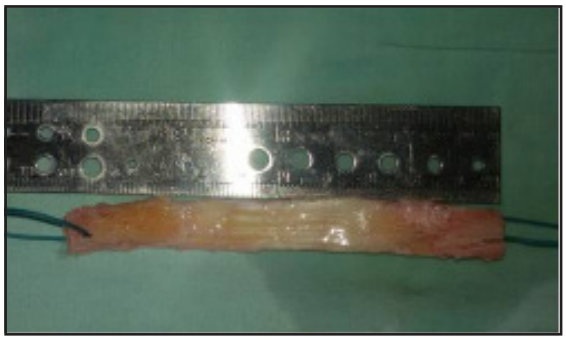
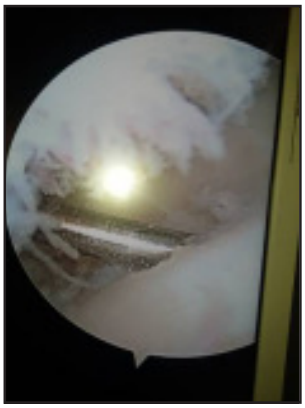
anesthesia, the stability of the knee is evaluated. When the injured side shows clinical evidence of ACL tear, the graft harvesting was planned to perform first; otherwise, a diagnostic arthroscopy is planned to perform first to evaluate the ACL integrity. Under tourniquate control, a 4-5 cm incision is given starting from middle of the patella. B-PT-B graft harvested and given to assistant for preparation (Figure 1). Diagnostic arthroscopy was performed to ensure the isolated ACL injury, through AM and anterolateral (AL) portals. Once ensured, the ACL stump is removed with a mechanical shaver until the tibial and femoral footprints are well visualized.





TRANS-TIBIAL TUNNEL CREATION

A 55° angled ACL guide inserted into the joint through the AM portal. Then the outer sleeve of 55° angled ACL guide is placed at a point located just medial to the tibial tubercle and anterior to the MCL. This point is obtained by elevating the periosteum further medially from tibial tuberocity through the incision given for harvesting the graft. Now the guide pin is drilled into the proximal tibia through guide sleeve and its exit into the joint visualized by arthroscope. The angle guide is removed and then the guide pin is further drilled by free hand technique targeting towards the medial wall of lateral femoral condyle so that it should get 1-2 O'clock position for right knee & 10-11 O'clock position for left knee. By free hand technique, the tibial exit point needs to be changed for 1-3mm from its original exit point to get desired position in femoral side. After this, preparation of transtibial femoral tunnel was started over the guide pin. Initially 4.5mm cannulated drill bit is used to make through & through drill from tibial entry to femoral exit. This makes the drill guide loose for easy passage. Then the cannulated reamers with increasing diameter starting from 6mm to the diameter 1mm above the diameter of the bone plug meant for the femur (usually 8-10mm) is used to drill on the guide pin from tibial entry point to tibial exit to femoral entry to inner surface of the lateral cortex of femoral tunnel. This completes the preparation of femoral tunnel through transtibial tunneling in continuity in straight line. Now the tibial tunnel is further reamed (if required) up to the diameter 1mm above the diameter of the bone plug meant for the femur (usually 9-11mm). This completes the preparation of tibial tunnel (Figure 2).

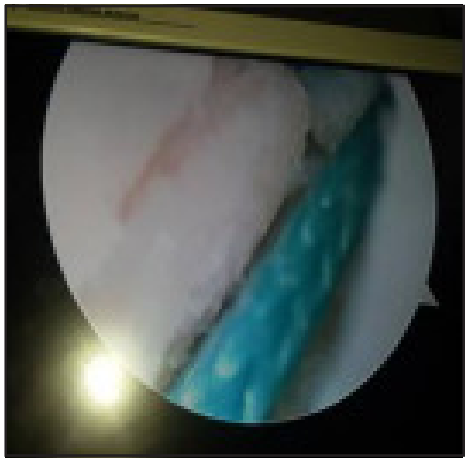


GRAFT INSERTION

A no. 5 braided shuttling suture (Ethibond) is looped through the drill hole made on tibial end of B-PT-B graft and passed through the eyelet of the guide pin. The guide pin is pulled from the antero-lateral side of the thigh, retrieving the two free ends of the suture proximally. Now the free ends of sutures are further pulled by holding with an artery forceps to pull the graft into the tibial tunnel then to joint and the finally to femoral tunnel (Figure 3).

GRAFT FIXATION

We used interference screw for both sides. With the knee at 100-110° of flexion, a guide wire for the cannulated interference screw (titanium / bioabsorbable) is inserted through the stab made through exposed patellar fat pad parallel to the tibial tunnel. Interference screw inserted through it. Tibial fixation of graft was done by interference screw in usual manner.


CLOSURE, DRESSING & REHABILITATION

The longitudinal gap of patellar tendon was approximated properly by absorbable suture. Paratenon closed nicely and finally the skin was closed by non-absorbable suture. Dressing and then compression bandage (Robert Jone's Bandage) applied. Patient shifted to ward and an accelerated rehabilitation program is implemented, the day of surgery.

RESULTS

The follow-up study of 3-4 years of patients operated in our institute with single incision transtibial B-PT-B graft for ACL construction has revealed excellent long term results. 87% of 26 patients had negative pivot shift examination with remaining 13% having grade 1 ligament laxity. Tegner activity levels were similar to preinjury levels, Lyshome score was 91.No patients exhibited any long term patellar tendinitis however low incidence of patellar pain (17%) was noted. All patients except one were satisfied with procedure. The dissatisfaction of one patient was stiffness of the knee which was manipulated under anaesthesia even then some degree of stiffness persisted.

CONCLUSIONS

Which portal is the best for femoral drilling is still on debate. Advantages in transtibial femoral tunnel are: simple to create tunnel by single incision, and by single guide pin; easy to insert graft; a more accurate graft placement in 1-2 or 10-11 O'clock position as it offers partly free hand technique; easy to fix the graft by interference screw. Most endoscopic technique reveals no superior differences in final outcome when compared with our technique. In conclusion, drilling the femoral tunnel through the trans-tibial portal by single incision is easy and reliable method with good outcome.

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FUNCTIONAL OUTCOME OF OPEN REDUCTION & INTERNAL FIXATION OF CAPITELLAR FRACTURES IN ADULTS

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ABSTRACT

Introduction: Capitellar fractures in adults are not only rare injuries but also a challenging one to manage. Very few studies have been published in literature, in view of which we present our study done in our institute with a purpose to evaluate the functional outcome of open reduction & internal fixation (ORIF) of capitellar fractures in adults.

Materials and method: 10 patients (two males and 8 females) of capitullam fracture were studied retrospectively from April 2013 to March 2016. All cases were operated by open reduction & internal fixation (ORIF) within 7-11 days of injuries. Fixation was done by Herbert screws in 7 cases, cannulated cancellous screw (CCS) in 2 cases and by K- wires only in 1 case. 1 case of Herbert screw & similar number of CCS was supplemented by 1 or 2 k wires. Follow up for a mean period of 31 months was done in all patients and final functional outcome was assessed using Mayo elbow performance index and by radiology.

Result: The mean Mayo elbow performance index score was 90. As per this evaluation of the functional rating the 7 patients (fixed by Herbert screws) had excellent results, 2 cases (fixed by CCS) showed good result however 1 case (fixed with K-wire) had fair result. The mean range of elbow flexion/extension was 120 (110 - 130) while range of movement in supination/pronation was 120-180. None except one had complications like avascular necrosis, myositis osiificans, osteoarthrosis or fixation failures. One case of capitullam fracture associated with communied fracture of lateral condyle showed malunion with anterosuperior migration which was excised in due course and the final outcome was good.

Conclusion: Open reduction & internal fixation (ORIF) of capitullam fracture gives good functional outcomes irrespective of the implants but Herbert screw was found to be superior. In choosing the right surgical approach and implants, preoperative computed tomography is helpful. Apart from stable internal fixation, early mobilization and rehabilitation are the keys for optimum functional outcome.

Key words: Capitulum fracture, Fracture fixation, Elbow joint.

INTRODUCTION

Capitellum fracture is one of the rare fractures around elbow accounts for approximately 1% of all elbow fractures and 6% of distal humerus fractures.[1,2] Most of these fractures are due to a direct force transmitted through the radial head that provides a shearing and/or compressive load to the capitellum and occasionally to the trochlea.

The outcome is invariably poor in displaced fractures if left untreated. Superior migration and union with anterior humerus is not uncommon causing mechanical block to elbow flexion by obstructing the radial and/or coronoid fossa. Various classification systems have been given for capitellar fracture e.g. Bryan and Morrey classification,[2] Mckee et al. classification,[3] Ring classification,[4] AO classification[5,6] Dubberley classification[6] etc.

Dubberley classification is popular amongst all which considers posterior condylar comminution and also recognizes fractures splitting the trochlea and capitellum into different fragments as a separate entity.[4] It classifies capitellar fractures into 3 types, Type 1 - injuries involving primarily the capitellum with or without lateral trochlear ridge. Type 2 - injuries involving the capitellum and trochlear as one piece. Type 3 - injuries involving capitellum and trochlear as separate piece. Type 3 is again sub classified into A and B, A - without posterior communition, B - with posterior communition.

The treatment options for these injuries includes conservative methods, fragment excision and open

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reduction and internal fixation (ORIF) depending upon the indication. Presently, ORIF is the preferred method for early mobilisation, stable anatomical reduction and maintenance of articular congruity.[2,6,7,8]

The ORIF can be done by various implants starting from simple K-wires and screws to special screw like Herbert screw. But due to the rarity of these fractures, it has been difficult to formulate a universally accepted method of fixation. Very few studies have been published in literature, in view of which we present our study done in our institute with a purpose to evaluate the functional outcome of open reduction & internal fixation (ORIF) of capitellar fractures in adults.

MATERIALS AND METHODS

A retrospective study for capitellar fracture treated by ORIF in our institute was done after proper approval by the relevant ethical committee. A full informed consent was taken from all subjects to participate in this study. 10 patients (two male and 8 female) of capitullam fracture were studied retrospectively from April 2013 to March 2016. The cases were selected from medical record department of this institution by review of the case files from January 2013 to March 2016. Patients having isolated fracture of capitulum confirmed by preoperative radiolograph and / or CT scan are included in this study. Patients having other associated fracture around elbow along with capitellar fracture are excluded from study.

All cases were operated by open reduction & internal fixation (ORIF) within 7-11 days of injuries. Fixation was done by Herbert screws in 7 cases, cannulated cancellous screw (CCS) in 2 cases and by K-wires only in 1 case. 1 case of Herbert screw & 1 case of CCS was supplemented by 1 or 2 k wires. Follow up for a mean period of 25 months was done in all patients for clinical & radiological evaluation. Dubberley classification was used to classify fractures in this study and final functional outcome was assessed using Mayo elbow performance index (MEPI) and by radiology. MEPI (Table 1) is one of the most popular elbow rating systems where the total score ranges from 5-100 points, with larger scores indicating better function. The result can be considered excellent, if the total score is between 90 and 100 points; good, between 75 and 89; fair, between 60 and 74 points; poor, less than 60 points. Complete demographic profiles of all 10 patients are in Table 2.

Table 1
Mayo elbow performance index (MEPI)

Variable	Definition	No of points
Pain	None	45
	Mild	30
	Moderate	15
	Severe	00
Stability	Stable	10
	Moderately unstable	05
	Grossly unstable	00
Function	Able to comb hair	05
	Able to feed oneself	05
	Able to perform personal hygiene tasks	05
	Able to on shirt	05
	Able to put on shoes	05

Table 2
Complete demographic profiles of all 10 patients

Sr.No	Age/Sex	Side of elbow	Date of Injury	Date of Operation	Mechanism of injury	Type of fracture	Implant used for ORIF	Follow up period
01	44yrs/Male	Right	18/11/2013	27/11/2013	Indirect injury	Type-II	Herbert Screw + K-wires	46 months
02	45 yrs/F	Right	10/01/2014	29/01/2014	Indirect injury	Type-I	Herbert Screw	38 months
03	20yrs/F	left	24/04/2014	05/05/2014	Direct injury	Type-I	Herbert Screw	39 months
04	35yrs/M	left	06/04/2015	13/04/2015	Indirect injury	Type-I	CCS + K-wire	31 months
05	64yrs/F	Right	21/09/2015	29/09/2015	Indirect injury	Type-II	K-Wires	23 months
06	33yrs/F	Right	21/12/2015	30/12/2015	Indirect injury	Type-I	Herbert Screw	22 months
07	54yrs/F	Left	24/08/2016	07/09/2016	Direct injury	Type-I	CCS	13 months
08	35yrs/F	Left	07/10/2016	26/10/2016	Indirect injury	Type-I	Herbert Screw	13 months
09	29 yrs/F	Right	14/10/2016	24/10/2016	Indirect injury	Type-I	Herbert Screw	13 months
10	32 yrs/F	Right	28/10/2016	08/11/2016	Indirect injury	Type-II	Herbert Screw + K-wires	12 months

SURGICAL TECHNIQUE

All cases were operated under general anaesthesia, under tourniquet control by lateral approach. Fracture site was cleared of haematoma and soft tissue debris for better identification of the fracture fragments which were reduced and fixed temporarily with Kirschner wires (K wires). Reduction was confirmed under image intensifier, and then definitive fixation was done using 4 mm cannulated cancellous screws / Herbert screws. In one case of old aged female we continued the temporarily fixed K wires as definitive treatment as the bone was very osteoporotic. We have not used bone grafts in any of our patients as it was not required. Postoperatively, above elbow slab was given to patients to immobilise the elbow for 10-15 days following which gentle active mobilization was started. Regular monthly follow-up was done for all patients for a minimum of 6 months to assess the functional (MEPI) and radiological outcome.

RESULTS

In the present study, we evaluated 10 cases of capitellar fracture. Out of them, eight were females and two males. Mean age of subjects was 39 years ranging from 20-64 years. All 10 patients were right handed out of which 6 had involvement of right (dominant) side and 4 had left (non dominant) side. As per Dubberley's classification, 7 patients had type I fracture and 3 had type II fracture. Mean time delay for surgery was 11.6 days in 10 patients. Two patients had delayed surgery (90 days from the date of injury). Average follow up duration was 25 months with range of 12 months to 48 months.

The mean Mayo elbow performance index score was 90. As per this evaluation of the functional rating the 7 patients (fixed by Herbert screws) had excellent results, 2 cases (fixed by CCS) showed good result however 1 case (fixed with K-wire) had fair result. The mean range of elbow flexion/extension was 120 (110-130) while range of movement in supination /pronation was 120-180. None except one had complications like avascular necrosis, myositis osiificans, osteoarthrosis etc. One case of capitullam fracture showed malunion with anterosuperior migration of fracture fragment (may be because of fixation failure) which was excised in due course with good functional outcome. All the patients returned to their

previous levels of activity. Statistically, there were significantly more females (08/10) than males and majority had fractures in dominant upper limb.

DISCUSSION

REVIEW OF LITERATURE

In 2003 Ring et al.[4] did retrospective study of outcome of 21 cases of capitellum and trochlear fractures treated by ORIF using Herbert screws8. With average follow-up of 40 months the MEPI were excellent in four, good in twelve and fair in five without any evidence of radiographic arthritis or osteonecrosis.

Dubberley et al.[6] reported the results of ORIF by cannulated cancellous screw of capitellum and trochlear fractures in 28 patients prospectively with mean follow up period of 56±33 months.[4] The average flexion of 138° and extension of 19° and supination of 74° and pronation of 82° were observed with average MEPI score of 91 corresponding to excellent outcome. Nine patients had radiographic evidence of osteoarthritis and three patients had evidence of osteonecrosis.

Ruchelsman et al.[1] reported outcome of ORIF by Herberts screws in 16 patients of Capitellum fractures and followed up for a maximum period of 2 years2. The average ulnohumeral arc was 123° with average flexion of 133° and average contracture of 10° with full forearm rotations. Nine were excellent, six good and one fair outcome according to MEPI scores. Four patients had radiographic evidence of osteoarthritis and osteonecrosis was not noted in any patient. The study had a small cohort with limited duration follow up and is a retrospective study.

Mighell et al.[5] did a prospective study of 18 patients of large coronal shear fractures of capitellum and trochlea, stabilized with cannulated headless compression screws with an average delay of 10 days, followed prospectively for a period of 26 months.[1] There were 11 type 1 and 7 type 2 cases according to Dubberley classification. Lateral Kaplan approach was used in all cases. The average ROM in flexion extension was 128° and in pronation supination 176° after follow-up period of 26 months. Broberg Morrey score was used in the study with average score of 93.3 points; 12 excellent, 5 good and 1 poor result. Five patients had radiographic evidence of osteoarthritis, 3 had osteonecrosis and 3 cases of heterotopic ossification noted. He also reported that no difference in BM score and Range of movements (ROM) of type 1 and 2 fractures.

Bilsel et al.[9] studied 18 cases of coronal plane fractures of the distal humerus involving the capitellum and trochlea treated by ORIF with cancellous screws with a mean follow up period of 43.6 months. Out of 18 cases 7 had type I, 5 had type-III, and 6 had type-IV fractures according to Bryan Morrey Classification. The mean MEPI score was 86.7, corresponding to 12 excellent, 2 good, and 4 fair outcomes.

Raju et al. studied[10] 18 patients with capitellum fractures treated with ORIF using cannulated cancellous screws. Sixteen cases were operated within 9 days of injury. The mean follow up period was 49 months and the mean Mayo elbow performance index score was 95. All patients except one had excellent functional ratings according to this evaluation. The mean range of movements at elbow in flexion/extension was 1240 (1140-1340) while range of movements in pronation/ supination was 1720 (1240-1800). Radiologically one patient had secondary arthritis after

DISCUSSION RELATED TO PRESENT STUDY

ORIF is the choice of treatment for capitellum fractures irrespective of its type. For fixation of this fracture, Herberts screws and cannulated cancellous screws are widely used for fixation however use of k-wires is not outdated. In the present study which was spread over 4 years, we have used all above implants and the results are comparable to other studies.

Retrospectively 10 patients were evaluated for an average period of 25 months. Several studies using headless compression screws have shown mostly good to excellent results (using varying rating systems) for all types of capitellum fractures over a wide range of follow-up.

The extensile lateral approach was used by most of authors for exposure of fracture. Olecranon osteotomy and medial approach were associated with higher flexion contracture rates and hardware problems associated with olecranon osteotomy necessitating re-surgery for hardware removal. And these exposures were used for higher classes of fracture classification for better exposure. In present study we have used Extensile Lateral approach for all the cases for fixing the fracture and a separate medial approach or olecranon osteotomy was not necessary in any of the cases as most of our cases were type - I (isolated capitellar fracture).

Despite using various implants for stabilisation of fracture, the range of motion achieved was comparable to each other and also with other studies. In most of the studies, there is female predominance of this capitellum fracture. The cause behind the same is increased valgus carrying angle of 5° compare to male leading to greater impact forces to the lateral column in fall on an

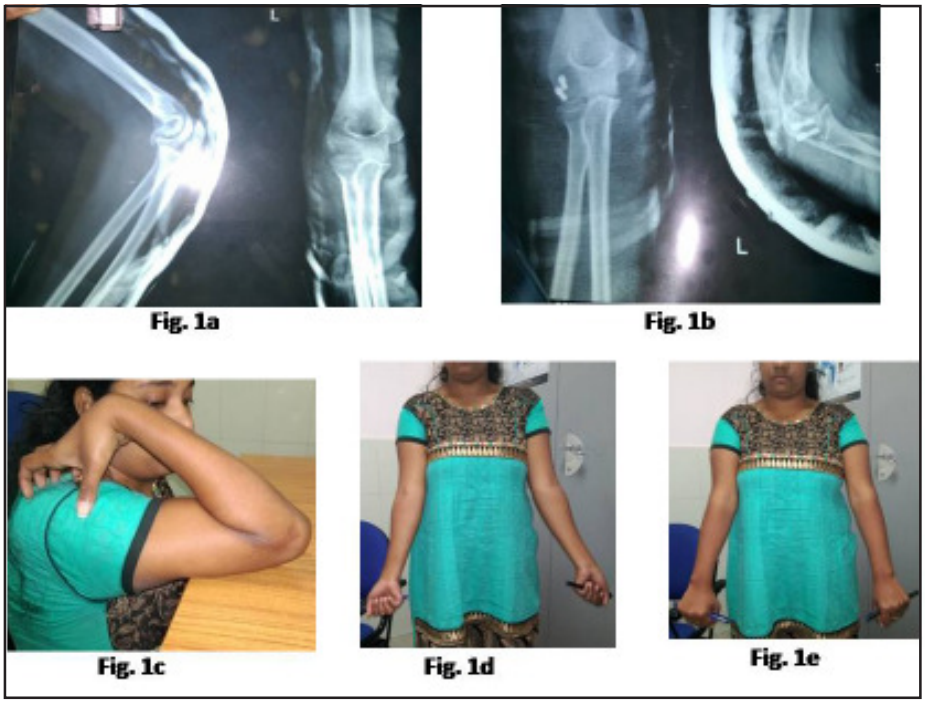

Fig. 1 : Fracture capitulum in 20 yrs, female fixed by two Herbert screws showing excellent result:
Fig. 1a : Preoperative radiograph Fig. 1b : 39 months (post op) follow-up radiograph
Fig. 1c : Full flexon of elbow at last follow - up Fig. 1d : Full extension of elbow at last follow - up
Fig. 1e : Full pronation / supination of elbow at last follow - up

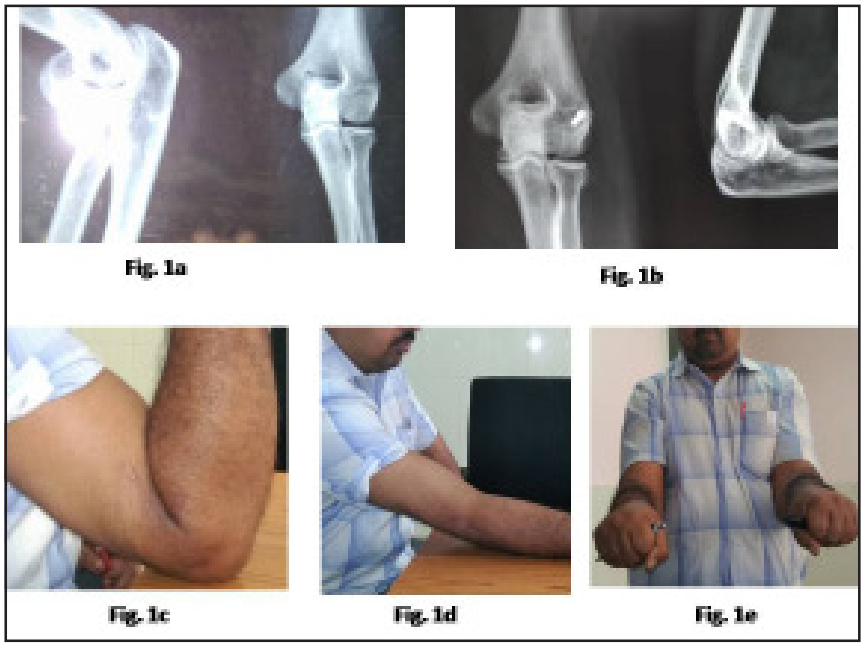

Fig. 2 : Fracture capitulum in 35 yrs, male fixed by single Herbert screws showing excellent result:
Fig. 1a : Preoperative radiograph Fig. 1b : 31 months (post op) follow-up radiograph Fig. 1c : Full flexon of elbow at last follow - up
Fig. 1d : Full extension of elbow at last follow - up Fig. 1e : Full pronation / supination of elbow at last follow - up

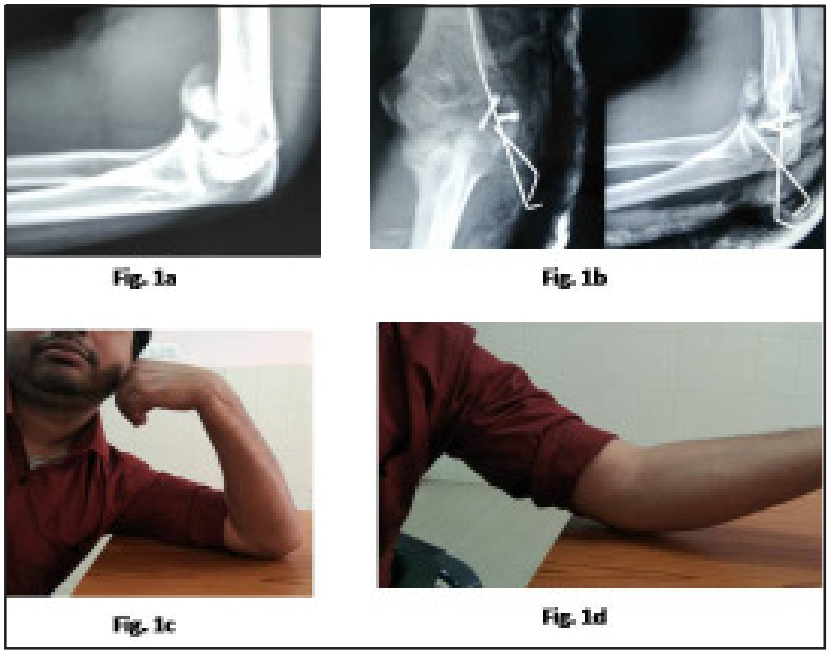

Fig. 3 : Fracture capitulum in 44 yrs, male fixed by 2 CC screws supplemented by k-wires showing poor fixation led to malunion with anterosuperior migration which was excised in due course with reasonably good result:
Fig. 1a : Preoperative radiograph Fig. 1b : Post op radiograph showing poor fixation
Fig. 1c : Limited flexon of elbow at last follow - up Fig. 1d : Limited extension of elbow at last follow - up

Fig. 4 : Fracture capitulum in 64 yrs, female fixed by multiple k-wires showing poor fixation led to fair result:
Fig. 1a : Preoperative rediograph Fig. 1b : Post op radiograph showing poor fixation
Fig. 1c : Limited movement of elbow at last follow - up

outstretched hand. Low bone mineral density in women compare to male could be another contributing factor for the same. In our study also, 08 out of 10 patients were female showing female predominance. The only contradicting observation of our study previous studies was increased predominance in dominant extremity i.e. 6 out of 10 patients. The reason for this was unclear and need to be assessed (Table 3).

CONCLUSION

Open reduction and internal fixation using cannulated cancellous screws via a lateral approach is a reliable treatment for capitellum fractures and results in stable fixation and restoration of a functional arc of motion. With proper technique mechanical obstruction can be avoided and the results are comparable to earlier literature using headless screws.

Table 3
Comparison of present study of capitellar fractures with Previous studies

Study	Number of patients	Duration of follow up	Material used	Assessment method	Outcome	Complications
Dubberley	28	58 months	Cannulated cancellous screws in type I and bone grafting in type II & III	MEPI	Overall mean score in MEPI – 91	9 osteoarthritis 3 osteonecrosis
Ruchelsman	10	24 months	Herbert screws	MEPI	9 – excellent 6 – good 1 – fair	—
Mighell	18	26 months	Headless Compression Screws	Broberg Morrey	12 – excellent 5 – good 1 – poor	—
Bilsel	18	43.6 months	Miscellaneous	MEPI	12 – excellent 2 – good 4 – poor	—
Raju et al.	18	49	Cannulated cancellous screws	MEPI	17 – excellent 1 - poor	1 osteoarthritis
Present Study	10	25	Herbert screws + k-wires – 07 CC screws + k-wires – 02 K-wires - 01	MEPI	7 – excellent 2 – good 1 – fair	1 Malunion with anteroposterior migration

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HYPOVITAMINOSIS D IN FRAGILITY HIP FRACTURE PATIENTS

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ABSTRACT

Introduction: Vitamin D is a fat soluble hormone required for maintaining serum calcium, optimising bone metabolism and controlling numerous extra-skeletal health benefits. Recent literature across the world is uncovering global existence of vitamin D deficiency. There are many reports of insufficient treatment of metabolic aspect of hip fracture mainly due to unawareness of its existence among orthopaedic surgeons. So, we conducted this study in hip fracture patients to gain insight into the vitamin D status of this specific population.

Materials and Methods : It is a descriptive cross sectional study of 68 fragility (non-traumatic) hip fracture patients of age 50 years and more. Exclusion criteria consisted of patients on any medications affecting calcium or vitamin D metabolism and patients with systemic illnesses interfering with vitamin D metabolism. Collected blood investigations included blood haemoglobin, total and differential leucocyte counts, erythrocyte sedimentation rates, blood urea, serum creatinine, liver function tests including serum alkaline phosphatase, serum calcium, and 25 (OH) vitamin D3 levels.

Result : Vitamin D deficiency was observed in 70.5% of patients. All the patients reported non-sedentary life style. Blood levels of serum calcium and serum alkaline phosphatase were also recorded and correlation coefficient was calculated and analysed between different variables.

Conclusion : Our study shows reasonably high prevalence of hypovitaminosis D in fragility hip fracture patients even with non-sedentary life stylethough this was one of the lowest prevalence reported from India. Vitamin D replacement should always be considered as an important component of hip fracture management.

Key words: Vitamin D deficiency, Hypovitaminosis D, vitamin D status

INTRODUCTION

Vitamin D or the 'sunshine vitamin' is actually a lipid-soluble hormone which is essential for optimising bone and neuromuscular health, and maintaining functions of numerous metabolic processes by maintaining calcium homeostasis. 7-Dehydrocholesterol present in the skin undergoes a nonenzymic reaction on exposure to ultraviolet light, yielding previtamin D. This undergoes a further reaction over a period of hours to form cholecalciferol, which is absorbed into the bloodstream. Cholecalciferol, either synthesized in the skin or from food, undergoes two hydroxylations to yield the active metabolite, 1,25-dihydroxyvitamin D or calcitriol. Ergocalciferol from fortified foods undergoes similar hydroxylation to yield ercalcitriol. The principal function of vitamin D is to maintain the plasma calcium concentration by (1) increasing intestinal absorption of calcium, (2) reducing excretion of calcium by kidneys and (3) mobilizing bone mineral.

The non-skeletal health benefits of optimum vitamin D status include cancer chemoprevention,[1] activation of the innate immune system, decrease in the risk of autoimmune diseases,[2] better metabolism with optimum cardiovascular health and prevention of diet-induced obesity,[3-9] improvement of muscle function of elderly and reduction in the risk of falls by about 20%,[10] and decreased mortality.[11-13]

The deficiency of vitamin D was earlier recognised during the industrial revolution of the 1800s, among children who lived in crowded, polluted and dimly-lit urban areas. Human inquisitiveness lead to expansion of knowledge related to dietary and nutritional aspects of vitamin D. By the end of the 1920's rickets and osteomalacia were considered to be deficiency diseases, and were potentially curable and preventable by the addition of vitamin D to the diet. In the recent decades, one of the major achievements of modern medical science is gradual increase in the global life expectancy.

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Life expectancy increased globally around >6 years and in India around 10 years in last 2 decades.[14-15]

We can safely label it as 'geriatric medical revolution' of 2000s as an analogy to industrial revolution of 1800s. With increasing longevity, BMD decreases and prevalence of osteoporosis increases leading to increasing global burden of fragility fractures including fragility hip fractures.[16,17]

Fragility fractures are fractures that result from 'low energy' trauma that would not ordinarily result in fracture. Fragility fractures occur most commonly in the spine (vertebrae), hip (proximal femur), and wrist (distal radius). Continued research into the causes of osteoporosis and fragility fractures lead to expansion of knowledge related to biochemical and metabolic aspects of bone including hypovitaminosis D. The increasing insight into bone health and hypovitaminosis D is gradually unravelling the global burden of hypovitaminosis D, and this discovery is being regarded as re-emerging major public health issue, as this is second emergence after industrial revolution.[18] But, we believe that this global deficiency existed before and only our renewed recent interest in osteoporosis related research has just uncovered it. Besides, all ages are equally susceptible to this deficiency, and not only the geriatric age groups.[19,20] Furthermore, it is a long held belief that hypovitaminosis D is associated with sedentary life styles as being sedentary is associated with decreased time spent outdoors leading to overall poor sun exposure and less physical activity with risk of obesity.[20,21]

Our Institute provides tertiary level health care facility to industrial and related workers and their families. Industrial and related workers are generally thought to have non-sedentary life styles. So, in order to have a better insight into our patients in the light of recent research globally related to hypovitaminosis D, we conducted cross sectional study of bone biochemistry and hypovitaminosis D in fragility hip fracture patients.

MATERIALS AND METHODS

It was a descriptive cross sectional study conducted in the Orthopaedics Department of our institute between June 2015 and March 2017. The main aim of the study was to evaluate prevalence of vitamin D deficiency in fragility hip fracture patients. This study was conducted according to the Declaration of Helsinki. The study was approved by the Ethics Committee of the Institute and informed consent was obtained from all patients. All the patients presented to this institute with fragility hip (intertrochanteric and neck of femur) fracture were recruited by non probability consecutive sampling during this period. Inclusion criteria included patients with fragility hip fracture aged 50 and above, and presenting within one week of sustaining trauma. Exclusion criteria comprised of non-ambulatory patients, all fractures due to high energy trauma (road traffic accident, fall from height etc.), patients on calcium or vitamin D supplementation or on anti-osteoporotic medications, or any medications affecting calcium or vitamin D metabolism like steroids (if taken for more then 2 weeks in last 6 months),[22] anticonvulsants, antitubercular, anticancer, antiretroviral and anticoagulants etc. Also excluded were the patients with previous history of (fragility) fracture of hip, spine, wrist or forearm, any history of uncorrected refractive errors or with altered mental status. Patients with systemic illnesses interfering with vitamin D metabolism like primary hyperparathyroidism, chronic kidney diseases (serum creatinine >1.5 mg/dl), chronic liver disease (raised serum transaminases/bilirubin), malignancy, inflammatory bowel disease and any bowel resection surgery etc. were also excluded. Based on inclusion and exclusion criteria, a total of 68 patients consented for the study during the study period and were included in the study. Along with proper history, patients were asked about adequacy of sun exposure, too. Adequate sun exposure was defined as around 2 hour per week of outdoor activity during the summer with exposure of the face, hands and arms (approximately 25% of the body surface area).[23]

Collected blood investigations included blood haemoglobin, total and differential leucocyte counts, erythrocyte sedimentation rates, blood urea, serum creatinine, liver function tests (bilirubin, aspartate transaminase, alanine transaminase, serum albumin), and markers of bone metabolism namely serum alkaline phosphatase (SAP), serum calcium, and 25 (OH) vitamin D3. For fracture classification, X-ray of the concerned hip, anteroposterior and lateral views were taken. First blood sampling, which included blood haemoglobin, total and differential leucocyte counts, erythrocyte sedimentation rates, blood urea, serum creatinine, liver function tests (including SAP) needed for pre-anaesthetic check-up, was taken either on the day of admission or next day, if patient admitted in late evening or night hours. If the patient satisfied the study criteria and consented for study, blood sampling for serum calcium and serum 25(OH) vitamin D was done next day. Serum level of 25(OH) vitamin D3 was checked using electro chemiluminesence immunoassay system (Beckman Coulter Access 2). The reference range for normal SAP was taken as 70-140 U/L, as dictated by our institutional reference range.Khadgawat et al described prevalence rate of 96.7% of vitamin D deficiency in Asian-Indian patients with fragility hip fracture, in 2010.[24] Based on this provisional prevalence rate of around 96%, with maximum allowable error as 5% of p, the sample size

was found to be around 62. So, the recruitment of 68 patients reasonably justified provisional prevalence rate. Samples were collected throughout the year with equal representations in winter and summer months.

RESULT

The study included total of 68 patients, of which 28 were males and 40 females. 26 were intertrochanteric fractures and 42 were neck of femur fractures. The mean age of the patients was 65.4 years (range from 50 to 87 years). The mean ages of male and female patients were 66.8 and 64.4 years, respectively. Table 1 shows basic demographic profile of patients.

Table 1
Basic demographic profile of patients

	Intertrochanteric Fracture (26)		Neck of femur fracture (42)	
	Right	Left	Left	Right
Males (28)	4	6	11	7
	10		18	
Females (40)	9	7	12	12
	16		24	
		(36)		
		(32)		

Vitamin D level

The mean 25 (OH) vitamin D3 level was 36.55±2.55 nmol/L (range 4.9-109.6 nmol/L). Vitamin D deficiency was observed in 70.5% (48 patients). Severe deficiency, relative insufficiency and optimum level were detected in 10.3% (7 patients), 10.3% (7 patients) and 8.8% (6 patients), respectively. Age wise deficiency grading is given in Table 2. Nature of deficiency in males and females has been stated in Table 3. The standard deviation was found to be 21.064. The box plot of sample data is presented in Figure 1. Standard error was found to be 2.554.

Table 2
Age wise vitamin D deficiency

Age group	Severe Vitamin D deficiency (< 12.5 nmol/L)	Vitamin D Deficiency (<50 nmol/L)	Relative insufficiency (50-70 nmol/L)	Optimum level (> 70 nmol/L)
50-59 years	2	13	4	1
60-69 years	2	15	1	2
70-79 years	1	15	2	2
80 years and above	2	5	0	1

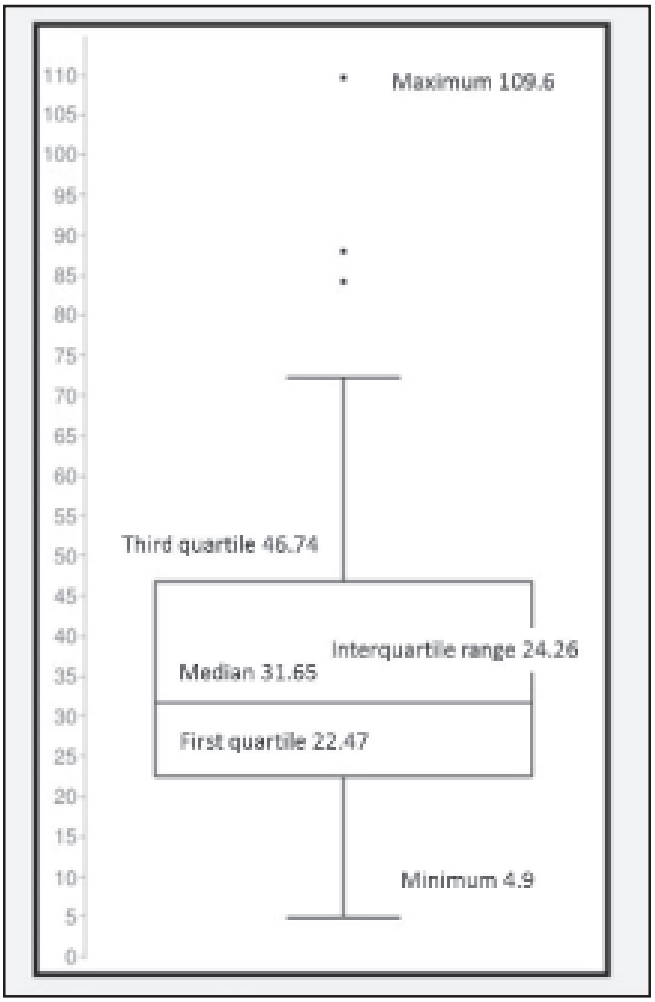

Fig. 1 : Box plot of vitamin D level

Table 3
Vitamin D deficiency in males and females

Gender	Severe Vitamin D deficiency (< 12.5 nmol/L)	Vitamin D Deficiency (<50 nmol/L)	Relative insufficiency (50-70 nmol/L)	Optimum level (> 70 nmol/L)
Males (28)	4	17	5	2
Females (40)	3	31	2	4

Serum alkaline phosphatase

All but 3 patients had raised SAP level (95.6%). The mean was 252.8 U/L (range 107-132 U/L). The mean SAP observed in different severity of vitamin D status, namely, severely deficient, deficient, relative insufficiency and optimum level were 281, 257, 227 and 218 U/L respectively (Table 4).

Table 4
Mean serum calcium and SAP in different grades of vitamin d deficiency

Mean	Severe Vitamin D deficiency (< 12.5 nmol/L)	Vitamin D Deficiency (<50 nmol/L)	Relative insufficiency (50-70 nmol/L)	Optimum level (> 70 nmol/L)
Mean serum calcium (mg/dl)	8.6	8.5	8.9	8.9
Mean SAP (U/L)	281	257	227	218

Serum calcium

Mean serum calcium was found to be 8.6 mg/dl (range 7.3-9.6 mg/dl). Again, the mean serum calcium observed in different severity of vitamin D status, namely, severely deficient, deficient, relative insufficiency and optimum level are 8.6, 8.5, 8.9 and 8.9 mg/dl respectively (Table 4).

Correlation coefficient

Pearson correlation coefficient was calculated between scientifically plausible parameters of biochemical bone quality to know the strength and direction of existence of any linear relationship between different variables.

Vitamin D (x) and serum calcium (y): correlation coefficient = 0.0244 (Figure 2).

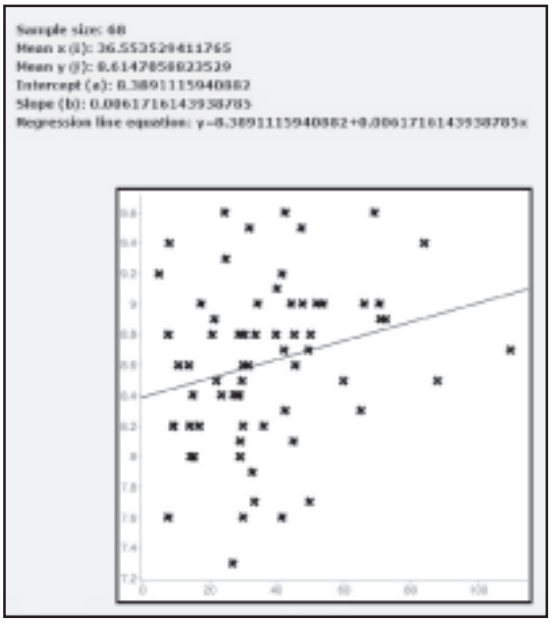

Fig. 2 : Correlation coefficient between Vitamin D (x) and serum calcium (y): (correlation coefficient = 0.0244).

Vitamin D (x) and SAP (y): correlation coefficient = -0.122 (Figure 3).

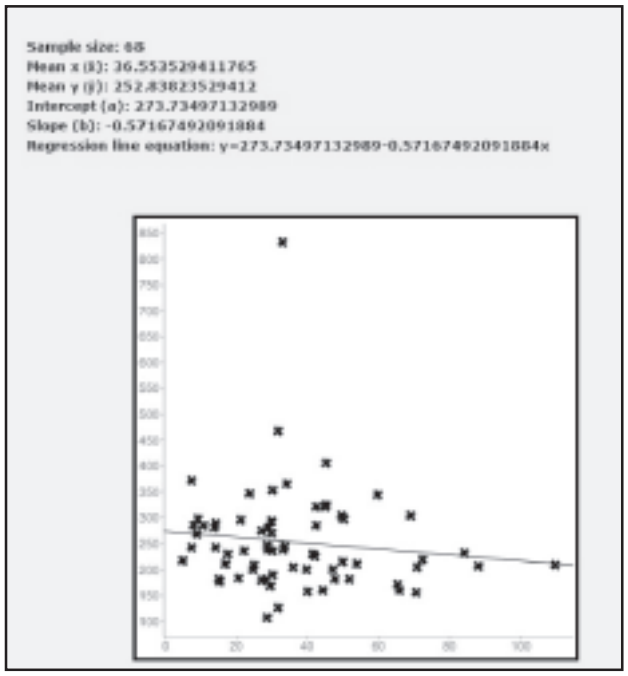

Fig. 3 : Correlation coefficient betweenVitamin D (x) and SAP (y): (correlation coefficient = -0.122)

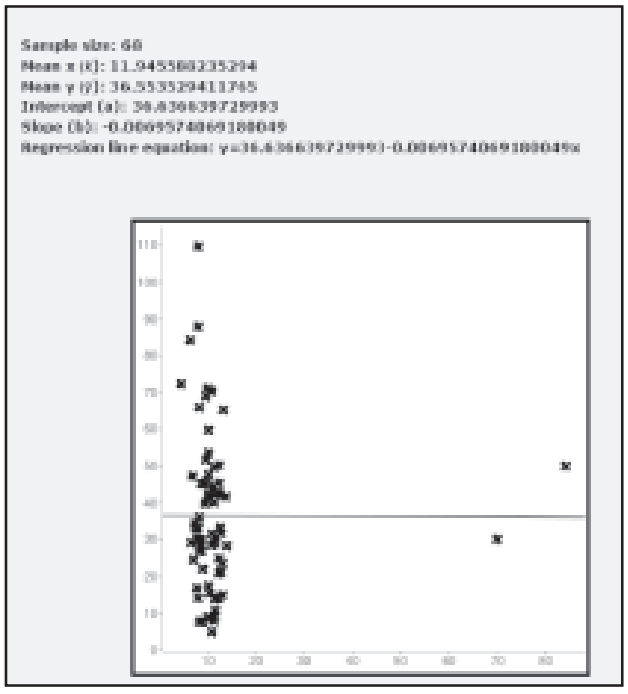

Fig. 4 : Correlation coefficient between Haemoglobin (x) and vitamin D (y): (correlation coefficient = -0.038)

Haemoglobin (x) and vitamin D (y): correlation coefficient = -0.038 (Figure 4).

Sun exposure and life style

Surprisingly, all the patients included in the study reported non-sedentary life style with adequate sun exposure.

DISCUSSION

Optimum vitamin D level and hypovitaminosis D

Although there is no consensus on optimal levels of 25 (OH) D3 as measured in serum, vitamin D deficiency is defined by most experts as a 25 (OH) D3 level of less than 50 nmol/L, whereas levels of 50 - 70 nmol/L, > 70 nmol/L and < 12-5 nmol/L are regarded as relative insufficiency, optimum level and severe deficiency, respectively.[24-27]

Khadgawat et al (2010) observed 96.7 % (all patients except one) of patients with fragility hip fracture had vitamin D deficiency with mean vitamin D level of 25±12 nmol/L. Another 2 studies from India has reported the prevalence of hypovitaminosis D (cut-off 50 nmol/L) as 74%, in fragility hip fracture,[28] and 82% in patients presenting with orthopaedic trauma,[29] whereas, some other studies from Brazil, Egypt and China reported a prevalence of 54.5%, 60.9% and 71.3% in fragility hip fracture, respectively.[30-32] The occurrence of hypovitaminosis D in fragility hip fractures or otherwise is global.

We observed Vitamin D deficiency in 70.5% (48 patients), with mean 25 (OH) D3 level of 36.55±2.55 nmol/L (range 4.9-109.6 nmol/L). Many other studies have also reported presence of hypovitaminosis D in hip fracture.[33-37]

There are various risk factors that have been described for hypovitaminosis D namely, older age, female gender, darker skin pigmentation, clothing and cultural practices that determine sunlight exposure, dietary habits and presence of any national policy regarding vitamin D fortification.[18]

We found standard deviation of 21.064, which is very much comparable to the reports by other researchers across the world.[38,39] A small standard error of 2.554 means that our sample was possibly true representative of the population for which the study was done.

Life style and sun exposure

All the patients included in the study had non-sedentary life style and adequate sun exposure. It may be due to our inclusion and exclusion criteria that excluded non-ambulatory patients and patients with medical co-morbidities. We accepted a simple definition of sedentary life style, as defined by Cabrera et al, that whether a patient performs less than 25 minutes of active physical activity per day. [40]

It may be because of this unique finding that we observed one of the lowest prevalence of hypovitaminosis D in fragility hip fracture from India.

Serum alkaline phosphatase and hypovitaminosis D

Serum alkaline phosphatase is a non-specific marker of metabolic bone disease, which is associated with osteoblastic activity. It is a good follow up tool to measure response to treatment of metabolic bone diseases. Some of the studies have noted inverse correlation between level of SAP and vitamin D deficiency state.[41,42]

We could not find any significant correlation between serum alkaline phosphatase and vitamin D deficiency. (Pearson correlation coefficient = -0.122), nevertheless level was found to be raised in 95.6% of the patients. It is a non-specific marker and reason for its increased level may be multifactorial. Farek et al (2002) also noted that alkaline phosphatase is not a predictor of degree of bone mineralization though it was reported in preterm infants.[43]

One study also reported no significant correlation between SAP and hypovitaminosis D, but they observed normal level of SAP in all the patients.[44]

Serum calcium and hypovitaminosis D

Normal serum calcium is maintained by interaction between vitamin D and serum parathyroid hormone. In any deficiency of vitamin D, some element of clinical or subclinical hyperparathyroidism sets in thatreleases calcium from bone and reabsorption of calcium from kidneys is also enhanced provided renal functions are also intact. Thus, routinely, hypovitaminosis D is associated with normal levels of serum calcium with high-normal or elevated levels of PTH and normal to elevated levels of total alkaline phosphatase, Patients with severe and long-standing vitamin D deficiency may present with overt hypocalcemia and/or hypophosphatemia, but this is the exception.

In this study, too, the observed serum calcium was just with in the normal limits, mostly at its lower cut-off. This phenomena was observed through all grades of vitamin D deficiency.

Study of Pearson correlation coefficient

Measurement of correlation coefficient determines existence of any linear relation between two credibly related variables, and strength and direction i.e. direct or inverse, relationship between the variable. We studied and plotted the correlation coefficient between vitamin D and serum calcium, vitamin D and SAP and haemoglobin level and serum vitamin D, and the values of correlation coefficient are 0.244, -0.122 and -0.38, respectively. We could not find any reasonable relationship between stated variables.

Need for replacement & replacement protocol

There are plenty of reports observing insufficient treatment of metabolic aspect of hip fracture, mainly due to lack of insight and failure to recognize this possibility after surgical management of hip fracture.[45-48] As stated earlier, vitamin D is not only important for bone health, but also it has multiple extra-skeletal benefits including direct effect on mortality. Most importantly, in the context of rehabilitation of operated fragility hip fracture patients, its replacement is very important as vitamin D sufficiency improves muscle function and power, which are required for proper rehabilitation of these patients.[26] More recently, Lavernia et al have reported lower hip replacement functional scores in hypovitaminosis D, that improves with vitamin D replacement.[49] For replacement of vitamin D, 60,000 units PO weekly for 6 to 8 weeks is suitable and is unlikely to induce hypervitaminosis in patients who have not received any previous treatment.[50]

Vitamin D toxicity

Vitamin D toxicity is observed when serum level of 25-hydroxyvitamin D is greater than 374 nmol/L (150 ng/ml). Vitamin D toxicity with oral replacement treatment is a rare event and generally is due to dispensing error or accidental ingestion. There is no consensus regarding upper safe limit, but doses up to 10,000 units/day may be safely tolerated.[25,51]

CONCLUSION

Our study showed moderately high prevalence of vitamin D deficiency in fragility hip fracture patients, though it was one of the lowest prevalence reported from India. It may be due to the fact that all patients included in the study had non-sedentary life style. Orthopaedic surgeon should be aware of possibility of vitamin D deficiency in hip fracture patients and its replacement should always be considered. Optimum vitamin D level also ensures better rehabilitation after fracture management. The major strength of this study is that it evaluated hypovitaminosis D in a very specific population of industrial and related workers and their families. This also reflects status of vitamin D level in non-sedentary population. Case control and cohort studies are required to study this phenomenon further and to devise different preventive and therapeutic protocols.

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