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Obituary

Prof. Dr. Jagannath Sahoo

The legendary doctor in the field of Indian orthopaedics leaves for his heavenly abode on 7.12.2018 at Bhubaneswar, Odisha. He was born at Mahanga, Cuttack on 11.02.1949 son of Late Sashi Sahoo and Sridhar Sahoo. He is survived by his wife Mrs. Sakuntala Sahoo, son Ashutosh Sahoo and two daughters Kalyani & Kukumina.

He was graduated from SCB Medical College & Hospital with honours and gold medal in 1971, post graduation from MKCG Medical College & Hospital Berhempur in 1978. he was trained in hand surgery at PMR Hospital, Edinburgh, UK in 1983 and Leprosy Reconstructive surgery from madras in 1979. He worked as a teacher in orthopaedics in 3 Govt. Medical Colleges in Odisha and retired as Professor of Orthopaedics from VSS Medical College & Hospital, Burla. After his retirement from Govt service he joined as Professor in Orthopaedics in IMS & SUM Medical College & Hospital, Bhubaneswar. He was a guide for Ph.D in Biomechanics of Engineering students and Musculoskeletal & sports medicine in Physiotherapy. He worked in research on STEM CELLS. He was the life member of IOA, OOA & he was the President of OOA.

He was always positive and optimistic, with the precious memories has left us. Words cannot express the void that was left with us. May the lord give enough strength to the bereaved family. He will be graetly missed. God grant eternal light to shine on him. May his soul rest in peace.

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2. The body, which consists of :

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Materials and Methods : The subjects of the study and the methods employed in the investigation must be clearly described. The reasons for examining the particular group of patients should be made clear, and reasons for exclusion of individuals from the study must be stated. Any group used as controls must be defined accurately. Described the study design (prospective or retrospective, inclusion and exclusion criteria, duration of study) and the study population (demographics, length of follow-up)

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Editorial ..... 

Functional electrical stimulation : A new hope for paraplegics

Neuroplasticity is the ability of nervous system to change in response to stimulation. Permanent changes are possible with long-term, repeated exposure. Clinically, a significant number of individuals with so-called complete spinal cord injury retain some connectivity across injury site; this could be represented by non-functioning myelin or denuded axons that could potentially provide conductivity across injury site w Functional electrical stimulation: A new hope for paraplegics

hen given optimal activation. An injury to the spinal cord can disrupt communications between the brain and body, leading to a loss of control over otherwise intact neuromuscular systems. By taking advantage of these intact neuromuscular systems, several neuro-prostheses have been developed to restore functions through stimulation of the central and peripheral nervous system. 3 distinct types of electrical stimulation commonly utilized in activity-based restorative therapy:

1. Neuromuscular electrical stimulation (NMES) is electricity applied across the surface of the skin over an intact peripheral nerve, which evokes an action potential in the nerve fiber, causing an exchange of ions to drive the muscle to contract.

2. Functional electrical stimulation (FES) is the application of electrical stimulus to a paralyzed nerve or muscle to restore or achieve function. FES is most often used in neurorehabilitation and is routinely paired with task-specific practice. A common example is orthotic substitution, also known as a neuro-prosthesis.

3. Transcutaneous electrical nerve stimulation (TENS) is used for pain modulation by exciting peripheral nerves using sensory, motor, or noxious settings. Clinically, TENS has been used for lower back pain, neurogenic pain, arthritic pain, and various other forms of pain. In activity-based restorative therapy, TENS sensory settings are also used to achieve sensory input to the nervous system and for tone and spasticity management techniques.

Functional electrical stimulation is a technique of eliciting controlled neural activation through the application of low levels of electrical stimulation. There are a wide variety of therapeutic applications of FES. FES has been used to maintain or increase range of motion, reduce oedema, promote healing of fracture or tissue, reduce muscle spasm and the effects of spasticity, improve circulation, prevent or reverse disuse atrophy, and facilitate movement. It has also been used for neuromuscular re-education and orthotic substitution. Thus, applications of FES can mainly be divided into two classes (A)neuro-prosthesis for use as permanent assistive devices and (B) to facilitate exercise and be used in temporary therapeutic interventions to improve voluntary function. This latter class of applications has been termed Functional electrical therapy. Neuro-prostheses using FES to control the paralyzed muscles may prevent many secondary medical complications and improve functional independence by providing a means to exercise and negotiate physical barriers. Other functional applications of FES which help to restore useful functions and thus improve the quality of life include bladder and bowel voiding and electro-ejaculation.

Lower motor neuron (LMN) syndrome results from damage to axon or cell body in peripheral nervous system. In SCI, this can occur with damage to anterior horn cells, stretching of nerve roots, foramenal stenosis or compression, cauda equina/conus medularis injury, or associated peripheral nerve injury (eg, brachial plexus). It is characterized by the loss of voluntary movement, low to no muscle tone, and absent reflexes. It

is commonly found at the level of injury or with chronic injuries and comorbidities, like impingement, stenosis, and traction neuropathies. Upper motor neuron (UMN) syndrome results from damage to the neural pathway above the anterior horn (or the motor nuclei of cranial nerves). It is characterized by decreased voluntary movement, impaired or absent sensation, and pathological reflexes. The easiest way to determine LMN or UMN presentation is via reflexes. Intact reflexes signal intact peripheral nerves or UMN presentation, which would clear the way for FES usage. These devices range in complexity and include components such as power supplies (which may be completely external to the body or implanted and recharged with radio frequency waves), a control circuit (i.e., the brains of the device), lead wires, connectors, external braces, and sensors.

Both nerve & muscles respond to electrical stimulation. By targeting nerves rather than the muscle fibers themselves (which can also be stimulated electrically), substantially smaller charge densities may be used, consuming less power and avoiding tissue damage. The goal of functional electrical stimulation (FES) is to obtain immediate contractions of smooth or skeletal muscles leading to functional movements. The underlying neurophysiological principle is the release of action potentials in uninjured parts of the nervous system by external electric stimulation, thus replacing lacking signals from injured parts of the nervous system. Provided that the neuromuscular system is intact, stimulation may be achieved at a variety of locations (from the origin of the neuron in the spinal cord to the peripheral nerve and to the skin above the muscle) using various types of electrodes. FES has greater potential use in incomplete spinal cord injury patients due to the preservation of some motor and sensory function.

Lastly, the fundamental idea of FES to use the patient's own nerves and muscles to restore lost motor functions after upper motor neuron lesions is still fascinating &despite the progress in the fields of neural regeneration and alternative rehabilitation strategies, FES will play an increasing role in the rehabilitation after upper motor neuron lesion within the next two decades.

Prof. (Dr.) Rabi Narayan Jee

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A RETROSPECTIVE ANALYSIS OF THE RESULTS OF TREATMENT WITH INTERTAN CLASS OF NAILS FOR UNSTABLE INTERTROCHANTERIC HIP FRACTURES IN THE ELDERLY AGE GROUP

Dr. Basanta Kumar Behera**, Dr.Saswat Samant#, Dr. K.Srikant****

Abstract

Introduction: The InterTAN class of nails, is considered to provide both linear intraoperative compression as well as rotational stability to the head/neck fragment. The aim of our study was to evaluate the clinical outcome in elderly patients undergoing surgery for unstable intertrochanteric fractures receiving the InterTAN class of cephalomedullary nails. Material & Methods: Patients with an intertrochanteric fracture of the hip were treated with interTAN between December 2015 to December 2017. Postoperative data were analysed alongwith results for every follow-up visit. Functional outcomes were evaluated using the walking ability score, the hip range of motion and the Harris hip score.All the complications were also recorded. Results: The results showed Patients exhibited good rates of fracture healing, rapid ambulation and weight bearing along with very low very low rates of failure/ requirement of re-surgery.Conclusion: Our study demonstrates that this class of device provides excellent stability for intertrochanteric fractures including unstable patterns.

Keywords

Intertrochanteric fracture, interTAN, intramedullary, retrospective analysis

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Introduction

Intertrochanteric femoral fractures account for nearly half of all the hip fractures in the elderly population across the globe [1,2]. The morbidity continues to show a rising trend as the population of the elderly continues to rise,[3,4.5]. Intramedullary nails with cephalomedullary screws along with sliding hip screw-plate construct have been the standard of treatment ever since the rationality of surgical over conservative management was understood to provide a quicker return to preinjury activity levels and functions[6,7]. Compared to extramedullary fixation the biomechanical advantages offered by an intramedullary device made them more popular especially in unstable fractures of the trochanter[8,9]. While the reconstruction class fixes the head-and-neck fragment by a combination an antirotation pin and the lag screw, preventing rotation of the femoral head, the gamma nail class was deemed to combine the theoretical biomechanical advantages that should allow earlier postoperative weight bearing (intramedullary) with surgical technique advantages that decreased operative morbidity(sliding screw advantages), the impaction class with its helical blades provides for reduced bone removal with fewer chances of screw cut out while the impaction class and the InterTAN, with its two cephalo-cervical screws in an integrated mechanism, is considered to provide both linear intraoperative compression as well as rotational stability to the head/neck fragment. Among the intramedullary nails, all have their own advantages as well as the causes of failures & controversy exists as to which device

provides better clinical and radiological results in the long term[11,12]. The aim of our study was to evaluate the clinical outcome of elderly patients undergoing surgery for unstable intertrochanteric fractures receiving the InterTAN class of cephallomedullary nails.

Material and Methods

26 patients with intertrochanteric fracture of the hip were treated with interTAN between December 2015 to December 2017. Surgeon preference, as well as the patient's ability to afford a costlier implant, were the main determinants for selection of the particular implant/device.

Surgical technique

All the surgeries were performed by 1 of the 3 surgeons in the team. In all the cases spinal anaesthesia was used and the patients were given 1 dose of prophylactic antibiotic (cefuroxime or cefoperazone+sulbactam) was administered 30 mins prior to skin incision. Traction table was used in all the cases. An attempt at closed reduction was performed (under the guidance of fluoroscopy) in every patient. Surgery was performed in standard technique as had been recommended by the manufacturer and as mentioned in previous literature (Ruecker et al13). Only 2 of the 19 patients required suction drains which were removed after 48 hours. Postoperatively, all patients and were given the same prophylactic antibiotics for 24 hours. Plain anteroposterior and lateral radiographs were obtained on postoperative day 1. The postoperative management protocol included quadriceps strengthening exercises from day 1 and all patients were encouraged to walk with full weight bearing, while being assisted by a physiotherapist, as soon as possible postoperatively. Continuous passive motion was used twice daily in all the patients. Follow-ups/assessments were carried out at 1, 3, 6, and 12 months postoperatively and yearly thereafter. Anteroposterior and lateral radiographs which were obtained at each visit were analysed along with the recorded data on any implant position changes, complications, and fixation failures.

Results

3 of the cases were lost to follow up while 19 of the remaining 23 cases had adequate radiographic and clinical data at the time of our analysis to be meaningfully included in the study. Data from each of the follow-up were assessed which included the hip range of motion; pain in the hip and thigh; walking ability score; postoperative complications and Harris Hip Score were recorded. This had been recorded by one of the three operating surgeons or junior residents.

Table 1: Patient demographics and study cohort's characteristic data.

1	Total no of fractures operated	26
2	Patients lost to follow up	3
3	Patients whose follow up clinical/radiographic data was inadequate for the study	4
4	Cases included in the final study	19
5	Mean age (in years) / and range (in years)	72.6 / 62-88
6	Gender (male/female)	7/12
7	Mechanism (high/ low energy)	3/16
Fracture pattern (AO/OTA-unstable fractures)		
8	31A2	15
9	31A3	4
10	co-morbidities	14

We felt that the fluoroscopy time was a little higher than what is spent during the use of the impactation class of nails (3.6 +/- 0.18) and so was the mean operative time. Duration of mean hospital stay was significantly reduced (8.7 /- 2.3) as the interTAN allowed for early weight bearing and better ambulation.

Table 2: Peri-operative data

1	Mean operative time, (in min)	60.5 +/- 18.2
2	Mean ?uoroscopy time, (in min)	3.6 +/- 0.18
3	Mean hospital stay, (in days)	8.7 /- 2.3

Complications like lateral migration of the hip screws and screw cutouts along with femoral shaft fractures were almost relegated. Pressure sores were also nor recorded as the patients ambulated very early.

Table 3: Complications

1	Wound infections	4
2	cutout	1
3	Lateral migration of the hip screw	0
4	Femoral shaft fracture	0
5	Hip pain	1
6	Delayed union	0
7	Pulmonary embolism	1
8	Pressure Sores	0
9	Urinary tract infections	2
10	Shortening>10 mm	2
11	Requirement of revision surgery	0

Functional outcomes were evaluated using the walking ability score, the hip range of motion and the Harris hip score during the final visit.

Table 4: Outcomes at final follow up (Mean +/- SD)

1	Walking ability score	5.2 +/- 1.5
2	Hip range of motion	92.7 +/- 12.4
3	Harris Hip Score	78.9 +/- 11.6

Discussion

Russel had divided cephalomedullary nail constructs into four classes10. Among these, the interTAN probably allows for the quickest mobilization and ambulation in a patient with intertrochanteric fractures. This is a significant point as early ambulation has been shown to be one of the most effective ways to decrease the complications / high rate of mortality in hip fractures14,15. The InterTAN class of nails combines the rotational stability of the reconstruction nails with the enhanced sliding and compression characteristics of the IMHS IM hip screw/ impactation class nails. It's trapezoidal proximal cross-sectional area aims to achieve proximal femoral stability. Fracture compression is increased by the integrated compression/lag screw while eliminating excessive sliding and the possibility of the Z-effect by providing significant resistance to intraoperative and postoperative femoral head rotation. These advantages are presumed to eliminate the high rate of complications, fixation failure, and reoperation rates reported in the meta-analysis of cephallomedullary nail fixation studies14,15,16. Our rates of fracture

union were consistent with historically established high rates as abundant blood supply aids union in even unstable patterns. Our average time to union was 13.9 weeks, whereas most other reported series averaged time to union in 15 - 17 weeks17,18,19. A cut-out is one of the well-documented complications of nail fixation for intertrochanteric fractures with rates ranging from 1.4% to 7%20,21. In our study, only 1 case came back with a partial cut out supporting the hypothesis that devices confer tremendous stability to the fixation. Earlier large-scale studies have shown a 24% limb length inequality (>10 mm) in cephallomedullary nails22. We found only 2 out of the 19 cases to be with such a complication re-enforcing the implication that this implant prevented excessive collapse & shortening. Earlier studies had indicated a higher reoperation rate in cephallomedullary nails as compared to sliding screws23,24,25. None of the patients in our series required revision surgery. Our study suffered from four major weaknesses. Firstly, the study sample was relatively small. Secondly, neither our study had a comparison group nor controls of any kind. Thirdly, the follow-up period was pretty small. And finally the retrospective nature of the study.

Conclusion

Our study reviewed the outcomes of a series of intertrochanteric fractures of the hip treated with the InterTAN class of nails. Patients exhibited good rates of fracture healing, rapid ambulation and weight bearing along with very low very low rates of failure/ requirement of re-surgery. Our results demonstrate that this class of device provides excellent stability for intertrochanteric fractures including unstable patterns. We believe that a comparison study of the interTAN with other devices like the impaction class and reconstruction class of nails in a larger study sample (in a prospective study) is the requirement to further validate the efficacy of these devices.

Figure 1: Serial radiographs of a 75 year old man showing A. preoperative image of intertrochanteric fracture sustained from a trivial fall. B, Immediate postoperative x-ray demonstrates good fracture alignment with a tip-to-apex distance (TAD) that was acceptable C At 6 weeks postoperative and D Five months postoperative period.

Figure 2: Further serial xrays E. at 8 months F 10 months and G. 12 months postoperative duration with no further no change in the fracture alignment and hardware position.

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A CASE REPORT OF COMPOUND PALMAR GANGLION CYST IN DISTAL PART OF FOREARM

Dr Sanjaya Kumar Behera(MS), Prof(DR.)Abani Kanta Mishra (MS)**,Dr Dullav Sahoo**

ABSTRACT:

We report a rare case of patient with compound palmar ganglion in distal part of forearm. Patient presented to our department having a compound palmar ganglion cyst with swelling of ventral aspect of forearm. Treatment by orthopaedic surgeon and patient on active excellent cosmetic and functional outcome..

INTRODUCTION:

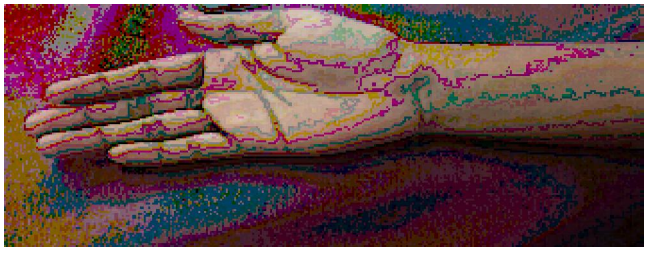
This is a case of compound palmar ganglion with chronic inflammation of common sheath of flexor tendon below the flexor retinaculum.It was treated by excision of sac and removal of melon seed body followed by dissection of entire flexor sheath.

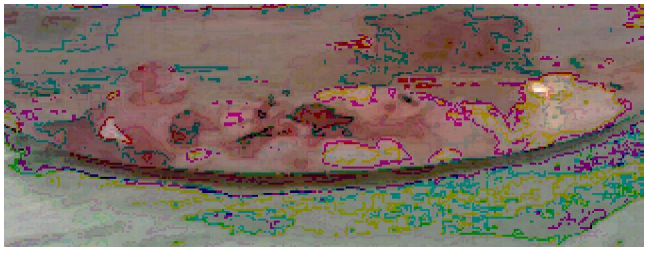
CASE REPORT:

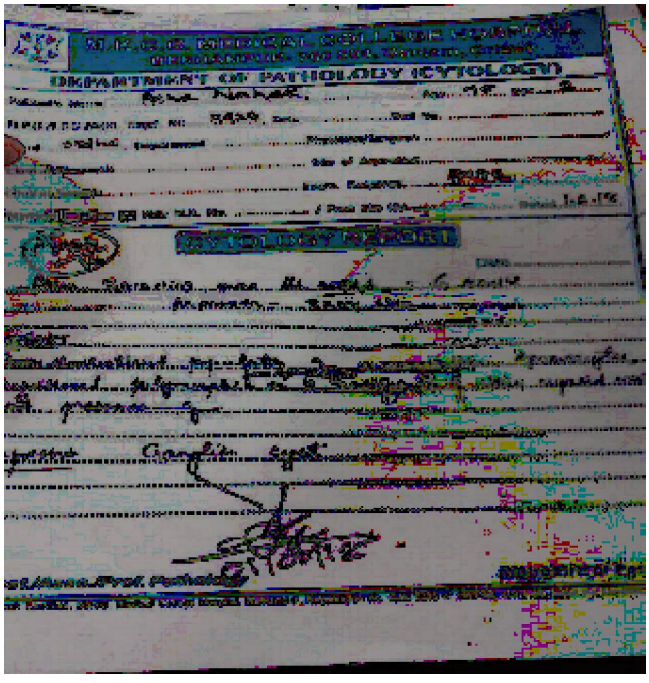
A 45 yr old female presented to our MKCG MCH with swelling of volar aspect of distal part of right forearm extending to hand since 5years, that was gradually increasing in size. On examination swelling is non tender and fluctuation test is positive. Further FNAC was done confirming ganglion cyst.

TREATMENT:

The patient was thoroughly evaluated by orthopaedic surgeons and was diagnosed as compound ganglion cyst. It was treated by excision of sac and flexor tendon sheath with removal of melon seed bodies and capsule. Later ,it was sent for histopathological examination where it was confirmed as compound palmar ganglion with underlying tuberculosis. Following which ATT was started. The patient now has no pain over the swelling with normal range of movement of wrist, there by not requiring surgery.







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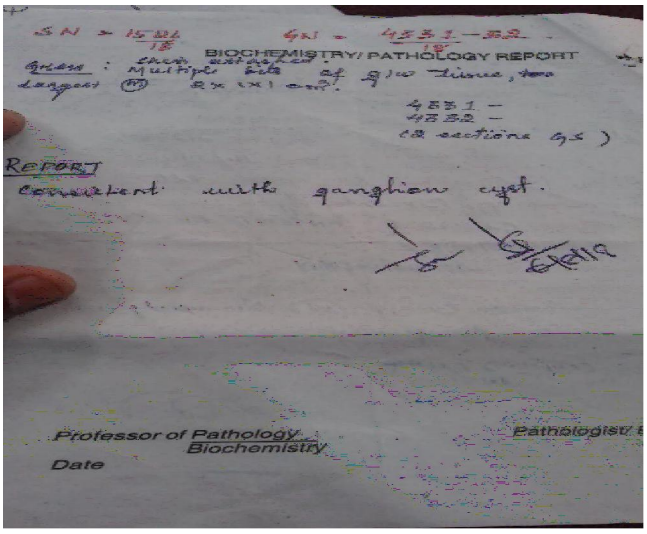

DISCUSSION:

In this report we present a case of 45 years old woman with compound palmar ganglion. Most common ganglion is dorsal wrist ganglion (80%) followed by volar palmar ganglion(20%). palmar ganglion arises from scapho-trapezoidal ligament, scapholunateligament,trapeziometacarpal. Ganglion on radial aspect of volar aspect wrist are not ruptured easily by pressure. Needle rupture is not advised because radial artery is intimately associated with ganglion.

CONCLUSION:--

This case report highlight the challenge that our orthopaedic surgeon face in treating patient with compound palmar ganglion cyst .The protocol of treatment is complete excision of sac with removal of melon seed bodies.

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FUNCTIONAL OUTCOME OF HOOK PLATE FIXATION IN ACUTE ACROMIOCLAVICULAR DISLOCATION VERSUS CONSERVATIVE MANAGEMENT

Dr. S.K. Behera, Dr. Mridul Biswas*, MKCG MCH, Berhampur**

Introduction:

The Rockwood classification system, which is based on the magnitude and direction of dislocation, is usually used to classify AC joint dislocation. Decisions regarding conservative versus surgical treatment are controversial for type III injuries. Hook plates have been developed as an alternative fixation method for fractures of the distal clavicle and dislocations of the AC joint and are used to promote natural healing of the ligaments. The aim of this single-center, single-blinded, prospective randomized trial was to compare the outcomes of hook plate fixation and conservative management for acute acromioclavicular dislocation.

Materials & Method:

We performed a prospective randomized trial involving 11 patients who were >18 to <50 years of age and had an acute simple dislocation of acromioclavicular joint (type 3). Patients were randomized to either conservative (n=5) or hook plate (n=6) fixation and were evaluated at 3,6 and 12 months. The primary functional outcome was assessed using the Constant Murley and UCLA scores. Conservative management was consisted of prophylactic taping, immobilization in sling keeping the shoulder in an internally rotated position with support against gravity for 3 weeks.

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Acromioclavicular dislocation

Fixed with hook plate

Patient no. 2

Patient no. 3

Results:

Mean age of the patient group was 35 years (18-50 years). The mean follow-up period in this study was 24 months after hook plate fixation or conservative management. The UCLA Score was an average of 15,25 & 30 at 3,6 month & 1 year respectively after hook plate fixation compare to conservative management, which was statistically significant (p value <0.05), meant excellent functional results.

Discussion:

Previously, conservative treatment was the main approach. Even though complete anatomic reduction by conservative treatment was difficult, functional recovery was good.

Surgical treatment can be used to obtain complete anatomic reduction and minimize the risk of shoulder deformity. For evaluation of the recovery of shoulder function after surgical or conservative treatments, we find no significant differences between surgical treatment and conservative treatment. But there is significant difference between two group for anatomical reduction, early function of shoulder and cosmetic appearance of acromioclavicular joint in favour of hook plate fixation. ACJI score also suggests that surgical treatment was superior to conservative treatment in terms of clinical and imaging aspects.

Conclusion:

Clavicular hook plate fixation without coracoclavicular ligament reconstruction is a good option for acute acromioclavicular dislocation producing excellent functional results compare to conservative management.

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COMPUTER RELATED INJURIES AND HOW TO PREVENT IT

Dr. Sanjay Das ** (P.M.R)**

Abstract:

In modern days people using computer for long time present with various musculoskeletal symptoms. The author describes details of such symptoms and suggests methods to minimize the injuries.

A person gets the typical symptoms in the body due to continuous and excessive use of computer over a period of time. Symptoms arise slowly and un-noticeably after certain period of time which can lead to injury of temporary disability in due course. In 1946 Enac was considered the first scientist to invent the computer which fills a large room. The Computer - A vital tool for adult and children in many different occupations. However, long periods of working at a computer increases the chance of developing an injury called Computer Related Injury (C.R.I). Muscle and joint pain, overuse injuries of the upper limbs and Eyestrain can result from inappropriate computer use. Computer related injury (CRI) is a cluster of work-related symptoms in computer users such as Repetitive Strain Injury (RSI), Work Related Upper Limb Disorder (WRULD), Musculoskeletal Disorder (MSD), Fatigue, Migraine Headaches and Eye strain.

Computer has completely revolutionized many aspects of modern world & life. It is used daily by millions of people The risks of CRI can be reduced or eliminated with proper workstation design, improved posture and good working habits with little exercises.

Ergonomics - It is the science that focuses on Equipment / Furniture design at workplaces with a view to reduce fatigue and discomfort in workers by improving working conditions. The overall aim of ergonomics is to increase workers efficiency and thereby maximize productivity. Employers and workers need to be informed of the health hazards of constant computer use. Successful prevention techniques and useful remedies must be followed if injuries do occur. Recent studies has shown that using computers for three hours a day at a stretch can prompt health risks such as Occupational Overuse Syndrome (OOS),Computer Vision syndrome (CVS),Tension headaches, Low back pains and Psychosocial stress. Intensive studies conducted to explore ways and means of coping with computer related injuries that are gradually increasing. Back injuries account for one third of all workplace injuries.

Physical fatigue in sitting.-

Sitting requires less muscular effort than standing but still causes physical fatigue and tiredness. This needs to hold parts of body in steady for long period of time. This reduces circulation of blood to muscles, bones, ligaments & capsules. Which leads to stiffness, pain & swelling. If works station design not proper it

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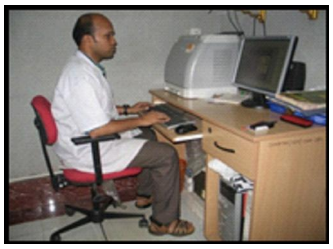
causes more stress and pain.

The Computer workstation has become very common both at work and at home and are used routinely for many purposes like data entry, word processing, telecommunication web browsing, purchasing, inventory, designing and PPT work, testing, entertainment, for all official works & so many.

As per scientific study stress symptoms in computer use leads to, musculoskeletal pain, Lower back pain - 50%,Upper back - 36%,Neck pain- 35 %,Shoulder pain - 30%Elbow, forearm-10%, Wrist & Fingers - 26%. Risk factors are Job design ,Work load and working hours, Workplace design Desktop, Table Chair height, Leg Room, Hours of Computer Operation if more than 3 to 4 hours at a stretch. Prevention are best for getting relief of CRI, Medical surveillance, Ergonomics, Intervention programs & Rehabilitation.

Spine pain is in 2nd position to common cold as a reason for outpatient visit. Every Computer user suffers from spinal pain phenomena sometimes or other during his/her life time. And it is said, "PAIN IS INEVITABLE, BUT SUFFERING IS OPTIONAL". Different spinal posture causes pain, most Spinal pain, released by rest and worsened by activity. Pathological conditions of elbow, wrist, hand & fingers. These are Tennis Elbow, Golfer's Elbow, Stiffness & Pain in elbow, Carpal tunnel syndrome, Ganglions, Tenosynovitis, De-Quirevains disease, Trigger finger, Pain & stiffness, Arthritic Changes, Overuse Syndrome.

How you sit at the computer is very important to prevent C.R.I. Correct sitting position.- People who do not sit properly or hold their hands properly while working at a computer can get repetitive stress injuries.



Correct sitting position-

Sit up straight, and lower back should fit snuggly against the backrest of your chair. If it doesn't use a small pillow or rolled-up towel for support on back. Table & Chair should be at the correct height so that your feet rest flat on the floor and legs are bent at knee angle 90-110. If not possible, use a foot rest or support on floor Monitor position- should be directly in front of your body at eye level or slight lower (15 to 20 dgr.) and the key board, should not be off to the side or far away. When you look straight ahead, you should be looking at the top of the monitor. Key board- should be at lower level if possible, yet allowing your wrists to be straight. & elbow at 90 to 110 angle. Sit about a hand-width away from the keyboard. Mouse should be directly to the side of the keyboard. Hand, Wrist & Fingers positioning.-Fingers on home row, curved and on top of keys. Palms slightly up, off the keyboard and wrists straight. Only your fingertips should be touching the keyboard. Elbows relaxed and on to the side of body and kept over the hand rest of chair.

Keyboard use Technique-

Let your fingers do the moving. The rest of your hand should remain as still as possible. Use your index fingers as anchor when reaching for other keys. Type with a light touch and with a steady rhythm.

Eye Strain / Fatigue (Asthenopia).-

Focusing eyes at same distance for long time causes fatigue & eye strain. Human eyes structurally prefer to look at objects

more than 6 meters away. If any work done continuously closure to that, puts extra demands on eye muscle. Illuminated computer screen causes eye fatigue. Eye fatigue does not damage eye sight but causes blurred vision, headache burning, itching, or tearing of eyes temporarily, inability to focus on far object & colors. Avoid Eye Strain by avoiding glare on your screen from outside windows and bright lights; adjust screen's contrast and brightness to reduce eye strain. Blink frequently to keep eyes moist. Tilt the screen slightly to avoid reflection & soothing color effect. Look far away from your screen every 15 to 20 minutes interval, preferably green color. Screen-Should not be too close to face, Take a thirty-second to one-minute rest break and walk away from your computer every one to two hour interval.

Injuries from Laptop computer:

Presently Laptops are more used than Desktop and it Causes increased no. of C.R.I, problems. The causes are monitor & key board are very close & together, To view the monitor & key board ,body posture changes to awkward position of spine, shoulder, elbow, and more over different people use different position for lap top.

Prevention of Laptop related Injuries-

Use Desktop more often than Laptop, Use peripheral equipment like separate ,keyboard, mouse, & laptop stand or desk on bed, take frequent rest break and Carry laptop on backpack bag to prevent shoulder problem. Avoid one shoulder carryingthelaptop.

Children & C.R.I.-

Research proved that playing computer game for prolonged time causes obesity, less physical activities, lethargic child, Overuse injuries, aggressive behavior, irritable, unmindful in class for some children. It negatively affects child's school work, less interest in studies, opening unwanted sites. Reduce the risk in children by siting at least half meter away from the screen, eyes not close to screen, take frequent break and pursue for other activities, encourage for other hobbies & interest in sports, outdoor games & physical activities. Keep time limit for computer use not more than 2 hours/day, Fix for them ,off screen time & study time per day.

Ergonomics design for Children.-

Desk top use is best, Set the computer, desk, chair,& keyboard to suit the child's height. Chair height should be perfect, legs not to dangle, Hand rest chairs are preferred for steady work. Use smaller mouse to contour child's hand, and teach the child how to use the key board & mouse properly & safely.

Ergonomic Exercises.-

Ergonomic exercises can be done if you work at the computer for long periods of time. Do these exercises every two or three hours interval sitting on same chair and work place.

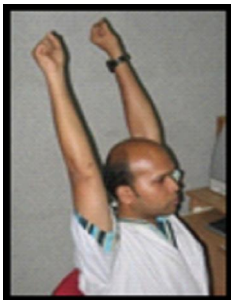
Back Stretch.-

Sit up straight in your chair and put your hands behind your neck. Lean or extend back as far as you can (without falling backwards,) Repeat 5 times.

Neck Stretches.-

Sit up straight and look down, touching your chin to your chest. Hold for 2 seconds. Now look up at the ceiling and hold for 2 seconds. Bring your head back upright and turn your head to the left, looking over your shoulder and hold for 2 seconds. Repeat on right side. Repeat 5 times.






Blade Squeeze.-

Clasp your hands behind your head, and pull your shoulder blades in & out until you feel the stretch. Hold for 5 - 10 seconds, then relax. Shoulder Rolls.- With your arms by your side, move your shoulders in a forward circle 3 times and then repeat going backwards 3 times.

Elbow stretch-

Reach for the sky raise one arm towards the ceiling and stretch as far as you can. Hold for 2 seconds. Now do the other arm. Repeat 5 times. Wrist exercises (Upside-down T).-Put your palms together in front of your chest (fingers pointing up). Press base of hands downward as far as you can and hold for 8 seconds. Repeat 5 times.

Rev like Your Motorcycle.-

Put your arms straight out in front of you. Pull your hands up and back as far as they will go and hold for 5 seconds. Then push your hands forward and down as far as they will go and hold for 5 seconds. Repeat at least 5 times.

Hand Stretch.-

Spread your fingers until you feel the stretch. Hold for 5 seconds, relax, then bend for 5 seconds, Repeat 5 times.

Foot Dance.-

Put both leg straight out in front of you. Point your toes up and hold for 2 seconds. Then point your toes down and hold for 2 seconds. Repeat 3 times. Now rotate your ankle to the right 3 times and then to the left 3 times & repeat with other leg.

Prevention tips in short to remember

Reducing the risk of muscle and joint problems include: Use an adjustable desk & chair designed for use with computers; position the monitor so that it is either at eye level or slightly lower. Position your keyboard at a height that allows your elbows to rest comfortably at your side. Forearms should be roughly parallel with the floor and level with your keyboard.

Referred Links:

1. http://www.advancechiro.on.ca/common-computer-related-injuries/
2. https://www.medindia.net/patients/lifestyleandwellness/computer-related-injuries-prevention.htm
3. https://kidshealth.org/en/parents/ergonomics.html
4. https://www.medindia.net/patients/lifestyleandwellness/computer-related-injuries-cost.htm
5. https://blogs.siliconindia.com/gandhiji/COMPUTER_RELATED__INJURIES-bid-kfn7DHQ856871973.html

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A PROSPECTIVE ANALYSIS OF VARIABLES DETERMINING THE CHANGES IN KNEE RANGE OF MOTION FOLLOWING CRUCIATE SUBSTITUTING TOTAL KNEE REPLACEMENT

Dr Nabin Kumar Sahu #, Dr Smarajit Patnaik****

Abstract:

Range of motion is a major outcome after total knee arthroplasty which is described the function of several variables including survival, kinematics, function and patient satisfaction. The aim of the present study is to analyze the variables determining the changes in flexion knee range of motion following cruciate substituting total knee arthroplasty of arthritic knees of patients presenting in a tertiary care centre Apollo hospital, Bhubaneswar, Odisha.Data has been collected by history, clinical examination, knee society score, goniometric measurement of ROM, measurements of tibiofemoral angle in radiographic ap view. The descriptive statistics like mean, standard deviation, median, first quartile and third quartile of the scale variables like age, preoperative ROM, postoperative ROM, KSS were computed following descriptive procedure in SPSS system Postoperative ROM versus variables like age, BMI, preoperative ROM, preoperative coronal plane deformity, postoperative coronal plane deformity following Kruskal-Wallis test. Postoperative ROM by gender, disease were compared following Mann-Whitney U test. There are 57 knees of 36 patients. In our study age, preoperative ROM, fixed flexion deformity and postoperative coronal plane deformity has significantly affecting postoperative ROM with P value of0.008, 0.00001, 0.007 and 0.009 respectively. Younger the age group 45-59 years, better ROM, lower FFD before surgery and without any postoperative coronal plane deformity has better ROM after surgery and age, preoperative ROM, fixed flexion deformity and postoperative coronal plane deformity has significantly affecting postoperative ROM.

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Introduction:

Range of motion is a major outcome after total knee arthroplasty which describes the function of several variables including survival, kinematics, functions and patient satisfaction. The aim of the present study is to analyze the variables determining the changes in flexion knee range of motion following cruciate substituting total knee arthroplasty of arthritic knees of patients. The variables under this study are non changeable variables (age and sex), different preoperative conditions of knee and postoperative changes..

Aims and objectives

The aim of the present study is to analyze the variables determining the changes in flexion knee range of motion following cruciate substituting total knee arthroplasty of arthritic knees of patients presenting in a tertiary care centre Apollo hospital, Bhubaneswar, Odisha.

Objectives: To study the association of different non changeable variables (age, sex), the association of different preoperative conditions of knee with the post operative range of motion and the association of different postoperative changes with the post operative range of motion

Materials and Methods

This study is a short term follow up study of 57 knees in 36 patients in which 21 are bilateral and 15 are unilateral were analysed in 1 year of follow up. This is a short term follow up study done on patients who underwent Total Knee Arthroplasty between September 2014 to august 2016 in which osteoarthritis and rheumatoid arthritis and posterior cruciate substituting posterior stabilized knee implant were included in the study. Patients having hinged prosthesis, infected knee, revision total knee Arthroplasty, Patients having bone defect requiring bone graft and augmentation and patients with severe varus or valgus deformity >200 are excluded from our srudy

Data has been collected by history, clinical examination, knee society score, goniometric measurement of ROM, measurements of tibiofemoral angle in radiographic ap view. The descriptive statistics like mean, standard deviation, median, first quartile and third quartile of the scale variables like age, preoperative ROM, postoperative ROM, KSS were computed following descriptive procedure in SPSS system. Postoperative ROM versus variables like age, BMI, preoperative ROM, preoperative coronal plane deformity, postoperative coronal plane deformity following Kruskal-Wallis test. Postoperative ROM by gender, disease were compared following Mann-Whitney U test.

Result

The median postoperative ROM of patients above 60 years with first and third quartiles was 1000 (100-120) and there was a significant difference (p=0.008) which suggests increasing age above 60 years have lesser postoperative ROM. Median postoperative ROM of patients having preoperative ROM in the range of below 75, 75-90 and above 90 with quartiles were 1000 (95-100), 1050 (100-120) and 1100 (110-120) respectively. There was a significant difference (p= 0.000) among the groups which suggests that higher preoperative knee ROM group has higher postoperative ROM. Among the patients with lower preoperative ROM there was appreciable improvement in postoperative ROM. In the 3 groups of FFD no deformity, 50 to 100 and above 100 median postoperative ROM along with quartiles were 1100 (110-120), 1100 (100-120), 1000 (95-100) respectively. This showed group with higher FFD has less postoperative ROM which was significant. The median postoperative ROM of patients in 3 groups of FFD were significantly different (p=0.007). The median with first and third quartiles of postoperative ROM versus postoperative coronal plane deformity in 3 groups such as no deformity, 50 valgus and 50 of varus have 112.50 (100-120), 1100 (105-110) and 1000 (100-110). When the deformities are corrected mean ROM was 112.50 which was significantly higher than the groups with post operative coronal plane deformity even up to 50 (p=0.009). The mean preoperative Knee Society Score was 42.14 12.02 and postoperative KSS was 90.86 3.86 which signifies pain was substantially reduced, ROM was improved, deformity was corrected. Postoperative ROM versus other variables like gender, BMI, diseases, preoperative coronal plane deformity do not have significant difference.

Discussion

In the present study, the variables determining the changes in flexion knee range of motion following cruciate substituting total knee arthroplasty of arthritic knees of patients have been analyzed. The variables under this study are non changeable variables (age and sex), different preoperative conditions of knee and postoperative changes. The study has compared various preoperative and postoperative parameters vis-à-vis flexion range of motion. The results are discussed in the previous chapter, and in this chapter the result of our study have been compared and discussed vis-à-vis the findings of the study conducted in different places and time.

Sample size of the study: BSK Reddi et al.1 has conducted similar study with 91 knees. A Harvey et al.2 conducted such study with 386 knees, Shoji et al.3 with 192 knees and M Moghtadaei et al.4 with 95 knees.In the study, 36 patients involving 57 knees with osteoarthritis and rheumatoid arthritis were included in the study. Our study has smaller sample size as compared to other studies. This is because of 15 months of limited duration period only 57 knees have been operated and followed up in the hospital where study was conducted.

Postoperative Range of motion versus gender:There was no significant difference (p=0.992) in the range of motion between the male group and female group, the median range of motion along with quartiles in males was 1150 (100-120) and 1100 (100-120) in females. Our study is comparable with the results obtained by B.S.K reddi et al.1 and Harvey et al.2 who also found an insignificant (p>0.05) co-relation between post-operative range of motion and sex of the patient.

Postoperative range of motion versus age:Patients were devided in groups ranging from 45- 59 yrs and >60 yrs are having median along with quartiles 1100 (110-120) and 1000 (100-120) respectively in our study. There was a significant decrease in range of motion in the age group >60 yrs (p=0.008). Alejandero lizaur et al.5 found significant decrease in range of motion in patients above 65 years age. M Moghtadaei et al.4 found that significant correlation (p=0.04) between age and postoperative flexion ROM. Anouchi et al.6 reported no correlation between age and postoperative knee ROM which was not similar to the finding of our study.

Range of motion versus body mass index:There was a relative decrease in range of motion in patients with a body mass index > 30 1100 (100-110) as compared to group of BMI 25-30 was 1200 (100-120) and BMI of < 25 was 1050 (100-125) but this was not statistically significant (p=0.082). Alejandro Lizaur et al.53, showed a significant co-relation between post-operative flexion range of

motion and body mass index ratio ($p<0.05$). In our study we found 40% were obese. Shoji et al.3 studied 192 patients who underwent primary total knee arthroplasty which showed that in the group of patients who had flexion range of motion of less than 100 degrees, 78% of them were obese.

Range of motion versus disease:Harvey et al.2 found a significant reduction in post-operative range of motion in patients with rheumatoid arthritis in comparision to osteoarthritis. BSK Reddi et al.1 studied 59 osteoarthritic knees which achieved average postoperative flexion of 91.39°, whereas 29 rheumatic knees achieved that of 101.21°. The difference was found to be significant with $p<0.05$. His study was showing significant increased ROM in rheumatoid arthritis as compared to osteoarthrits. In the present study 52 cases of osteoarthritis have achieved median postop ROM along with quartiles 1100 (100-120) and 5 cases of rheumatoid arthritis have median ROM 1000 (100-110) and ($p = 0.1$). This nonsignificant result is not a conclusive one because of very small no of case of rheumaoid arthritis.

Pre-operative range of motion versus post-operative range of motion:In the present study analysis of median postoperative ROM vis-à-vis preoperative ROM revealed better achievement of postoperative ROM in the group with higher range of preoperative ROM ($p=0.000$). The other interesting finding was that in the lower preoperative ROM of < 75, the mean ROM improved by about 580 in the postoperative period showing the efficacy of surgery. The findings in our study is similar to that found in A Harvey et al.2 found a significant correlation ($p < 0.001$), Moghtadaei et al.4 found significant correlation ($p=0.001$) and Mankel et al.7 assessed the preoperative range of motion was significant correlation with their postoperative range of motion.

Pre-operative coronal plane deformity versus post-operative flexion range of motion:In the current study the median flexion range of motion in patients with more than 100 varus has less postoperative ROM 1000 (100-110) as compared to other 2 groups but this was not statistically significant ($p=0.072$). The findings in our study were similar to that found in B.S.K Reddi et al.1 who found that no correlation between preoperative coronal plane deformity with postoperative ROM ($p>0.1$). M Moghtadaei et al.4 found significant correlation ($P=0.007$) between preoperative coronal plane deformity and postoperative ROM.

Pre-operative fixed flexion deformity versus post-operative flexion range of motion: In our study the median along with quartiles of post-operative flexion range of motion of patients who had a pre-operative fixed flexion deformity of above 10 degrees was 1000 (95-100) which was lesser than that of case with 5-10 degees of FFD and had significant correlation with postoperative ROM ($p=0.003$). The lesser the pre-operative fixed flexion deformity the better was the post-operative flexion range of motion. The findings in our study was similar to that found in A. Harvey et al.2 who had a significant association between preoperative FFD versus postoperative ROM ($p<0.0001$).

Postoperative coronal plane deformity versus postoperative range of motion: In our study 44 knees did not have any significant change on the coronal plane alignment post-operatively and the median range of motion along with quartiles was 112.50 (100-120). 5 degrees of varus group had the median post-operative flexion range of motion along

with quartiles was 1000 (100-110) and found significant difference in 5 degrees of postoperative varus and valgus deformity with postoperative ROM (p=0.009). B.S.K Reddi et al.1 found no significant difference between postoperative coronal plane deformity versus postoperative ROM (p>0.1).

Knee society scoring: In our study mean preoperative KSS was 42.14 and postoperative KSS was 90.86 which showing decreasing in pain, improvement in flexion range of motion and improvement in deformity. M Moghtadaei et al.4 found mean preoperative KSS was 45.21 and mean postoperative KSS was 93.17 which was significantly improved 2 times than the preoperative value.

Conclusion

Younger the age group 45-59 years, better ROM, lower FFD before surgery and without any postoperative coronal plane deformity has better ROM after surgery. In our study age, preoperative ROM, fixed flexion deformity and postoperative coronal plane deformity has significantly affecting postoperative ROM. The study has a very short term follow up and small sample size. Therefore results of our study can be considered as indicative. This type of study needs to be continued with large sample size with long term follow up.

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PHYSICAL CHILD ABUSE: ROLE OF ORTHOPAEDIC SURGEON

Dr. Manoranjan Mallick*, Dr .Amit Das***

ABSTRACT

Recognition and awareness of child abuse are primary tasks of the orthopaedic surgeon. Skin trauma is more common than Fractures, yet fractures are the most common radiographic findings. Majority of fracture cases resulting from abuse is Non operative casting or Splinting. Good communication, appropriate history and timely management is all that is required. In this article, we will discuss all aspects of physical abuse of child related to Orthopaedics and Orthopaedic manifestations of child abuse. We will also define orthopaedic surgeon's Role in cases of Child Abuse and Medicolegal aspects.

Key words: Abuse,fracture,awareness

INTRODUCTION

According to the Child Abuse Prevention and Treatment Act(CAPTA) amended by the keeping children and families safe act of 2003(public law 108-136), the term "child abuse and neglect" means ,at a minimum,"any recent act or failure to act,on the part of the parent or caretaker which results in death,serious physical or emotional harm, sexual abuse or exploitation,or an act or failure to act which presents an imminent risk of serious harm". Abuse may be physical, psychological, sexual ,or simply due to negligence or connivance.

In children younger than 36 months admitted for fractures,between 11.9% and 12.1% of cases were due to abuse. The incidence was greater for those children younger than 1 year,24.9%,versus 2.9% for those 24 to 35 months old. The incidence of fractures caused by abuse was estimated at 15.3 per 1,00,000. The mean age of the abused was 6.6 months and 59% were males. Abuse is second to sudden infant syndrome as a cause of death in children between 1 and 5 months of age and second to accidental injury in children older than 1 year.

Although an increasing awareness of abuse across the world is encouraging, it must be borne in mind that the data gathered so far, and detected cases, are only tip of the Iceberg. Physicians should always keep abuse in mind while examining patients. They should pay attention to the patient's history and age, along with the location, number and patterns of the lesions and the time which passed since the event occurred. Studies have demonstrated that Pediatric Orthopaedists are more successful at identifying and reporting abuse cases than General Orthopaedists.

DISCUSSION

The history of the injury needs to be complete in all children when looking for indicators of Abuse,but specifically in children younger than 3 years. The developmental stage of the child is important when considering the possibility of abuse.

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The Orthopaedic Surgeon should perform a thorough physical examination in all children with fractures,especially if they are younger than 3 years. The skin needs to be examined closely , as findings of trauma such as bruising are more common than fractures and can be obscured by clothing. Burns are present in 10 % to 25 % of cases, and 50 % to 75 % of abuse victims have bruising. The entire body should be included in the examination, as the location of bruising is often on the buttocks,trunk,back of the head, and back of the legs. The bruising can often be in different stages and colors similar to that of fractures in different stages of healing.

Radiographic interpretation is critical to diagnosis to the diagnosis of abuse but should be analysed in context with the history and examination . Skeletal injuries are the most common findings noted on imaging studies in cases of child abuse. In infants, they result from various forms of manual assaults. Multiple fractures in different stages of healing are present in more than 70 % of abused children younger than 1 year. A skeletal survey should be ordered if there is any suspicion of abuse. Multiple AP, lateral ,and oblique views are preferable to an AP " Baby -gram". Good Rib radiographs including oblique views are important as part of the survey because rib fractures have the highest probability for abuse. A Towne's view of skull may be added in cases of suspected head trauma and skull fractures. Bone scan can be also diagnostic in cases of suspicion when there is a negative skeletal survey and there high index of suspicion.

SPECIFICITY OF RADIOGRAPHIC FINDINGS

SPECIFICITY INJURY

HIGH

a) classic metaphyseal lesions
b) ribs fractures,especially posterior
c) scapular process fractures
d) spinous process fractures
e) sternal fractures

MODERATE

a) multiple fractures,especially bilateral
b) fractures of different ages
c) epiphyseal separations
d)vertebral body fractures and subluxations
e) digital fractures
f)complex fractures
g) pelvic fractures

LOW

a) subperiosteal new bone formation
b) clavicular fractures
c) long bone shaft fractures
d) linear skull fractures

Although solitary long bone fractures are the most common bone lesions in child abuse, it is not always the case that additional lesions are detected. In that instance, a family 's behaviour and history should be closely examined. If any solitary bone fractures are detected in patients under ambulatory age, the risk of abuse increases. In different studies, fractures of humerus, forearm, and rib were reported as being the most common fractures in abuse cases. In spite of the fact that fractures may occur at different times and/ or there are multiple fractures,this may indicate bone metabolism abnormalities and physician should be alert for abuse.

Some authors suggest that metaphyseoepiphyseal fracture or spiral long bone fractures are more closely associated with abuse.

Below list summarises the important forms of abuse and important features.

HISTORY

a) Inconsistent and unclear history,provided by family

b) Negligence in looking for healthcare

CLINICAL EXAM.

a) Unhappy, extremely introverted, being frightened by adults, having impaired communication of the child
b) Skin bruises,ecchymosis and skin burns(most common physical finding)
c) Tenderness on palpation of long bones
d) Palpable mass of callus formation
e) Neglected previous injuries
f) Impairments of consciousness and vision

RADIOGRAPHICAL FEATURES:

a) Epiphysiometaphyseal corner fractures(pathognomic)
b) Posterior rib fractures(pathognomic)
c) Fractures in different healiong ages
d) Sternal fractures
e) Vertebral spinous tubercle fractures
f) Scapula fractures
g) Long bone fractures before the ambulatory age
h) Solitary long bone fractures(non specifically but the most)
i) Multiple fractures
j) Spiral humerus fractures
k) Spiral femur fractures
l) Finger fractures

Fractures that are common but have a lower specificity for abuse include long-bone fractures,clavicle fractures and linear skull fractures(27% of fractures in children younger than 3 years). The femur (18 % of all fractures in children younger than 3 years) and humerus (10.5 % of fractures in children younger than 3 years) are the most common long bone fractures. All fractures patterns(transverse,spiral, and communited) can occur in abuse. Only 12% to 13 % of femur shaft fractures are due to abuse in children younger than 3 years. In children younger than 1 year, upto 30 % of femur fractures are reportedly from abuse. Humerus diaphyseal fractures in those younger than 3 years may be seen with abuse but are also nonspecific.

A variety of naturally occurring diseases and accidental injuries can confused with abuse. Different etilogies and diseases that results in a fracture, such as osteogenesis imperfect(OI), may be brought up in legal proceedings. The differential diagnosis of abuse includes the following : accidents,developmental variants,syndromes, and metabolic disorders. OI(osteogenesis imperfecta) is an example of a metabolic disorder that is often discussed when abuse is considered. Many of these non abuse conditions can be easily ruled out. Findings such as metaphyseal "corner fractures", retinal haemorrhages, and rib and skull fractures are not typical of OI.

MANAGEMENT AND LEGAL ASPECTS

Orthopaedician should notify social services in any case of suspected abuse. The cost of not acting on suspicion is worse than a false suspicion and possible embarrassment. He should inform family that there is duty to notify the appropriate agency as a part of routine treatment. Unless there is malicious intent in reporting ,the physician is immune from lawsuits for act of reporting. That is why documentation is important. Electronic medical record,drawings and evidence of various stages of healing are kept to improve documentation.

Management of cases of abuse requires multi speciality team approach,including Child Protection services. It is often non operative splinting,casting,and ensuring the child comfort. Clinically followup will be needed to observe any remodelling or need for future malunion treatment. Since the majority of fractures are in children

younger than 3 years of age, there is a large potential for fracture remodelling.

CONCLUSION

Child abuse should be a national concern and ,in conjunction with such awareness, a national online data collection system should be formed that would alert physicians to any recurrent case. The common symptom of abuse is skin trauma or bruising, and the second most common is fractures. The most common mechanism of physical abuse is shaking. Head trauma is common cause of death. The need for improved and on-going health care provider education in the area of child abuse identification and documentation remains.

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USE OF CHEATLE FORCEPS IN OPERATION THEATRE: IS IT SAFE ?

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ABSTRACT

Cheatle's forceps is a surgical instrument used in operation theatre to remove sterilized instruments from boilers and formalin cabinets. They are a source of potential microbes. Nosocomial infections(better termed as Health care associated infections) create burden in health community. Cross infections (that is transmitted through articles that are shared by people) is indeed an issue in health environment. The Hospital acquired infections pose a major problem and are recognised as critical public health problem. Medical instruments like Cheatle's forceps which is used to bring almost all surgical sterile instruments in Operation Theatre is also contaminated with microbes. In this article we will review literature on use of Cheatle Forceps ,it's safety and effects of microbicidal solution.

Key words: Cheatle's forceps,Nosocomial infections,Operation Theatre

INTRODUCTION

Cheatle's forceps are commonly used in surgical wards and operation theatres to transfer sterilized instruments and materials to surgeon's hands. It is kept in variety of antiseptic solutions . This antiseptic/disinfectant solutions often remain unchanged for days. There is every possibility of contamination of these bottles, thus may spread infections. The cheatle's forceps which is universally used as a medical equipment by health workers to pick up the medical instruments and dressing materials is likely to be contaminated by microorganisms.

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DISCUSSION

Hospital Acquired Infections are a significant source of morbidity and mortality for the impatient population in tertiary care hospitals. The death due to hospital acquired infections is really reaching the heights. It is estimated that an average of 1.6 to 3.8 infection per patient occur annually in tertiary care hospitals. Infections of urinary tract, respiratory tract(e.g pneumonia and bronchitis) and skin and soft tissues(infections of pressure ulcer) represent most of Nosocomial infections.

An effective facility wide infection prevention and control program can help to contain and reduce adverse consequences. Contamination of forceps might be potential vectors of Nosocomoial infections.

There are two important issues when using antiseptics and disinfectacts for keeping Cheatle's Forceps in surgical wards. These are bacteriological contamination and loss of their antimicrobial activity over period of time, thus necessitating its change to fresh solution. There are many reports using bacterial culture to determine in-use antiseptics and disinfectants. These reported the following.

1. Contamination incidence varied from 1% to 63.1%.

2. The rates of contamination correlated with duration of use.
3. Pseudomonas was the commonest bacteria to be cultured. Its resistance to microbial agents was a concern.
4. Risk factors were improper preparation, storage,and prolonged use.
5. Periodic quality testing and strongly adhering to standard disinfection procedures were advised to prevent this problem.

While it is expected that continuous use of a solution to sterilize instruments for a long period would inevitably result in dilution of sterilizing solution: exact time frame for the loss of potency of a chemical is specifically mentioned only for Glutaraldehyde. It is recommended that this solution should be discarded 14 days after activation because of the reported significant decrease in activity and free aldehyde concentration. For Povidone Iodine,it has been mentioned that previously opened solutions may lose their anti-microbial effectiveness because of a partitioning of the iodine between the micelle structure of the surface active agent and the water phase.

Practising and maintaining asepsis remains the HolyGrail for every hospital. It is well known that asepsis, like any other chain, is only as strong as its weakest link. Many diverse aspects of this chain have received scientific attention: contamination from opening glass ampoules, risk of multiple-use vials/ bottles, contamination of pagers/mobiles, even deliberate contamination of in-use antiseptic solutions to establish the minimum care necessary. However, it is extremely surprising that a very important issue of contamination of various antiseptics and disinfections used for keeping the Cheatle's Forceps has not received any scientific scrutiny, a classic example of missing the wood

According to CDC(USA) has a classification system that identifies the risk levels associayed with medical and surgical instruments:
critical,semi-critical and noncritical.
This includes:critical items(e.g needles,intravenous catheters,indwelling urinary catheter) are defined as those items which normally enter sterile tissue or vascular system. The equipment must be sterile when used, based on one of several accepted sterilization procedures.
Semi-critical items(e.g thermometers,podiatry equipment, and electric razors) are defined as those objects that touch mucous membrane or skin that is not intact. Such items require meticulous cleaning followed by high level disinfection treatment using appropriate chemo sterilizer agent
Non-critical items(e.g stethoscope,blood pressure cuffs,over-bed tables)are defined as those that come in contact with intact skin or do not come in contact with the patient. They require low level disinfection by cleaning periodically after a visible soiling with an EPA disinfectant or germicide that is approved for health care settings.
Medical equipments that are used in non -critical care setting are less likely to have standard disinfection and cleaning protocols than equipments in critical care settings. These equipments are more likely to carry pathogenic microorganisms. The contamination of the tips of the Cheatle's Forceps is reported mainly due to lack of regular disinfection every day and no attempts have been made to survey,modify and document the ways and means of disinfecting or sterilizing these instruments.
Cheatle Forceps were generally kept in the dressing trolley in the surgical wards in

various solutions for this study. These solutions were as follows:

1. 0.5% Cetrimide and Chlorhexidine combination.
2. 1% Cetrimide and Chlorhexidine combination(Savlon)
3. 5% Povidone Iodine (Betadine)
4. 10% Chloroxylenol(Dettol)
5. 2.4% Glutaraldehyde(Cidex)

The Cheatle's Forceps if not cleaned/ disinfected properly may transmit pathogen from one patient to another and also contaminate entire hospital environment with a particular organism which it may carry on itself.

In a prospective study conducted by Ganesh babu,Murugesan,Ravikumar, Mythreeyee,Tamilselavan,kesavalingam,Saravanan and Meera in Department of Surgery, Govt medical college and ESI Hospital, Coimbatore to determine bacteria that are contaminating the Cheatle's Forceps and to survey and modify the practices of cleaning and disinfecting forceps. Swabs were taken from Cheatle's Forceps used in out Patient Department,Surgical wards,Dressing rooms. There were alarming list of organisms such as coagulase negative staphylococcus, enterococci,E .Coli, Klebsiella, Pseudomonas,Gram Negative Bacilli from surgical wards. Culture from post op wards show Pseudomonas. The study concluded that mere immersion of Cheatle's Forceps in Chlorhexidine solution is not enough. It is recommended that it should be autoclaved every day and should be kept immersed with Sterile Saline solution.

Pawan agarwal,Mahendra singh,D Sharma conducted a study at N.S.C.B government medical college ,Jabalpur on Bacteriological evaluation of antiseptic solutions used to keep Cheatle's Forceps . Five solutions were assessed for contamination and were compared with normal saline as control. The growth of bacteria was found after 1 week ,in 22.5 % of samples at 0.5 % concentration of Cetrimide /Chlorhexidine combination and 20.8% of samples at 1% concentration ofCetrimide/Chlorhexidine cpombination, and it cannot be recommended as a safe solution for keeping Cheatle Forceps. Povidone Iodine samples of 5 % were positive for growth of bacteria after 1 week. After 1 week ,bacterial culturewas positive in 0.83%(1/120 samples) and 0% for Chlorxylenol and 2.4 %Glutaraldehyde, respectively. Thus they concluded that ideal solution for keeping Cheatle's Forceps is 2.4 % Glutaraldehyde followed by Chloroxylenol.

According to Guidelines on infection control practice in clinics and maternity homes Recommended method for decontamination of Cheatle's Forceps is to autoclave daily and to store in Alcoholic Savlon which should be changed daily. Alternatively , instead of Autoclaving it should be boiled for 20 minutes.

According to WHO , in Section 3 Supplies and Equipment for Primary Health Care , Sterilizer Forceps are to lifting hot sterilized instruments from Sterilizer and also from Boiler. Ideally avoid using these- if they are used ,Forceps should be sterilised daily and stored in fresh disinfectant solution between use.

CONCLUSION

For patient health safety and aseptic hospital environment ,we should give emphasis on these matter ,although there little information regarding the bacterial contamination of solutions used for storing cheatle's forceps. Louis Pasteur in his celebrated lecture to Academic de Medicine on 30th april,1873 said, "If I had the honour of being a surgeon.....not only would i use absolutely clean

instruments(free from germs)but after cleaning my hands with great care would only use sponges previously raised to a heat of 130-150 degree. I would still have to fear germs suspended in air and surroundings of patient" .Thus Cheatle's Forceps most commonly used in wards, dressing rooms, OT, post op general wards should be autoclaved daily as per standard precautions and ideally stored in Chlorxylenol or Glutaraldehyde solution which should be changed regularly.

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AVULSION FRACTURE OF THE TIBIAL TUBEROSITY COMBINED WITH LATERAL TIBIAL PLATEAU IN AN ADOLESCENT

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Abstract

Avulsion fractures of the tibial tuberosity are commonly sustained in adolescent males during sport activities which involve jumping and tackling. Tibial tuberosity avulsions combined with lateral tibial plateau in an adolescent are rare injuries. We received an unusual case of left Ogden type IIIB avulsion fracture of the tibial tuberosity with an articular involvement of the lateral tibial plateau (Salter Harris type IV) in a 14-year-old boy. The injury was sustained after jumping from three stairs where the boy predominantly landed on his left lower limb. Unlike other cases reported, since they were athletes and injuries were sustained during sport activities, our case is an obese individual who jumped off few stairs. The results following surgical treatment are excellent since the fracture united, and the articular surface was restored without the need of arthrotomy with gaining full range of motion. Therefore, displaying this case in the literature will be helpful since it is rare and was successfully treated differently from the previously reported cases.

Introduction

An avulsion fracture of the tibial tuberosity is an uncommon injury, with reported incidence ranging from 0.4% to 2.7% (as cited in Bolesta MJ, 1986; Mosier SM, 2004) .The average age of presentation of such injuries was reported to be 15.0 ± 1.1 years with around 10% of the cases initially presented with compartment syndrome or vascularcompromise . It accounts for less than 1% of all physeal injuries . Avulsion of the tibial tubercle can occur when the traction force on the patellar ligament exceeds the combined strength of the physes underlying the tubercle, the surrounding perichondrium, and the adjacent periosteum. There are two mechanisms of injury: violent contraction of the quadriceps muscle against a fixed tibia which can occur in forceful jumping or acute passive flexion of the knee against the contracted quadriceps. Associated injuries may involve the surrounding ligaments, menisci, and rarely tibial plateau .

2. Case Report

A medically free 14-year-old male who was obese sustained an injury to his left knee after jumping from 3 stairs. The patient mentioned that he predominantly landed on his left lower limb with his left knee in full extension and in external rotation. The patient started complaining of left knee pain limiting his range of motion and ability to bear weight immediately after the fall. He was brought to the Emergency Department (ER) of SCB Medical College by his parents immediately after the injury. On physical examination, the left knee was profoundly swollen and bruised. There was tenderness over the tibial tuberosity and lateral joint line. He was unable to actively move the knee joint. The passive range of motion was painful. There were no signs indicating compartment syndrome or neurological or vascular injury. X-ray radiographs revealed a Watson-Jones type IIIB avulsion fracture of the tibial tuberosity

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apophysis (Figure 1). A CT scan showed a step of the articular surface more than 2mmextending to the posterior-lateral epiphyseapart of the proximal tibia (lateral tibial plateau) (Figure 2).

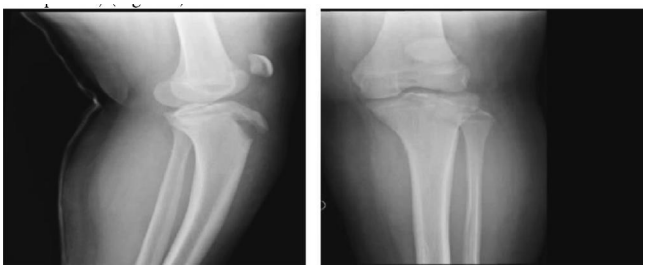


Figure 1: AP and lateral view X-ray of the left knee The patient was admitted and was prepared for operative management. A procedure was planned and done on a radiolucent table under general anesthesia. A tourniquet was used to avoid excessive bleeding during the procedure. The tourniquet was inflated after pulling down the quadriceps to avoid blocking the reduction due to the extensor mechanism. The leg is prepped and draped according to the standard orthopedic protocol. Anterolateral approach of the knee was used with an incision starting from the lateral upper border of the patella to 10cm down. Deep fascia was opened anterior to the iliotibial tract. The fracture line was identified; the reduction of the articular step was done using a reduction clamp and assured using a portable image intensifier on flexion and extension of the knee without arthrotomy. We avoided arthrotomy of the joint to not make it vulnerable to infection and possible scarring. Stabilization of the reduction was maintained using a k-wire. Definitive fixation was achieved with three 3.5mm partially threaded cancellous screws placed under fluoroscopic guidance for the tibial tuberosity fracture. A proximal tibial plate was slid laterally and was used to buttress the lateral tibial column. Careful placement of the screws was done to not cross the physis with the help of a C-arm (Figure 3). After fixation, good hemostasis was achieved, drain was placed, and the range of motion was assessed which was full. Closure was done layer by layer, then dressing after. The postoperative plan was to immobilize the knee in a cylindrical cast for 3 weeks with no weight bearing on the left lower limb with the use of crutches for ambulation.

Postoperative knee CT scan is requested to ensure that the fracture is anatomically reduced. The patient received analgesia and antibiotics, and drain was removed 24 hours post-op. The patient was seen in an orthopedic clinic after 3 weeks, there were no signs of surgical site infection, and the clips were removed. The controlled range of motion was advised using a hinged knee brace throughout the day for 4 weeks. A follow-up X-ray (Figure 4) shows that the fracture is aligned with no loss of reduction or displacement. Physiotherapy is advised 7 weeks postoperative management focusing on the range of motion and strengthening. The patient was seen 6 weeks later, he had full range of motion with no deformity, and there were no complaints reported by the patient like locking or pain.

3. Discussion

The tibial tuberosity develops from a secondary ossification center in the proximal tibia between 7 and 9 years of age . During ossification, calumniated cartilaginous cells with poor tensile strength transiently replace the fibrocartilage, predisposing the tibial tuberosity to traction injury just before or during the later stages of physiologic epiphysiodesis . The mechanism of injury is usually an indirect force caused by sudden contraction of the quadriceps muscle. During sudden acceleration and deceleration forces, the quadriceps mechanism forcefully contracts against the patellar tendon insertion. When the force is greater than the strength of the tibial tubercle physis, a fracture occurs, leading to avulsion of the tibial tubercle. An important

predisposing factor is a preexisting Osgood-Schlatter disease which was excluded and was not evident in our case . Tibial tubercle avulsion fractures are commonly seen in athletic males, reportedly basketball players (Ozer H, 2002) . The most common self-reported mechanism of injury was related to jumping activities followed by falling directly on the knee and twisting injuries Our patient was not athletic, he sustained an injury while jumping over three stairs landing on the left lower limb with the knee extended and externally rotated in relation to the femur which combines sudden quadriceps contraction and a twisting mechanism. Basketball usually involves frequent jumping which will lead to repetitive contractions and could be a factor leading to a tibial tubercle avulsion fracture. We believe that the weight of the patient was a very important factor since he was weighing 105 kilograms(BMI: around 40 kg/m2). Javed reported a Watson-Jones type III avulsion fracture of the tibial tuberosity apophysis and an Aitken type II fracture of the lateral tibial plateau which is similar to our case. Their definitive fixation was achieved with five 4.5mm partially threaded cancellous screws which revealed a satisfactory outcome. Our case was surgically treated differently since reduction was achieved with three 3.5mm partially threaded cancellous screws for the tibial tuberosity fracture and a proximal tibial plate was used to buttress the lateral tibial column. The full range of motion was gained 12 weeks postoperative management without symptoms as reported previously. Our surgical management is similar to what Chakraverty reported in a case series of skeletally mature patients with tibial tubercle fractures in association with tibial plateau fractures. Prior to fixing the tibial plateau fracture, we used 3 cancellous screws to fix the tibial tuberosity anatomically since the growth plate was open. Howarth approached the reduction of tibial tubercle fractures with intra-articular involvement using small parapatellar arthrotomy for both inspections of associated meniscal or osteochondral injuries as well as subsequent confirmation of anatomic articular reduction with arthroscopi

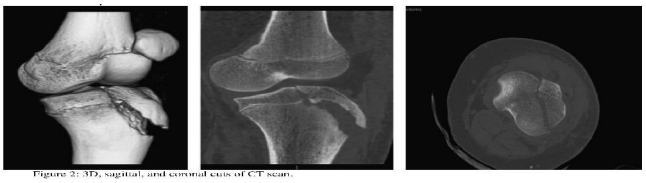
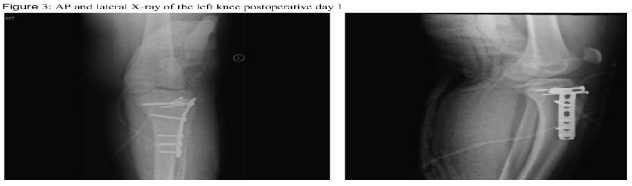


Figure 2: 3D, sagittal, and coronal cuts of CT scan.

Figure 3: AP and lateral X-ray of the left knee postoperative day 1



assistance. We avoided opening the joint capsule to decrease the chance of infection, arthrofibrosis, and complex regional pain syndrome . Our case is discharged from our clinic without complications and with no residual complaint after 13 weeks.

Figure 4: AP X-ray of the left knee 3 weeks post-op.

4. Conclusion

The avulsion fracture of the tibial tuberosity combined with lateral tibial plateau is a rare fracture to be encountered, and few have been reported in the literature with similar treatment approach but not exactly the same. The mechanism of the injury is an important factor in the identification of the structures involved. Unlike the previously reported cases, the patient was not athletic and was obese. Open reduction of such case can be obtained without the need of arthrotomy.

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ANATOMIC I.D.E.A.L ACL RECONSTRUCTION

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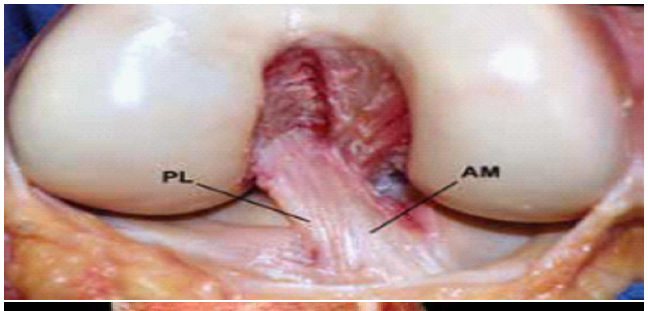
Abstract:

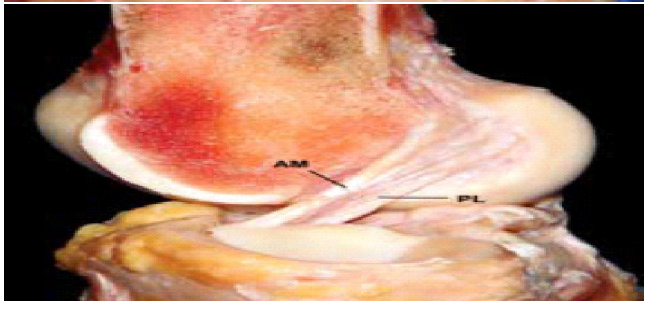
Anterior cruciate ligament (ACL) reconstruction is one of the most commonly performed orthopaedic procedures. Surgical treatment of anterior cruciate ligament (ACL) injuries has improved in leaps and bounds over the past several decades. Surgeons have progressed from extra-articular tenodesis procedures that over-constrained the knee and reduced motion, to intra-articular reconstruction techniques that more accurately recreate the native ACL. Recently, tunnel and graft placement has improved to make ACL reconstruction even more anatomic, further improving the kinematics and joint health in reconstructed knees

WHAT IS ANATOMIC ACL RECONSTRUCTION?

According to van Eck et al, 'anatomic' ACL reconstruction is defined as "the functional restoration of the ACL to its native dimensions, collagen orientation and insertion sites."

- The first principle of anatomic ACL reconstruction is to reproduce as closel as possible the size, shape and location of the native ACL attachment sites.
- The second principle is to restore the two functional bundles of the ACL. In order to create an ACL replacement graft that reproduces the behaviour of the two functional bundles of the ACL, it is necessary to reproduce the size, shape and location of the native ACL attachment sites.
- The third principle is that the ACL replacement graft should reproduce the tensioning pattern of the native ACL. The anteromedial (AM) bundle fibres of the native ACL are taut throughout the range of motion, while the posterolateral (PL) bundle fibres tighten rapidly during the last 30 degrees of extension. The reconstructed ACL graft should mimic this tensioning pattern.
- The final principle of anatomic ACL reconstruction is to individualise the surgical procedure for each patient. Every patient and every knee is different, so the same operation should not be performed in every case.





Complete restoration of the native ACL may not be possible, due to the complex nature of the ligament. However, since anatomy is the basis of orthopaedic
surgery, the surgeon should strive towards

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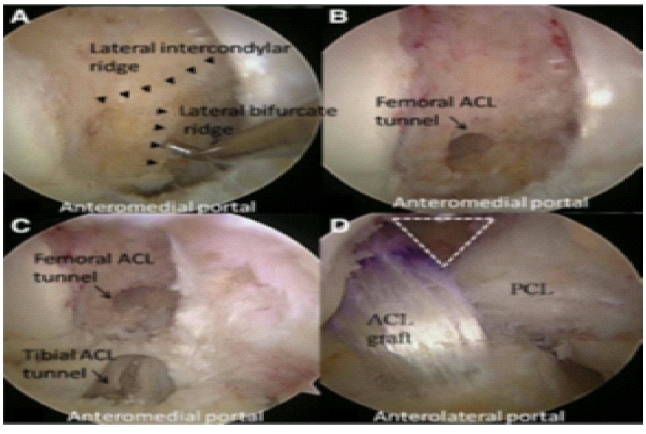
close approximation. So, the primary surgical goal of most anatomical ACLR techniques is creation of a femoral tunnel based off the anatomical centrum (center point) of the ACL femoral footprint

The femoral footprint is 3.5 times larger than the midsubstance of the ACL. Detailed anatomical dissections have recently demonstrated that the femoral origin of the ACL has a stout anterior band of fibers with a fanlike extension posteriorly. As the ACL fibers extend off the bony footprint, they form a flat, ribbonlike structure 9 to 16 mm wide and only 2 to 4 mm thick. Within this structure, there is no clear separation of the AM and PL bundles. The presence of this structure makes sense given the anatomical constraints inherent in the notch. Indeed, the space for the native ACL is narrow, as the posterior cruciate ligament (PCL) occupies that largest portion of the notch with the knee in full extension, leaving only a thin, 5-mm slot through which the ACL must pass. Therefore, filling the femoral footprint with a tubular ACL graft probably does not reproduce the dynamic 3-dimensional morphology of the ACL.



WHAT SURGICAL TECHNIQUES ALLOW ANATOMIC FEMORAL TUNNEL PLACEMENT?

- Two-incision technique
- Transtibial surgical technique
- Medial portal surgical technique

Medial portal surgical approach provides several advantages compared to the traditional transtibial technique:

1. First of all, the ACL femoral tunnel is drilled independently of the tibial tunnel which allows the ACL femoral tunnel to be placed within the native ACL femoral attachment site.
2. Secondly, the intra-articular position and the angle of the ACL tibial tunnel do not have to be compromised to accommodate drilling of the ACL femoral tunnel. Therefore, the surgeon can position the tibial tunnel in the centre of the footprint and is free to drill a steeper and thus longer tibial tunnel. A longer tibial tunnel minimises the potential for graft-tunnel length mismatch and allows longer bone-tendon-bone graft constructs to be utilised.
3. Thirdly, in the medial portal technique, femoral interference fixation screws are inserted through the same medial portal which was used to drill the ACL femoral tunnel, thus minimising screwtunnel divergence.
4. Finally, the medial portal technique provides improved arthroscopic visualisation during ACL femoral tunnel drilling since the femoral tunnel can be drilled under ideal arthroscopic conditions without the loss of joint distension due to fluid extravasation out of the tibial tunnel.

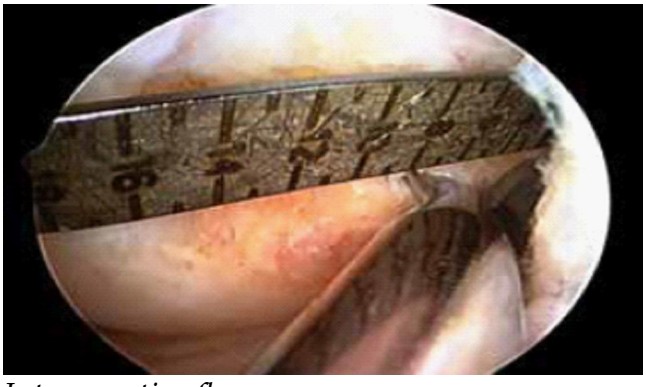
Some transtibial ACLRs were associated with nonanatomical placement of the femoral tunnel-resulting in vertical graft placement, PCL impingement, and recurrent rota-tional instability.

Native ACL footprint

In most situations there are remnants of the native ACL footprint present to aid with anatomic ACL femoral tunnel placement. The borders of the ACL femoral attachment site are marked with a 90° electrocautery or thermal probe and the centre of the ACL femoral attachment site can be estimated using the 'eyeball' method. Although the eyeball method is fairly accurate for estimating the high-low

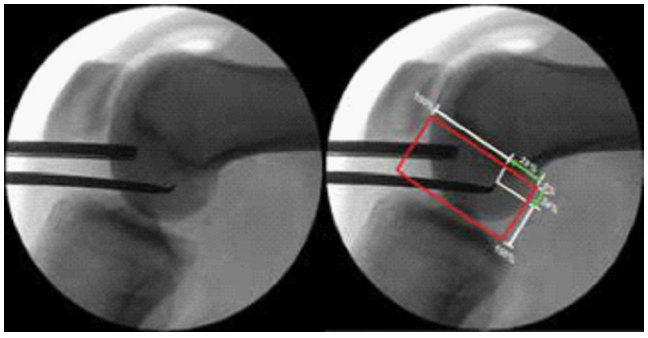
position of the ACL femoral tunnel, due to distortion of the visual field that occurs with the use of a 30° angled arthroscope, this method tends to position the ACL femoral tunnel shallow relative to the true centre of the attachment site. The true centre of the ACL femoral attachment site can be more accurately located by using an ACL ruler to directly measure the length of the ACL femoral attachment site ACL ruler

Use of a malleable ACL ruler allows the knee surgeon to individualise the location of the ACL femoral tunnel based on the specific anatomy of the patient. This approach allows for 'a la carte' or patient specific surgery to be performed, vs the 'one size fits all' approach associated with the use of offset ACL femoral aimers. This technique is particularly useful for revision ACL reconstructive surgery where there are no ACL remnants present and the bony landmarks may have been destroyed by prior notchplasty or the previous ACL femoral bone tunnel. The ruler is positioned along the lower-third of the lateral wall of the intercondylar notch. The centre of the ACL femoral tunnel is located at a shallow-deep position that is 45 to 50% of the measured distance from the deep (proximal) articular cartilage border to the shallow articular cartilage border. This point has been validated by Bird et al as a good approximation to the centre of the ACL femoral attachment site.



Intraoperative fluoroscopy

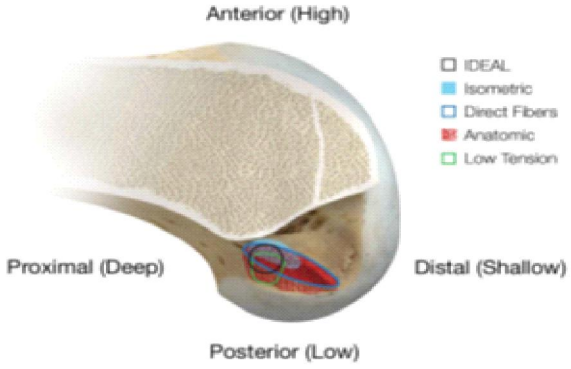
At the present time, interoperative fluoroscopy is the most accurate and reproducible method for ACL femoral tunnel placement. Fluoroscopy gives the surgeon the ability to precisely measure and if needed change the ACL femoral tunnel position during the surgical procedure. Fluoroscopy is especially valuable in revision cases. Fluoroscopy is also extremely helpful when attempting to preserve remnants of the torn ACL or performing an augmentation technique for a partial ACL tear. In these situations, identification of the lateral intercondylar and bifurcate ridges is not feasible as this would require resection of intact ACL fibres to expose the lateral wall of the notch. The ruler technique is also not possible in this situation since the intact ACL fibres prevent accurate positioning of the ruler along the lateral wall of the notch. The grid system described by Bernard and Hertel is used to locate the centre of the ACL femoral attachment site. This method is easy to use, is reproducible and has been shown to be independent of the knee size, shape and the distance between the X-ray tube and the patient. Using any or all of the above guidelines eliminates the need to use an offset ACL femoral aimer and referencing off the 'over-the- top' position to determine ACL femoral tunnel placement. ACL femoral offset aimers can constrain the location of the femoral guide pin and can lead to non-anatomic placement of the ACL femoral tunnel.



Acronym I.D.E.A.L., which refers to placing a femoral tunnel in a position that reproduces the;

Isometry of the native ACL, that covers the fibers of the Direct insertion histologically, that

is Eccentrically located in the anterior (high) and proximal deep) region of the footprint, that is Anatomical (within the footprint), and that replicates the Low tension-flexion pattern of the native ACL throughout the range of flexion and extension.



The biomechanical rationale for choosing an isometric region of an ACL graft is that it will maintain function throughout the range of flexion and extension. A nonisometric graft would be expected to slacken during a large portion of the flexion cycle and not restrain anterior translation of the tibia, or, if fixed at the wrong flexion angle, it could capture the knee and cause graft failure by excessive tension. A large body of literature has demonstrated that a tunnel placed in the center of the femoral footprint is less isometric than a tunnel in the more anterior region. Indeed, the anterior position (high in the footprint) identified by Hefzy and colleagues demonstrated minimal anisometry with 1 to 4 mm of length change through the range of motion. In contrast, a central tunnel would be expected to demonstrate 5 to 7 mm of length change, whereas a lower graft (in the PL region of the footprint) would demonstrate about 1 cm of length change through the range of motion. As such, central grafts, or grafts placed in the PL portion of the femoral footprint, would be expected to see high tension or graft forces as the knee is flexed, or to lose tension completely if the graft is fixed at full extension. Importantly, Markolf and colleagues reported that the native ACL does not behave exactly in a so-called isometric fashion during the last 30° of extension. They showed that about 3 mm of retraction of a trial wire into the joint during the last 30° of extension (as measured with an isometer) is reasonable to achieve graft length changes approximating those of the intact ACL. Given this important caveat, a primary goal for ACLR is placement of the femoral tunnel within this isometric region so that the length change in the ACL graft is minimized to 3 mm from 30° to full flexion. In addition, results of a time zero biomechanical study suggested better rotational control with anatomical femoral tunnel position than with an isometric femoral tunnel placed outside the femoral footprint. Therefore, maximizing isometry alone is not the goal; placing the graft in the most isometric region within the anatomical femoral footprint is desired. This isometric region in the footprint is in the histologic region that corresponds to the direct fibers.

The direct insertion consists of dense collagen fibers anterior in the footprint that is attached to a bony depression immediately posterior to the lateral intercondylar ridge. This anterior band of ACL tissue with the direct insertion histologically corresponds to the fibers in the anterior, more isometric region of the femoral footprint. The direct fibers of the insertion form a firm, fixed attachment that allows for gradual load distribution into the subchondral bone.

Again, this region is eccentrically located in the anterior (high) and proximal (deep) portion of the footprint.

In vivo and in vitro studies as well as surgical experience suggest a need to avoid both (a) the nonanatomical vertical (roof) femoral tunnel placement that causes PCL impingement, high tension in the ACL graft in flexion, and ultimately graft stretch-out with instability and (b) the femoral tunnel placement in the posterior (lowest) region of the footprint that

causes high tension in extension and can result in graft stretch-out with instability.

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OBSTACLES AND CHALLENGES IN MANAGEMENT OF CLUBFOOT

Dr. Atanu Mohanty*, Dr. Rg Asutosh Mohapatra**, Dr. Sudeep Kumar Samanta***

Abstract

Clubfoot is a common developmental malformation around the globe. Approximately 80 percent of babies with CTEV are born in low & middle income countries. Without appropriate treatment it creates great burden for individual as well as society. Ponsetti method for management of clubfoot is accepted as most effective treatment modality & is practised across our country & throughout the world. Prevalence of clubfoot can be easily reduced to near eradication level by early initiation of treatment & regular follow up , which recquires active & dedicated participation of parents, society and health care system. Late presentation or default cases cause the deformity to be more rigidly fixed and compensatory changes in foot that are very difficult to treat.There are various obstacles/barriers to success of ponsetti method of management in full potential as observed in clubfoot clinic of our institution. In our study Information regarding these obstacles are gathered and represented from viewpoint of parents and family members, counsellor and treating doctor

INTRODUCTION

Idiopathic clubfoot is a widely prevalent congenital deformity in Indian subcontinent. Appropriate management from earliest age of child is essential for avoiding permanent disability for lifetime & associated social burden in a developing country like India.

Treatment of clubfoot has taken major turn from partial correction with various conservative & operative methods; which also carried high risk of residual disability; to complete correction by ponseti method. It is a simple, effective & inexpensive method of treatment but requires high degree of social participation, dedicated doctors & supporting staffs.

Late presentation or default cases cause the deformity to be more rigidly fixed and compensatory changes in foot that are very difficult to treat.

Clubfoot elimination program in our country aims for access of every clubfoot child to clubfoot clinic regardless of race, religion, social status, locality etc. All the obstacles in way of treatment of this deformity should be discussed & dealt with.

MATERIALS AND METHODS:

The study was conducted in clubfoot clinic, SCB MCH during treatment of 55 patients with 90 idiopathic clubfeet under supervision of a senior orthopaedic consultant. Ponseti method was strictly followed, in which serial manipulation & repeated cast is done.

Manipulation is done with the thumb of one hand placed over the talar head and the other hand holding the first metatarsal head with index finger and thumb (Ignacio V Ponseti). Cavus is corrected by lifting the first metatarsal head, and the other manipulations done serially by abducting

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the forefoot in supination till the foot is maximally abducted, and supination corrected which is indicated by neutral or slight valgus heel. After this equinus is corrected by either a percutaneous tenotomy of tendoachilles or stretching the tendoachilles with the palm of one hand placed under the entire foot, stretching being done in only those feet where the foot can be brought to or brought within 5 to 10 degrees of neutral with gentle manipulation . The final cast was applied after this & child has to use FAB after cast removal till minimum of 5yr age.

This was an observational study. A standard set of questionaire was developed & provided to parents, treating physicians & supporting counselors. Interviews were taken from parents orally because of low literacy level among parents coming for treatment. Patients' demography, physical examination, course of treatment, complications arising during the procedure were noted . The obstacles faced at each individual levels & complications faced during treatment were recorded & categorized.

PHYSICIANS

1. The doctors who participated in our study stated that they have not received any primary training in their MBBS curriculum & after in depth study & regular cast application under supervision they are able to effectively treat the children. If appropriate training facilities are not available which is not uncommon & there is less number of visitors to clubfoot clinic then the junior doctors may not be well skilled in casting method. Primary care physicians at local hospitals sometimes treat these patients but deviate from actual protocol which makes the deformity difficult to correct.

2.Negligence and/ or ignorance of parents due to any reason cause the treatment to start at late stage or follow up at irregular interval & these cases are susceptible to be resistant to ponseti treatment.

3. Occasionally there is shortage of logistic supplies from govt. stores, in proportion the number of patients visiting. It is difficult for those poor parents to buy the required items.

4.Physicians are working in very busy public hospitals & don't find enough time to counsel the parents, listen to their anxieties & difficulties or ensure follow up. Lack of adequate healthcare workers who can fill up this gap is lacking in our system. There is also lack of infrastructure for supporting parents or children & lack of OT facilities for tenotomy.

5.Missed diagnosis and lack of knowledge on clubfoot management were among the challenges experienced by health providers. Participants highlighted that the diagnosis was frequently missed at birth or not recognized and therefore not referred on time.

Patients

The ponseti method of casting needs to be applied skillfully without forceful manipulation & discomfort to the child. This when not properly followed causes various problems for the child.

Some children are inconsolable & constantly crying after application of cast or brace, some have temporary mild edema of foot, some have unrelated physical illnesses like fever, diarrhoea, cough & cold so parents tend to remove cast/ splint in those children.

Premature and over correction of equinus results in Rockerbottom deformity. Tenotomy procedure may not be perfectly carried out & result in partial tenotomy & persistence of equinus foot.

Some of the complications encountered are illustrated in following figures.

complex clubfoot (due to improper moulding & cast slippage)

Deep abrasion around Groin

edema & pressure sore

skin excoriation & breakdown

syndromic clubfoot , associated with constriction band

Parents & social issues:

- In many cultures mother is blamed for abnormality of child, in laws family members create disturbances about how their hard earned money is being wasted on travelling, treatment expenses & work days lost. This uncooperative attitude discourages parents & they are more into resentment than solution.
- Parents; when they mark the defect in the newborn; are sometimes reassured by relatives/ inexperienced health care workers that it will correct on its own with time.
- Belief on local oiling & other ingenious method of treatment by casts, which appears more familiar & accessible to them.
- Considering the deformity as God's will/punishment or the fate of child & parents.
- Parents not wanting the foot to be completely corrected so that they can take the advantage of disability certificate
- Long distance the mother/caregiver has to travel & un availabilty of a suitable accompanying male person & also the associated expenses.
- Believing that amount of correction achieved after few initial castings or after initiation of brace therapy, to be sufficient & not doing appropriate follow up to clubfoot clinic.

- Not understanding importance of 5 yr long use of FAB for maximum period of day. Some have fear in tenotomy period that some nerve may be cut and child be disabled , so these parents do not show up for tenotomy.

CONCLUSION

Clubfoot program to be successful in India a number of factors needs to be taken care of. Major among them is poverty & ignorance among parents & society at large, lack of faith or compliance on current treatment protocol, limited number of clinics & healthcare staffs & less working space, complications due to improper application of plaster & plaster care.

Possible interventions may include:

- Awareness among people & community about clubfoot & its effective treatment
- Encouraging parents of children who have successfully completed clubfoot treatment to talk to other parents coming to clinic or in their neighborhood,
- Establishment of weekly clubfoot clinic in some far ,semi urban areas;
- Help of various voluntary organization members in spreading awareness, counselling & helping parents cope with difficulties they face during treatment
- Regular free supply of plaster of paris, FABs & other logistics to all clubfoot centers
- Training & employing nurses & para-clinical staffs for applying cast; introduction & training of primary physicians about correct ponseti methods.
- Special care, & if needed, early referral of atypical, complex & neglected clubfoot to higher center with proper facilities

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VARIOUS TREATMENT PROTOCOLS OF GIANT CELL TUMOR OF DISTAL RADIUS: PROSPECTIVE STUDY.

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Abstract

Giant cell tumor are benign aggressive type of tumor which account 20% of benign bone tumors and 6% of all bone tumors. GCT usually occurs at epiphysio-metaphysis of long bones and distal end radius is 3rd most common site after distal end of femur and proximal end tibia. Various treatment modalities are mentioned in literature from simple curettage to reconstruction or prosthetic replacement of distal radius. A prospective study of 17 patients of GCT of distal end of radius treated by various procedures in our institute and followed up to 2 years to evaluate complications and functional outcome based on The MusculoSkeletal Tumour Society Score. After 2 years of follow up functional score evaluated as 29.4% in patients treated as curettage with PMMA augmentation or iliac bone grafting, 41.17% in treated as resection with fibular autografting or ulnar translocation with osteosynthesis and 29.4% in those who are undergone as resection and centralization of ulna with Osteosynthesis, therefore a careful clinical and radiological assessment of distal radius GCT and judicious treatment plan is the key for successful outcome in these lesions.

Introduction

Giant cell tumor is a benign aggressive tumor. It forms 4% of all primarytumors. The distal end of radius is a relatively common site of skeletal neoplasm and is the third most common location (after the distal end of femur and proximal end of tibia) of giant cell tumor. The peak incidence is between 20-45 years of age(2). 70% of cases of GCT fall in this age group(3). The tumor occasionally invades the articular space involve ligament and synovial membranes.Giant cell tumor at the distal end of the radius presents special problems in local control of the tumor and reconstruction after surgical treatment because of limited surrounding soft tissue, closeness to adjacent neurovascular structures, and juxtaarticular location. A more aggressive behavior and high recurrence rate for both intralesional and excisional procedures has been noted for giant cell tumors at this site. They are recognized for variable clinical behavior, which is not always related to radiographic or histological appearance. The problem of selecting proper treatment is complicated by the failure of its histologic appearance to indicate its biologic behavior.

Various treatment modalities are advocated in the literature these include:

1. Extended Currettage with or without reconstruction using autogenic/ allogenic bone grafts or polymethylmethacylate.(4,5)
2. Resection and construction with vascularized or non vascularized proximal fibula (fibular head arthroplasty)(6,7).
3. Resection with partial wrist arthrodesis(radioscapho-lunate arthrodesis) using a strut bone graft.(8)

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4. Resection and complete wrist arthrodesis using an intervening strut bone graft.(9-10)
5. Resection and reconstruction techniques includes arthrodesis with different autografts.(6,11,12).

Reconstruction ofthe wrist after exicision of the distal aspect of the radius is a challenge because of the high functional demands on the hand, the young age and relatively long life expectancy of many patients, the limited surrounding soft tissue ,and the proximity of adjacent nerve and tendons.

We undertook a prospective study of the surgically treated GCT of distal radius to analyze the treatment protocol, recurrence rate, complication and functional outcome.

Material And Methods

A prospective study of 17 patients of GCT of the distal end of radius, treated In SCB Medical College And Hospital, Cuttack. These included the case diagnosed primarily and all the lesions were biopsy proven GCTs. The minimum follow up period is 2years.

All patients evaluated preoperatively with plain radiographs, computed tomography (CT) scan and magnetic resonance imaging (MRI) scans of involved wrist and with plain x-rays of chest. Serum calcium, phosphorus and alkaline phosphatase were also determined to rule out hyperparathyroidism.

Radiologically grading of the lesion was done by Campanacci Grading (13). Grade I is well defined border of a thin rim of mature bone and bony cortex was intact. Grade II lesion had relatively well defined margin but there was no radio-opaque cortical rim. Grade III lesion with fizzy borders, suggest a rapid and possibly a permeative, growth of the tumour. All patients with grade I tumour are treated with extended curretagge with bone grafting or PMMA to avoid more radical surgeries. Grade III tumours have been uniformly treated by autografts reconstruction in our institute. However the decision type of operative intervention in grade II was based on individual case with one of the important consideration being the subcortical bone stack likely to be available after curettage. Five types of procedure were performed in our institute:

1. Currettage with bone cementing (PMMA).
2. Currettage with autografting(Iliac bone grafting).
3. Resection of tumour and reconstruction with nonvasularized fibular graft with fixation by osteosynthesis.
4. Resection of tumor and reconstruction by centralization of ulna with osteosynthesis.
5. Resection of tumor and reconstruction with ulnar translocation and fixation with osteosynthesis.

At every 3 months, plain radiographs of forearm were repeated to see union, recurrence of tumour or graft related complication. After first year, follow up was at every 6 months till 24 months.

The functional scoring of the outcome was done by using The Musculo Skeletal Tumour Society System.(14) This scoring system measures the function in the upper extremity of assigning points (0-5) under six different heading: pain, function, emotional acceptance , hand positioning, manual dexterity and ability of lifting weight. The functional score was expressed in percentage of the actual points scored out of the total 30.

Results

A total of 17 patients were analyzed, there were 09 males and 08 females with 10 right sided and 07 left sided involvement of

distal radius. The age distribution ranged from 21 years (youngest) to 53 years (oldest) with a average age of 27.46 Years and median of 28 Years.The commonest presenting symptom was swelling (n=12), followed by swelling and pain (n=13). The lesion were graded radiologically as per the **Campanacci Grading System.** Only 5 of the lesion was grade I; while 7 were grade II and 5 were grade III.

Grade I lesion (n=5) was treated as: Curettage and cementing i.e. poly methyl methaacrylate(PMMA) (n=4) and Curettage and iliac bone grafting (n=5).

Grade II lesion (n=7) were treated as: En bloc resection with fibular grafting with osteosynthesis (n=2), En bloc resection with centralization of ulna (n=5) .

Grade III lesion (n=5) were treated as: En bloc resection with fibular grafting with osteosynthesis (n=2), En bloc resection with centralization of ulna (n=2) and En bloc resection with ulnar translocation (n=1).

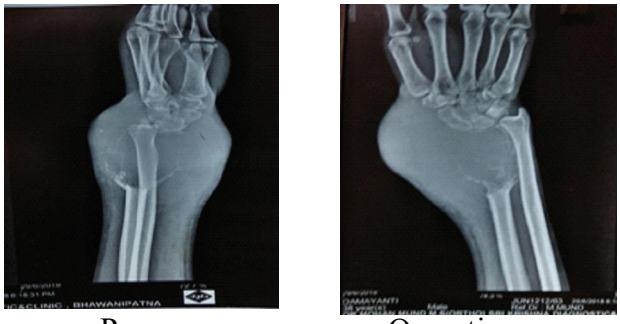
The patient were followed up clinicoradiologically with the ranging from 18 months to 26 months with an average of 24 month.

Complication as a result of the disease or the treatment modality did occur. There were 3 recurrent , one nonunion which was managed by bone grafting at the graft host bone junction, 2 delayed union cured by 6 weeks above elbow cast, 3 infection which was cured by 6weeks period of antibiotics and one case of instability at wrist presented as a deformity of wrist in our study which was further treated by Darrach's osteotomy .The average range of motionwere 50degree forearm supination, 30 degree pronation, 35 degree palmar flexion, 30 degree dorsiflexion. The average time of union was 3.25 months was observed in our study.The functional score in this study ranged between 58-90% with the average being 77%. The patients treated with curettage and bone cementing or bone grafting has the best functional outcome with scores of around 80%. The patients who had undergone en bloc resection with wrist arthrodesis either by fibular graft with osteosynthesis or ulnar translocation withosteosynthesis found well with score around 73%. The lesion treated with en bloc resection and centralization of ulna had the least functional score which was 60%.

Case:1

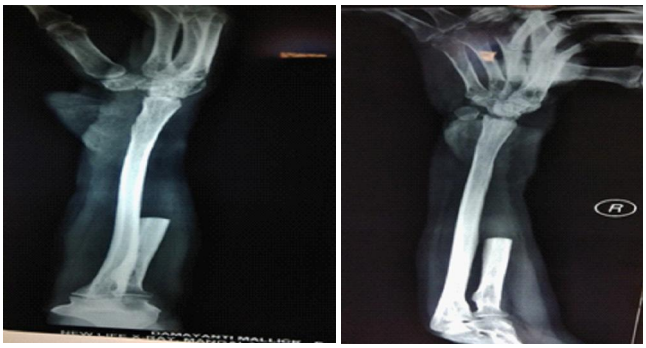
Pre-Op X-Ray Cementing.

Post-Op With Curettage And Bone



Pre- Operative

Anteroposterior And Lateral View Of Right Wrist



Follow up after 4 months

Discussion

Many different modalities of treatment have been used over the years, each with its own prospective and consequences. It's distal end is the major participants inthe wrist joint whose function is quite essential to maintain the normal life style. It's removal from the bone will jeopardize function of the forearm, compromise ROM of wrist and cause instability of the wrist unless a reconstruction be under taken to restore anatomy. The clinical behavior of GCT is unrelated to histological or radiological grading(15,16) and thus the decision to either salvage or excise the tumorous bone is based on ability to achieve stability and function whatever may be the means used.

Most authors agree that the completeness of the curettage and exicision is the single most important factor to prevent recurrence (17,18).A campanacci grade I and II GCT of distal radius is usually treated by curettage and reconstruction with either PMMA or bone graft. The recurrence is easier to be noticed with a cement reconstruction and it also gives immediate structural stability. The exothermic reaction of cementing cures is also supposed to increase the tumoricidal effect(19). Ipsilateral fibular nonvascularisedautograft reconstruction of the large defect created after resection of distal radius offers many advantage over procedures(20). It has low donor site morbidity, with predictable and satisfactory functional results.Translocation of ulna to the distal radial defect with carpoulnar arthrodesis was performed in 2 patients reported on by **Seradge,(21)**6 patients reported on by **Bhan and Biyani,(22)** 1 patient reported on by **Lalla and Bhupathi(24)**and 1 patient reported on by **Turcotte et al**.(24) The distal fusion was carried out to a slot between the scaphoid and lunate, and stabilization was achieved with a long 3mm kirschner wire from the 3rd metacarpal and lunate to the medullary cavity of the proximal radius. The patients had good grip strength and forearm rotation without the proximal stump to cause functional disturbance. Another complication was non union in one of the patient which was treated with bone grafting and delayed union in two patient which also treated as conservative cast for 6 weeks.

Conclusion

The morelocalized lesion are best treated with curettage. Those with extensive cortical destruction and large soft tissue component usually need en bloc resection. It has been seen that non-vascularisedfibulararautograft reconstruction of distal radius show substantial loss of subjective results acceptable to most patients.Campanacci grade III lesion may be treated with resection and appropriate stabilization if the bone stock permit.

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INTRAOSSEOUS WIRING FOR SHAFT FRACTURE OF SHORT LONG BONES OF HAND.

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Abstract

In Modern world hand injuries are very common and often neglected causing poor results.Various implants and techniques are used for the treatment of short long bone fractures like meta carpals,phalanges with varying grades of stability.

Ten patients with displaced transverse or short oblique proximal phalangeal shaft fractures were treated lister's fixation(intraosseous wiring) between July and November 2017. Outcome was analysed in terms of stability, early mobilization, fracture healing and function of hand. They were graded according to the Belsky score.

90% patients were graded excellent and 10% good, with none having fair or poor results.

This technique is a simple and effective method of fracture of shaft of short long bones with results comparable to other techniques. This method gives good fracture stability to allow early mobilization of joints and thus early return of function. It is also a cost effective way of management for the developing world.

Key words:short long bone fracture,two part fracture, intraosseous wiring/lister fixation.

Introduction

Main agenda of phalangeal fracture treatment is to avoid stiffness while getting a stable fixation.The most quoted statement regarding the management of hand fractures probably is the following comment by Swanson: "The treatment of hand fractures is complicated by deformity from no treatment, stiffness from overtreatment and both from poor treatment."(1)This simple but eloquent statement points out the problems associated with phalangeal fracture treatment.

Various methods to treat phalangeal fractures include buddy strapping, percutaneous cross Kirschner (K) wiring, plate fixation and tension band wiring. Unstable transverse phalangeal fractures require internal fixation. Open fractures, however, must be fixed with a minimum of implants to reduce the possibility of infections, but with a stable construct to commence early mobilization to prevent stiffness. Lister described a technique of coronal interosseous wiring perpendicular to plane of osteosynthesis with k wire supplementation for the treatment of phalangeal fractures. In this method both compression and rotational stability are achieved.(2)This method works as a tension band wiring.

Early mobilization of phalangeal shaft fractures within the first 4 weeks after injury resulted in 75-80% return of hand function.[3]However, when mobilization was initiated later than 4 weeks; the hand function was only 66% of preinjury levels. From this, the need for early mobilization is well-understood. Rigid fixation allows early mobilization of the injured digit.

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Various fixation techniques like single oblique K-wire fixation, crossed K-wire fixation, oblique screw fixation, plate and screw fixation etc., have been described for phalangeal shaft fractures. Fyfe and Mason(4) produced experimental fractures of the proximal phalangeal shaft and tested different methods of fixation. They reported that the least rigid was the single K-wire fixation. Crossed K-wire fixation was more rigid and interosseous wiring supplemented with an oblique K-wire the most rigid.

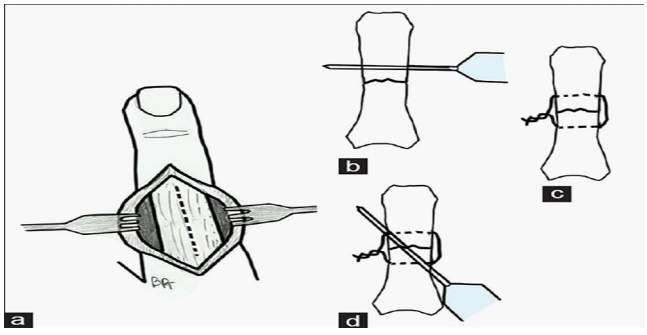
Materials and Methods

Ten patients with short oblique or transverse fracture of the shaft of proximal phalanx from July to November 2017 who underwent fracture fixation using the intraosseous wiring technique were included in this study. The inclusion criteria were (a)two part fracture (b) no other injured structures in hand (b) no co-morbidities. The exclusion criteria were (a) comminution (b) extensive soft tissue injury (d) patients already with stiffness of any digit (e) long oblique fracture

Operative procedure

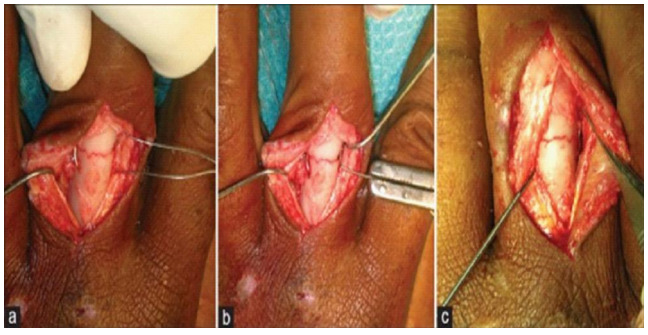
Under regional block a dorsal curvilinear incision was given on the skin over the fracture site. [Figure1 a-d]. Modification of incision was done in some cases according to position of original wound.Fracture ends were delivered by splitting the extensor tendons or by lateral inscion. Fracture ends were cleaned.After trial reduction two coronal holes were drilled 5mm away from fracture ends parallel fashion by 1.5mm k wire.Fracture ends were reduced and 24-26 G as wire passed through the holes and was tightened.Then a k wire of size 1.25 or 1.5 mm was passed in oblique fashion across the fracture avoiding the drilled holes for ss wire [figure 2 a-c] .The extensor tendon was repaired by 4-0 polyamide suture.Then skin closure was done by 4-0 polyamide suture. Fingers were immobilised in volar plaster in James position.

Figure 1



Diagrammatic representation of intraosseous wiring technique . (a) Dorsal extensor splitting approach. (b) Transverse drill hole for the cerclage wire. (c) cerclage wire applied. (d) oblique Kirschner wire insertion.

Figure 2



Clinical photographs of intraosseous wiring technique. (a)fracture exposed through dorsal extensor splitting approach,reduced and cerclage wire inserted. (b) Transverse drill hole for the cerclage wire. (c) cerclage wire applied. (d) oblique Kirschner wire insertion

Postoperative care

Gentle mobilization of the fingers was done by the surgeon during wound

inspection and patients were encouraged to move the fingers actively. After the 3rd day, the hand therapist was instructed to commence active and passive mobilization of the hand daily.In order to protect the fixation from unwanted unprotected activity, the splint was continued for 3 weeks. Patients attended the hand therapy clinic daily where the therapists would remove the splint to encourage active and passive range of motion exercises under supervision and then reapply the splint. The sutures were removed on the 10th day. The slab support to the hand was discontinued at the end of 3rd week. The K-wires were removed under local anaesthesia in OPD after fracture union if required.

The radiographs were taken on 3rd day, at 6th week and 12th week and 24th week [Figures 3 and 4]. Patients were allowed to do light work at the end of 6 weeks to return to their profession with full unrestricted activity when radiological evidence of fracture union was confirmed. The outcome was measured by Belsky et al.(5)score [table-1] at end of 6th week, 3rd month, and 24th month.

Figure 3

Preoperative X-ray of hand anteroposterior and oblique views showing a transverse fracture of the proximal phalanx of the middle finger

Figure 4

Postoperative X-rays of hand anteroposterior and oblique views showing the intraosseous wiring technique with sound fracture union.

Table 1
The Belsky et al.5 score

Belsky grade	Parameters
Excellent	No symptoms, pain-free union, no angular/ rotational deformity, PIP>100°, TAM>250°
Good	Minimal angular/rotational deformity, PIP movement of >80º, TAM>180°
Fair	TAM<180°
Poor	Remaining unchanged

TAM=Total active range of motion, PIP=Proximal interphalangeal

Results

Of the 10 patients, eight were male[table-2]. The most common mechanism of injury was road traffic accident (7). Four of them are open fracture.The average age was 24.4 years (range 18-50 years). Middle and ring finger were involved in three cases each and the index in one. Little finger and thumb were not involved in any patient in this series. The average followup was 13.2 months (range 11-15 months). The average hospital stay was 4.5 days (range 4-6 days). The average time for starting mobilization of joints was 3 days. The average time to return to unrestricted routine activities and work was 12 weeks.

Table 2

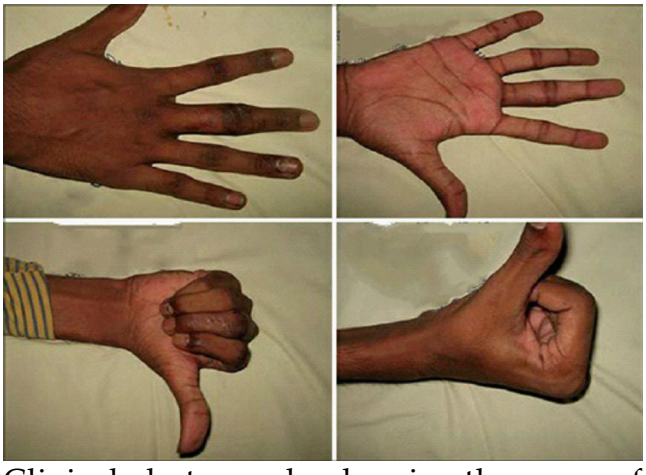
Clinical details of patients and followup

Sex	Age (yrs)	Side	Finger	Mechanism of injury	DPD (cm)	Fracture healing (Wks.)	Follow up (Months)	Hospital Stay (Days)	TAM at 3 month	Belsky Score At 6 week	Belsky Score At 3 month
F	30	L	Index	RTA	0	6	12	4	260	Good	Excellent
M	43	R	Ring	RTA	0	7	14	4	270	Excellent	Excellent
M	50	R	Index	RTA	0	6	15	5	270	Excellent	Excellent
M	35	R	Ring	RTA	0	6	13	5	260	Excellent	Excellent
M	50	R	Ring	Crush	0	6	15	4	270	Excellent	Excellent
M	24	R	Index	RTA	0	6	12	5	270	Excellent	Excellent
M	26	R	Middle	RTA	0	6	11	4	260	Excellent	Excellent
M	18	R	Index	RTA	0	6	15	6	260	Excellent	Excellent
M	20	R	Middle	Crush	0	7	13	4	270	Excellent	Excellent
F	33	R	Middle	Crush	0	6	12	4	220	Good	Good

RTA=road traffic accident,DPD= digit to palm distance TAM= total active range of motion

The average duration for radiological healing was 6.2 weeks (range 6-7 weeks). The outcome measured by Belsky et al. scoring method revealed seven excellent and three good results at the end of 6 weeks which changed to nine excellent and one good at the end of 3 months. The digit to palm distance (DPD) of all patients at the end of 6 weeks was zero [Figure 5]. No patients had infection or resurgery. Implants were removed in three patients following irritation of the skin by the wire.

Figure 5



Clinical photographs showing the range of movements following modified lister's fixation at 3 months followup.

Discussion

Phalangeal fractures are not uncommon injuries. The extensor tendon over the phalangeal shaft may adhere to the fracture site during union causing stiffness of the proximal interphalangeal joint, as well as an extensor lag.(6) Early mobilization helps in preventing the adhesion. A rigid fixation is a prerequisite for early mobilization. Displaced transverse phalangeal fractures require internal fixation. Open fractures, however, must be fixed with a minimum of implants to reduce the possibility of infections, but with a stable construct to commence early mobilization to prevent stiffness. Closed reduction and percutaneous cross K-wiring is the standard treatment for closed phalangeal fractures. However, cross K-wire fixation fails to provide compression at the fracture site especially for transverse shaft fractures.(7)and may also result in distraction of the fracture with subsequent delayed unions or gap nonunions(8)As the construct is not very rigid, early mobilization is not routinely done. Though extremely stable, plate, and screw fixation is best avoided in open fractures to minimize the chance of subsequent infection. In this context, the Lister fixation provides adequate stability but minimizes the chance of infection as there is a minimum implant used.

Lister2 described fixation of transverse fractures and arthrodesis of digits with a cerclage wire and oblique K-wire which is type of tension band fixation, providing proper reduction and maintaining fixation till the union. In his series, he had a 100% union rate in the case of transverse fractures. Overall, 83.2% of the maximum attainable total active range of motion (TAM) was achieved in the 100 cases.We have been utilizing this technique for the treatment of transverse phalangeal shaft

fractures. This fixation technique is not as simple as crossed K-wire fixation, has a definite learning curve, but is our fixation of choice for displaced phalangeal fractures when the fracture line is transverse and there is no comminution.

Many studies have shown the efficacy of the tension band technique of fracture fixation. The strength of the K-wire and cerclage wire construct nears that of the plate and screw fixation. Rayhack et al.(9)in their study concluded that single looped tension band wires were superior in strength to figure-of-eight constructs in experimental transverse osteotomies. Hung et al.(10)following biomechanical testing of different fracture fixation techniques in the fifth metatarsal of porcine forelimbs concluded that an intra-medullary K-wire and a cerclage interosseous wire was more stable than crossed K-wires though not as rigid as a dorsal plate and screw fixation.

Pun et al.(11) reported 70% fair or poor results in 109 unstable digital fractures treated with K-wire fixation. Lag screw fixation for proximal phalangeal fractures can be done only if the length of the fracture exceeds 2 times the diameter of the bone.(12) Hence, screw fixation alone is not applicable to a transverse shaft fracture. Page and Stern(13,14)reported total active digital motion was <180° in 62% of fractures after plate fixation of 39 phalangeal fractures. Green(15,16,17)and Safoury18 have demonstrated that fracture stability is enhanced when the K-wires are supplemented with stainless steel wire, a technique termed composite (or tension band) wiring.

Massengill et al.19 noted that the only construct that is superior in stiffness and strength to any configuration of the wire loop or the K-wires is plate and screw fixation. Gould et al.(20) concluded that tension band stabilization provides superior strength, stiffness, and approximation when compared with K-wire fixation.Our result is comparable to other studies.(21),(22)

Conclusion

To conclude, modified lister's fixation technique is a safe and effective method for both closed and open two part transverse or short oblique long short bone fractures. The technique gives good stability and compression at the fracture site which allows early mobilization of joints to prevent stiffness.This method of fixation is also a cost effective way of management for the developing world.It has some demerits (1) not applicable to all type of fracture(only two part transverse and short oblique shaft fractures). (2) requires definite learning curve to handle the small bones.(3)malrotation or angulation can occur.

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DIFFERENT MODALITIES OF TREATMENT IN PROXIMAL INTER-PHALANGIAL JOINT FRACTURE DISLOCATIONS

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Abstract

Proximal interphalangeal joint injury is a difficult fracture to deal with. This bicondylar joint has extreme flexibility and stability throughout its arc of motion, which are difficult to replicate after the joint has experienced injury or degenerative changes. Dorsal dislocations with palmar lip fractures are the most common pattern of injury. This study reviews the treatment methods and results in 37 patients with PIPJ fracture dislocation in a period of 2 yrs. Different methods of management included buddy strapping, hemi hamate arthroplasty, Close reduction & fixation with K wire, ext. fixation, Open reduction with screw fixation, Central sleeve repair etc.

Functional outcome following these procedures in both acute and chronic cases were assessed. Both groups showed functional improvement in range of motion of PIP joint without impairment in daily activity of living. The most common complication found was stiffness. Fracture dislocations of the proximal interphalangeal joint is a gray area owing to varying treatment options & complexity of fracture Early diagnosis & proper management like other intra articular fractures is a must to avoid devastating complications like stiffness & arthritis.

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INTRODUCTION

Proximal interphalangeal joint fracture is an unsolved entity in hand surgery. There may be several issues to support this fact. First of all, it is the most commonly injured joint in the hand & the fact that these fractures occur most often following an axial impact on an extended finger, makes it a more substantial problem in a cricket loving & developing country like India where majority of population work as manual labourers. But these are often overlooked or dismissed as nothing more than a "jammed" or sprained finger by coach or emergency physician. Graveness of the situation adds if the patient "self-treats" the injury considering it to be a minor trauma. Both of these may lead to permanent stiffness due to unnecessarily long immobilization (if inadequately treated) or deformity (if neglected).This bicondylar joint has extreme flexibility and stability throughout its arc of motion, which are difficult to replicate after the joint has experienced injury or degenerative changes.

MATERIALS & METHODS

All patients presenting to our OPD or casualty within a period of 2 years (between Dec 2016- Dec 2018) with PIPJ injury are taken in to study.Acute and subacute injuries usually present with mild to moderate swelling about the PIP joint. Palmar fracture of the base of the middle phalanx may lead to a clinical deviation and rotational deformity of the digit.Range of movement was measured for both DIP and PIP joints at the time of

presentation.Anteroposterior and lateral X-rays of the PIP joint are taken. PIP joint subluxation on lateralradiographs present a "V" sign(fig 11).This study reviews the treatment methods and results in 37 patients with PIPJ fracture dislocation.The different modalities of treatment followed are tabulated below.

FRACTURE-DISLOCATION TYPE	PATTERN	MECHANISM OF INJURY	PHYSICAL EXAMINATION	ARTICULAR INVOLVEMENT	COMMENT	STABILITY	MANAGEMENT
DORSAL	Volar lip fracture with dorsal displacement of middle phalanx	Hyper-extension of PIPJ l/t rupture of volar plate with or without volar lip avulsion fracture l/t dorsal dislocation of middle phalanx d/t pull of extensor system	Attempted dorsal translation of the middle phalanx tests the competency of the VP	Less than 30%	Stable with full ROM	Stable	Non-hyper extensible: extension block splint Hyper-extensible: Buddy tapping
				30%-50%	May/may not requires more than 30% flexion to maintain reduction	Tenuous	Stable in less than 30 deg. flexion: extension block splinting
							Stable in more than 30 deg. flexion : DDEF/ORIF
				Greater than 50%	Requires more than 30% flexion to maintain reduction	Unstable	DDEF/ORIF->if failed->VPA/HHA
VOLAR	Dorsal lip fracture with volar displacement of middle phalanx	Hyper-flexion of PIPJ l/t central sleeve rupture with or without dorsal lip avulsion fracture l/t volar dislocation of middle phalanx d/t unopposed action of FDS	ELSON test (PIPJ is flexed as far as is comfortably possible& the examiner holds the joint in this position while the pt attempts to extend the DIPJ against resistance. Fixed extension of the DIPJ &inability to extend the PIPJ indicates loss of central sleeve integrity)	Less than 50%	Stable in full extension	Stable	Less than 2mm avulsed fragment : dorsal splint
							More than 2mm avulsed fragment: DDEF
				Greater than 50%	Not stable in full extension	Unstable	CRPP/DDEF/ORIF
PILON	# involving both volar & dorsal cortical margin of middle phalanx with extensive comminution & depression of articular surface	Axial loading of PIPJ in extended position		100%	Grossly unstable	Unstable	DDEF/ORIF

Table 1 showing different methods of management of PIPJ injury according to type of fracture-dislocation

All patients are followed up at 6 weeks,3 months, 6 month&1 year intervals.At each follow up ROM and radiograph was done.6 patients were managed conservatively with splinting/buddy strapping, hemi hamate arthroplasty was done in 10 patients with neglected PIPJ injury.6 patients underwent Volar Plate Arthroplasty which got failed in 1 patient that was managed by Hemi Hamate Arthroplasty later. Close reduction & fixation with k wire was done for 5 patients with fresh fractures& Open reduction with screw fixation was done in 3 patients.4 patients with extreme comminution /compound fractures were managed with ext. fixation.Central sleeve repair was done in 3 patients with dorsal dislocation.

RESULTS

A total of 37 patients were studied in a period of 2 years. The average age of presentation was 45 years.17 patients were female. This high male to female ratio was mostly because women often neglect this injury thinking it to be a minor problem& don't usually seek medical attention.Out of 37 cases ,17 cases operated within 2 weeks considered as a fresh case and 20 cases operated after 6 week considered as late cases. The average Pre-operative Range of motion was about 15 degree(range 10°-25°) where-as Post-op ROM was around 85 degrees(range 75°-90°).The most common complication of the study was stiffness noted in 6 cases; out of which, four improved to full extension after long physiotherapy, and in 2 patients, it persisted (not bothersome).The overall result in fresh case were considered as good as compared to late cases. Both group showed functional improvement in range of motion of PIP joint without impairment in daily activity of living.

Procedure	Number of cases	Avg. PreopROM (Degree)	Avg. Post-op ROM (Degree)	Complications (Number)
Buddy strapping	3	20	70	Stiffness of PIPJ & DIPJ(2)
Ext. block splinting	3	10	75	Flexion contracture(1), Stiff DIP(2)
Dynamic ext. fixation	4	15	85	Flexion contracture(2), pin tract infection(1)
K wire fixation	5	25	95	Stiff DIP(1)
Screw fixation	3	10	90	Extension lag(1), Cold intolerance(1)
Volar plate arthroplasty	6	15	80	Re-displacement(1), Pain with stress(1)
Cental sleeve repair	3	20	85	Stiff DIP(1)
Hemi hamate arthroplasty	10	20	90	Graft non-union(2)

DISCUSSION

A variety of treatment procedure are available for PIPJ, but it is of utmost importance to decide appropriate technique for different presentation of PIP fracture dislocation.Conservative treatment is reserved for stable fracture which are reducible even in full extension. Extension block splint is indicated when

the size of volar fragment is <40% and requiring no >30°of flexion for reduction, but there should be some residual collateral ligament intact, no articular incongruity, and stable joint. McElfreshet al.(2)produced a good result in his study.We found 75% regain of ROM but there was stiffness of DIPJ in 2 cases that gradually improved with supervised physiotherapy.

Dynamic skeletal traction is best used in pilon type fracture or unstable injury with several small fragments constituting 30%-50% of the joint surface.The advantages of traction are simultaneously reduction and movement of PIP joint. Rulandet al.(3)operated 34 patients (26 of dorsal fracture dislocation and 8 pilon type)and regained 88° arc of PIP joint motion and 60° arc motion at DIP joint. Pin tract infection is only their complication.There was an average gain of 85 deg of ROM in our study post operatively.1 patient reported pin tract infection which improved with regular dressing & appropriate antibiotics after culture,sens. reports.

Fig 1,2,3,4 showing pre & post op x-ray,Intra op C-Arm view of CRIF with K-wire

Open reduction and internal fixation (ORIF) is best situated in the acute case and with single large fragment.The fracture can be approached through both volar and dorsal incision. Hamilton et al.(4)repaired volar fracture fragment in 9 patients and got 85°motion at PIP joint with residual flexion contracture.Lee and Teoh(5)reported 12 patients by dorsal approach and get 85° motion at PIP joint.Our preferred approach was volar approach & 80 deg of flexion was achieved in an average.

Fig 5,6,7,8 showing pre & post op x-ray,Intra op C-Arm view & ROM at follow up of ORIF with screw

Volar plate advancement arthroplasty provides a volar restraint to maintain reduction & simultaneously resurfacing the irregular or deficient volar articular surface of middle phalanx. Meena DK(6)in 2018 reported functional improvement in range of motion of PIP joint without impairment in daily activity of living in both acute & chronic cases.In our study there was re-dislocation in 1 case which

was managed with hemi hamate arthroplasty later.

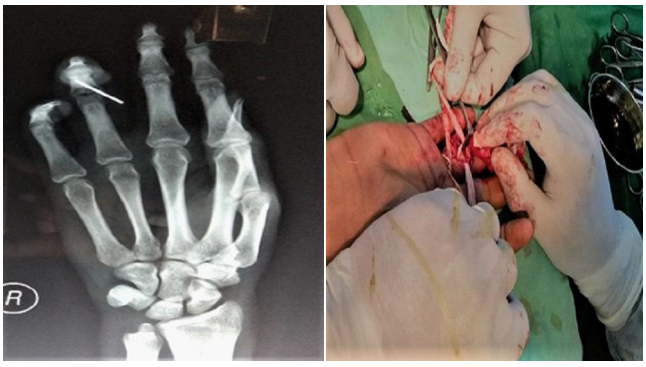
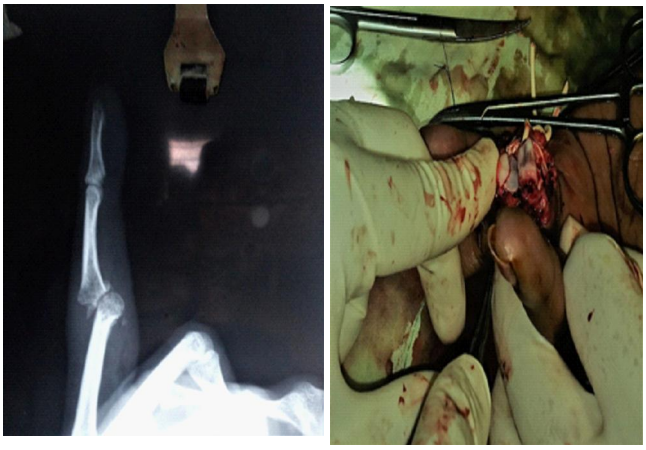


Fig 9,10 showing immediate post op x-ray&Intra op photos of Volar plate arthroplasty

Hemi hamate arthroplasty introduced by Hasting in1999,is a reconstructive procedure of choice when there is extensive articular comminution involving >50% articular surface & in patients presenting late.The most recent study by Calfee et al.(8) was compiled from 22 patients at a mean of 5 years by with average ROM at PIP joint was 19°-89° with minimal pain and instability at carpometacarpal joint.We found this method very useful for old neglected cases.There was complete restoration of pre-injury movement in about 80% cases. There were 2 cases of graft non-union which were manged successfully. No major donor site morbidity was reported except terminal pain on forced grip.



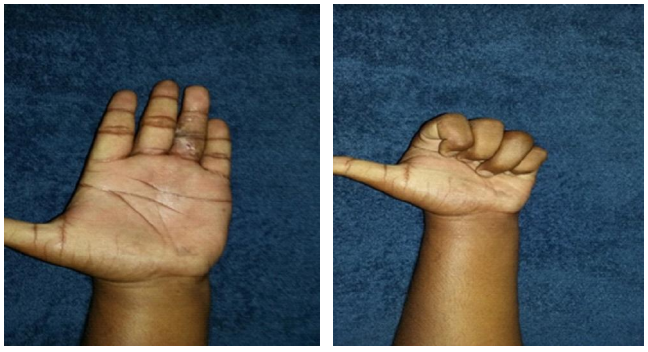


Fig 11,12,13,14 showing pre & post op x-ray,Intra op photos& ROM at follow up of Hemi hamate arthroplasty

CONCLUSION

Fracture dislocations of the proximal interphalangeal joint is a gray area owing to varying treatment options & complexity of fracture.It may occur by several different mechanisms of injury and are of 3 basic fracture patterns: palmar lip fractures, dorsal lip fractures, and pilon fractures.Proper treatment of these injuries is predicated on maintenance of concentric reduction of the joint, restoration of joint stability, and institution of early motion.Understanding the fracture anatomy & biomechanics of injury helps to guide in the selection of the most appropriate treatment.Where-as acute fractures can be managed by simple k wire or screw fixation,methods like hemi hamate arthroplasty give promising result in PIPJ injury & is viable option in unstable & old/neglected cases.Early diagnosis & proper management like other intra articular fractures is a must to avoid

devastating complications like stiffness & arthritis.

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OUTCOME OF DISTAL BOTH BONE LEG FRACTURES FIXED BY INTRAMEDULARY NAIL FOR FIBULA & MIPPO IN TIBIA

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Abstract

racture of the distal tibia accounts for 7 to 9% of lower extremity fractures, with the fibula fractured in about 85% of these cases.The fracture of the distal tibia occurs by either alowenergymechanism like rotational strain or a high energy mechanism like road traffic accidents or a fall from heights.The management of the distal tibia and fibula fracture is decidedbasedonamountofswelling,blisters,and openwounds.Thecloseddistaltibiaandfibulafracture without excessive swelling, blistering, and compound injures are treated withdual plating with alocking plate through MIPPO inthetibiafractureandplatingforthe fibula fracture through the posterolateral approach. There is a high rate of superficial wound infection, wound dehiscence, implant exposure, and delayed or nonunion in patients treated with dual plating in these fractures. Rushnailisa better alternative forfibular fixation because it requires a smaller incision and less soft tissue dissection.It also affords better mechanical stability in osteoporotic bone and has the potential to reduce the incidence of complications.Favorable short term outcomes of rush nailing have been reported in small numbers of patients .We hypothesized that by using AO plating in the distaltibia through MIPPO and rush nail in the fibula fracture, ankle stability can be achieved and complications of dual

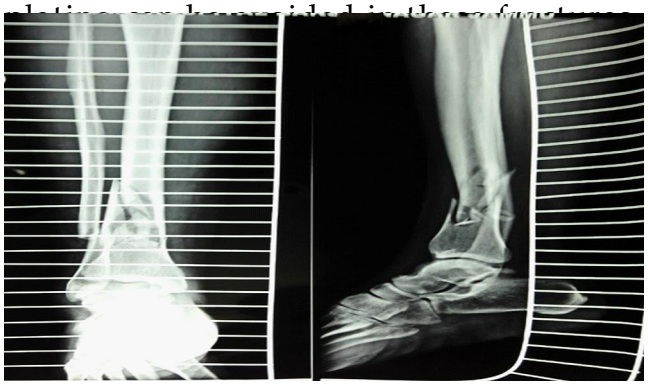

Figure 1(a). PreOp Radiograph of patient showing comminuted
extraarticular fracture tibia with fractured fibula.
(b). immediate Post op radiograph showing an intramedullary nail
for fibula and plate for tibia.

Methods

A prospective study on 30 patients with a fracture of both distal leg bones was conducted in SCB MEDICAL COLLEGE from JUNE 2017 to DECEMBER 2018. The inclusion criteria included a fracture of both distal leg bones, patients of any sex who were more than 20 years old, and fractures associated with moderate swelling and no blisters. The fractures with blisters - especially over medial aspect, open wounds, associated talar and calcaneal fractured - were excluded from the study. Patients' history with mode and mechanism of injury were noted. In the examination the following were noted: swelling of the ankle, blister, open wounds, and neurovascular status. Radiographs of the leg and ankle were taken in AP, lateral and Mortise view.The

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fractures of the tibial plafond are classified by Reudi-Allgower and AO classifications. We used the AO classification to classify the tibial plafond fractures. The fractures are classified into extra-articular, partial articular, and articular fractures. Furtherclassifications are type A that includes extra-articular distal tibial fractures; type B that includes partial articular fractures in which a portion of the articular surface remains in continuity with the shaft, and type C with a complete metaphyseal fracture with articular involvement.

The patients' general conditions like obesity or history of smoking or alcohol intake and comorbidities like diabetes or neuropathy status were also noted and informed written consent was obtained from all the patients. Complications include superficial wound infection, wound dehiscence, implant exposure/ failure, delayed or nonunion, ankle instability, and permanent anklestiffness. Patients were assessed at 3, 6, 12, and 24 weeks for clinical and radiological evidence of bone healing.

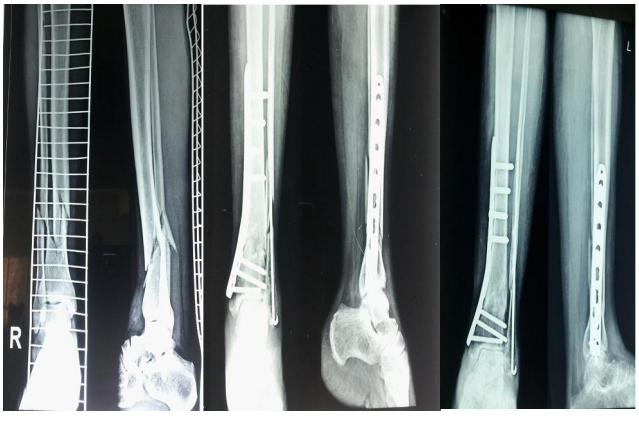

Figure 2(a). Preopradigraph of another patient. (b). 4 week Post op radiograph of the same patient. (c). 12 months post op radiograph of same patient.

Table -1 Demographic Data

Age in years	Males	Females
20-35	6(20%)	2(6.66%)
35-50	9(30%)	5(16.66%)
>50	3(10%)	5(16.66)
Total	18(60%)	12(40%)

Table -2 Side of Injury

Side	No of patients	percentage
Right	19	63.33%
Left	11	36.66%

Surgical technique

The patients were operated on under spinal/epidural anesthesia. The pre-op antibiotics were given 30 minutes before surgery. The patient was placed supine on a radiolucent table. A bump was placed under the ipsilateral hip to internally rotate the affected limb and to provide easier access to the lateral side of the ankle. A pneumatic tourniquet was applied and inflated after the entire limb was prepared and draped. For fixation of the fibular fracture a small incision starting ~2 cm proximal and extending to the tip of the lateral malleolus was given, after careful dissection of the soft tissue, the tip of the lateral malleolus was exposed and using a 2.7 mm drill bit, a portal was made into the medullary cavity of the distal fragment of the fibula. A rush nail of appropriate size was put initially into the distal fragment only, by doing so we were able to control the distal segment and it was reduced to proximal fragment under C-arm control. Once the fracture was reduced the nail was advanced into the proximal fragment. The fracture was reduced in a closed manner under C-arm control in all the patients. The size of the rush nail varied upon the medullary cavity and location of the fracture. In the next step, the distal tibial fracture was then approached through the anteromedial incision of 5 cm at the distal part by the MIPPO technique. Thefracture

was reduced and stabilized with a locking compression plate. Postoperatively, the patient was put on IV antibiotics for three days and then on oral antibiotics for another seven days. Stitch removal was done on the twelfth postop day. Isometric and isotonic exercises were started on the first post-operative day. Patients were assessed clinically for wound infection, wound dehiscence, and ankle instability. They were also assessed radiographically for delayed or nonunion and implant failure. Radiographs were taken immediately on postop day and then at 3, 6, 12 and 24 weeks [Figure 1] a and b [Figure 2] a, b and c. Partial weight bearing was started at 6-8 weeks and full weight bearing at 12- 14 weeks. The weight bearing status was decided on the basis of clinical and radiological signs of healing.

Figure 4. Radiograph showing Figure 3. Exposedimplant,seen in Stable fixation of fracture with patient of distal tibia & fibula plate and rush nailfracture managed by fracture managed by dual plating.

Results

All the 30 patients (mean age: 42.4; 18 males and 12 females) were available for regular follow up until 6 months. Demographics and data on laterality is given in Table 1 & 2. The most number of patients were in the age group of 35-50 years. The fractures were classified according to OTA classification, there were 14 patients belonging to type A (46.67%), 11 cases of type B(36.67%) and 5 cases were classified as type C fractures (16.7%). Road traffic accidents were the leading cause of fractures in our series.There were three patients with diabetes and so they were started on insulin injections. Seven patients were smokers and were encouraged to either cut back or stop smoking altogether. There were three patients who developed superficial wound infection at the tibial incision and they were treated with a change of antibiotics after doing a culture sensitivity report. No patient had ankle stiffness or developed deep infection/osteomyelitis or wound dehiscence or any case of ankle instability. All patients started full weight bearing at 12-14 weeks. The average time to union of the tibial plafond was found to be 19 weeks with a range of 16-24 weeks. There was no case of nonunion in our series; however, two cases of delayed union were seen. The average time to union in the fibula was 14 weeks in our study with the shortest being 12 weeks and the longest was 16 weeks. There was no case of delayed union or nonunion in case of fibular fracture in our series. The rest of the postop period was uneventful in all the other patients.

Discussion

Fractures of the tibial plafond constitute about 10% of all lower extremity fractures. The fracture can be caused by low energy rotational forces or high energy axial force. They are often associated with severe, closed soft tissue trauma or open injuries.Different methods of treatment includes plaster cast immobilization, lag screw fixation, ORIF with plates and external fixation with or without limited internal fixation for distal tibial fractures,

and ORIF with plates for distal tibial fractures. The average time to union of the tibia plafond was found to be 19 weeks in our study with a range of 16-24 weeks, superficial wound infection in three (10%) patients and 2 (6.67%) cases of delayed union were reported in our study.Rush nail is excellent in achieving reduction of the fracture and avoids much soft tissue complications. We have concluded in our study that the use of rush nail in the fibula to achieve stability, and reduction of the distal tibial fracture using the medial buttress plate through the MIPPO technique is a good method in simple, closed fractures of both the distal leg bones [Figure 4]. This technique reduces the chances of local wound complications and bone healing can subsequently improve.

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SYNOVIAL CHONDROMATOSIS OF SHOULDER CURED WITH ARTHROSCOPIC REMOVAL : A RARE PRESENTATION

Dr. Rg Asutosh Mohapatra, Dr. Prasanta Mahato***

Abstract:

Synovial chondromatosis or synovial osteochondromatosis is a rare entity in which there is proliferative metaplasia of the sub intimal fibroblasts of synovial membrane of the joint, tendon sheath or bursa into chondrocytes resulting in the formation of cartilaginous nodules which may ossify later. It is characterized by chronic pain, recurrent swelling,crepitus with limitation of function. While commonly being mono articular in nature, affecting large joints(most commonly in knee) involving shoulder is a rare variety of this disease. Here, we describe a case of extensive synovial chondromatosis of the shoulder joint with nodules in both intra and extra articular location. To the best of our knowledge, this is a very rare type of presentation with such an extensive distribution. A 42yr old male presented with progressive pain in the left shoulder, restricted range of movement and crepitation during the active movement of the left shoulder for last 1yr. He underwent careful preoperative imaging and investigations followed by single step arthroscopic procedure for removal of loose bodies and radical synovectomy, which is very important to prevent recurrence. Histopathological examination of the specimens confirmed our suspected diagnosis of Synovial Chondromatosis. After proper rehabilitation, at 22 months of follow up, he recovered full range of motion and performing his daily activities without any complains. Advantages of the arthroscopy include good visualisation during surgery, low morbidity and early healing. However, patients must be informed that recurrence could occur and should be followed up at specific interval, as there might be chance of incomplete resection, which was not in this case, suggested by no recurrence in almost 2 yrs of follow up. This report highlights the removal of loose bodies and radical synovectomy of shoulder joint in a one step arthroscopic procedure instituted successfully for complete cure of a rare extensive synovial chondromatosis.

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INTRODUCTION

Synovial chondromatosis or synovial osteochondromatosis is a rare entity in which there is proliferative metaplasia of the sub intimal fibroblasts of synovial membrane of the joint, tendon sheath or bursa into chondrocytes resulting in the formation of cartilaginous nodules. [1]

First described by Leannac in 1883, it is classified as primary also known as Reichel's syndrome, where an idiopathic benign neoplastic process occurs in an otherwise normal joint, with chromosomal alterations like recurrent translocations of chromosome 6 [2] and secondary when there is metaplasia of synovial tissue in to cartilaginous tissue with pre-existing traumatic, inflammatory or degenerative pathology of synovial joints .

It is characterized by chronic pain, recurrent swelling,soft tissue crepitus,

palpable loose bodies with limitation of functions of involved joints,while commonly being mono articular in nature.. Synovial chondromatosis is a relatively rare disease and large joints such as knee-joints, hip-joints, and elbow joints and rarely shoulder joints are affected [1,3]. Here we present a case of synovial chondromatosis of shoulder joint treated with arthroscopic removal of loose bodies and synovectomy, with complete resolution of symptoms during 2 yrs of follow up.

CASE PRESENTATION

A 42 years old male patient presented with a 1 years history of progressive pain in the left shoulder, restricted range of movement and crepitation during the active movement of the left shoulder. There was no history of trauma or any other inflammatory or infectious disease or any other systemic illness. He had no active movements above the head of the left shoulder after 90? of abduction.(fig 1)

On the physical examination the active range of movements was limited, abduction 90º, adduction 40º, flexion 50º, extension 10º, internal and external rotation 20º, all of them were painful with crepitus during movement. No neurological deficits of his left upper arm were found.

Routine preoperative investigations (including liver function and renal function tests) were within the normal limit. Serologic tests for rheumatoid arthritis, other seronegative arthritis or tuberculosis were negative whereas inflammatory markers [ESR, CRP] were raised.

On the X-Ray, there were seen to be multiple calcified radio-opaque lesions filling infero medial area of the glenohumeral joint and extra articular area also.(fig 2)

To further scrutinize a magnetic resonance imaging (MRI) was taken and it showed extensive thickening of the synovium, multiple intra-articular calcific and ossific loose bodies, consistent with synovial chondromatosis.(fig 3a)

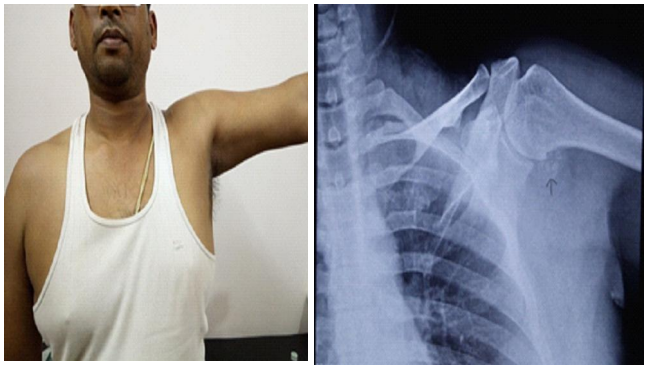


FIGURE 1 : Showing decreased maximum range of movement at presentation.

FIGURE 2: X-Ray showing multiple ossified bodies both intra and extra articular region.

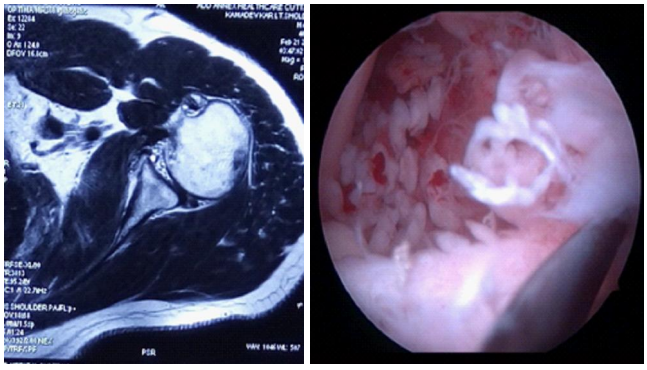
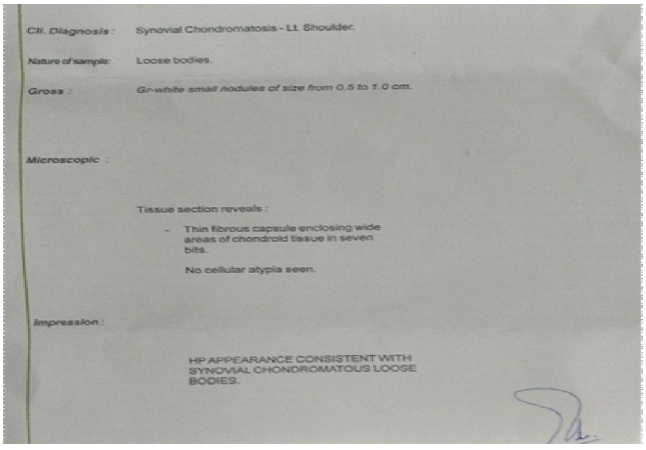


FIGURE 3A : MRI showing multiple calcifications, extensive thickened synovium suggestive of synovial chondromatosis.

FIGURE 3B: showing multiple loose bodies in shoulder joint and inflamed synovium during arthroscopy

Arthroscopy was done to the left shoulder with the patient in the lateral position under general anaesthesia. A routine posterior portal entrance was made and multiple free fragments were seen filling the glenohumeral joint (Fig. 3B). Using antero-superior and antero-inferior

portals, a partial synovectomy was done with a shaver. From the same portals, the free fragments were removed with a grasper. By changing portal, the free fragments were completely removed. Approximately 20 free fragments, ranging in size from 0.5 to 1.0 cm, were removed and sent for histopathological examination, which further confirmed our diagnosis.(fig 4)


Clt. Diagnosis : Synovial Chondromatosis - Lt. Shoulder.

Nature of sample: Loose bodies.

Gross : Gr-white small nodules of size from 0.5 to 1.0 cm.

Microscopic :

Tissue section reveals :

- Thin fibrous capsule enclosing wide areas of chondroid tissue in seven bits.

No cellular atypia seen.

Impression :

HP APPEARANCE CONSISTENT WITH SYNOVIAL CHONDROMATOUS LOOSE BODIES.

Figure 4 : Showing histopathology report confirming the diagnosis.

Passive and active assisted range of motion exercises were initiated immediately postoperatively. In the 1st week postoperatively, active range of motion exercises and strengthening exercises were started. At postoperative 1 year follow-up, there was no symptoms and range of motion was normal. (FIG 5A,5B)

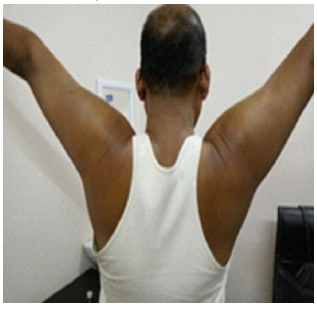
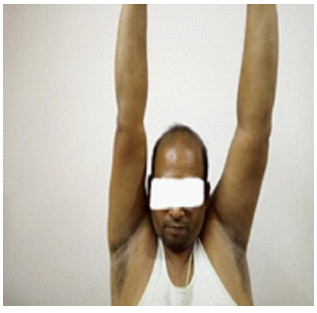



FIGURE 5A FIGURE 5B

FIGURE 5A,5B,: Showing full ROM post operatively

DISCUSSION:

Synovial chondromatosis is a rare benign type of metaplasia of the synovial membrane that leads to the formation of cartilaginous free bodies in the joint space, without any antecedent pathology or any direct relationship with trauma, degenerative or inflammatory processes. On the basis of the currently known molecular abnormalities, primary synovial chondromatosis is believed to be a benign neoplastic rather than metaplastic disease.These cytogenetic aberrations are absent in secondary synovial chondromatosis. In addition, growth factors, such as the fibroblast growth factor ?2 and ?3 have been found in primary synovial chondromatosis. The fibroblast growth factor receptor 3 (FGFR3) is a specific marker of the mesenchymal precartilaginous stem cells. Histologically, the cells at the periphery of the cartilage nodules express FGFR3 (4,5). Milgram[.described three phases of disease process occurring in temporal sequence,

Phase I: (Active intrasynovial phase)- Active synovitis and nodule formation is present, but no calcifications can be identified.

Phase II: (Transitional lesions phase)- Nodular synovitis and loose bodies are present in the joint. The loose bodies are primarily still cartilaginous.

PhaseIII:(Quiescent/Inactive intrasynovial phase)- The loose bodies remain but the synovitis has resolved. [6]

. Early diagnosis and treatment is mandatory because long standing disease may lead to early joint degeneration by mechanical wear due to loose bodies and nutritional deprivation of the articular cartilage. Saotome et al[7] concluded that these loose bodies have the potential for slow growth by chondrocyte proliferation

in primary synovial chondromatosis and by metaplasia following proliferation of surrounding connective tissue in secondary synovial chondromatosis. Moreover, its potential for chondrosarcomatous malignant transformation further warrants prompt diagnosis and treatment.[8,9].

In our case we have noticed some rough patches over articular cartilage of humeral head and glenoid which may support the above discussion.

A high index of clinical suspicion and judicial battery of investigations is needed to arrive at the correct diagnosis. Plain radiograph, ultrasound, CT and MRI are the imaging modalities which can be used to assist in diagnosing this condition. MRI is definitely the modality of choice because of its superior soft tissue contrast. It usually reveals low to intermediate signal intensity in T1-weighted images and high signal intensity in T2-weighted images with hypointense calcifications.[10]. Blood tests and arthritis profiles can also help rule out specific differential diagnoses. Pigmented villonodular synovitis, synovial hemangioma and lipoma arborescens, rheumatoid or other seronegative arthritis, septic arthritis which includes granulomatous infections, synovial chondrosarcoma and osteochondromas with adjacent secondary bursal osteochondromatosis are few conditions which can mimic synovial chondromatosis [11].

The treatment of synovial chondromatosis remains controversial. A comprehensive review of the literature revealed the fact that radiotherapy and chemotherapy has no role in the treatment of synovial chondromatosis and surgical excision remains the preferred treatment modality.[12]

Surgical treatment options include removal of loose bodies alone and arthroscopic or open synovectomy along with retrieval of loose bodies. In early literature, Jefferys[1] concluded that removal of the loose bodies alone was preferable to synovectomy and complete synovectomy was impracticable as it entails dislocation and stiffness of joint.

While in 1994, Ogilivie Harris and Saleh[13].compared the outcomes between a group of patients treated with removal of loose bodies alone and a similar group treated with arthroscopic synovectomy for synovial chondromatosis of the knee and demonstrated that the group treated by arthroscopic synovectomy had significantly lower recurrence rates(p ¼ 0.02).

In the present case, we used arthroscopic approaches in a single step procedure for removal of loose bodies and radical synovectomy which gave us an excellent exposure and better chances for disease eradication.

We believe that the proposed treatment was appropriate, since combining with extensive synovectomy presents a greater chance to prevent recurrence, which is absent during our 2 yrs of follow up.

Both open and closed arthroscopic methods can be used in the treatment of synovial chondromatosis. To reach the joint in the open method, a subscapular tenotomy is necessary and there are reports that associated with this there are disadvantages such as inadequate tendon repair and attachment site [14]

This situation extends the healing period and delays rehabilitation. However, the advantages of arthroscopic treatment include good visualisation, low morbidity,rapid healing and early rehabilitation [15,16].

In our case, for clear vision of fragments and effective early postoperative rehabilitation we preferred arthroscopic treatment. In the case presented here, the patient, who had shoulder pain and an advanced degree of limited joint movement preoperatively, showed rapid recovery and the pain was completely resolved with full ROM was possible and similar status was maintained throughout the follow up period.

Documented malignant transformation of synovial chondromatosis to chondrosarcoma is quite rare, but this diagnosis should be suspected when a rapid deterioration of the clinical status appeared and when bone involvement was detected by MRI [16]

CONCLUSION

Synovial chondromatosis of the shoulder joint is a rare benign neoplasia which can be generalized, extensive, aggressive, and refractory at times. This case reports highlights the removal of loose bodies and radical synovectomy of shoulder joint in a one step procedure instituted successfully for cure of a rare extensive synovial chondromatosis. Advantages of the method include good visualisation during surgery, low morbidity and early healing. However, patients must be informed that recurrence could occur and should be followed up accordingly, as there might be chance of incomplete resection which was not in this case, suggested by no recurrence in 2 yrs of follow up.

CONSENT

The patient was informed that the data concerning his case would be submitted for publication and written informed consent was obtained from the patient for publication of this case report and any accompanying images.

CONFLICT OF INTEREST

We certify that this artcle contains original works other than references and we do not have any commercial associations (e.g. consultations, stock ownership, equity interest,patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

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SURGICAL MANAGEMENT OF DISPLACED FRACTURES OF LONG BONES OF LOWER LIMB IN SKELETALLY IMMATURE CHILDREN BY TITANIUM ELASTIC NAILS--A PROSPECTIVE STUDY

Dr. Madan Mohan Sahoo*, Dr. Rajesh Senapati***

Abstract

AIM: To demonstrate the effectiveness and safety of intramedullary fixation of displaced long bones shaft fractures in skeletally immature children using the elastic stable Intramedullary nails.

MATERIALS AND METHODS

The study was conducted from July 2016 to July 2018 at SCB medical college. We included 40 pediatric patients, who underwent surgical fixation of 40 long bone fractures by TENS were included in this prospective study. The average age of the study group was 9.8 years and mean follow-up was 9 months. RESULTS: Road traffic accident was the main mode of injuries. The most common long bone fracture was femur80% and tibia 20%fracture. Pattern of fracture 40% transverse, 10%communited, 20% oblique, 30% spiral. Time interval between trauma and surgery was average 5.6 days. Duration of stay in hospital was 8.7 days. Time of union is 12.2 weeks. Follow up done for period of 36weeks. According to Flynn's criteria, 90% of patients were excellent and 10% satisfied; no patients reported their outcome as poor. CONCLUSION: On the basis of results Titanium Elastic Nailing is the best choice for the management of long bone fractures in children, because Titanium nails provide stable and elastic fixation, leading to controlled motion at the fracture site leading to healing by callus formation. It allows early mobilization with lower complication rate.

INTRODUCTION

Treatment of long bone fractures in children must first consider the fact that excellent results can be achieved with non-operative care, with reported union rates of more than 90%, and 100% full functional recovery. Sometimes, reduction cannot be maintained due to excessive angulations, shortening or malrotation at the fracture site, making operative intervention necessary. The biomechanical principle of the TENS is based on the symmetrical bracing action of two elastic nails inserted into the metaphysis, each of which has contact against the inner bone at three points1. This produces the four properties that are essential for achieving optimal results like flexural, axial, translational and rotational stability. It gives stable fixation with rapid healing and prompt return of child to normal activity. Many studies have supported the use of this technique in the long bone fractures with advantages including closed insertion, preservation of the fracture hematoma, and a physeal-sparing entry point. Titanium elastic nail (TEN) fixation was originally meant for femoral fractures, but was gradually applied to other long bone fractures with satisfactory results and minimal complications. The purpose of this study was to evaluate our results following fixation of unstable long bone fractures with TENS. We have evaluated all patients for fracture reduction,

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complications and clinical outcome given in accordance to Flynn criteria.

MATERIALS AND METHODS

Patients aged 5 to16 years that underwent TENS fixation of long bone fractures from July 2016 to July 2018 at our institution were the subjects of the study. Inclusion criteria were: age above 5 years and below 16 years with traumatic closed or open femoral and/or tibial diaphysial fractures. Exclusion criteria being patients with grade III C open femoral and/or tibial fractures, Patients with incomplete clinical and/or radiological data, patients with pathological fracture, and patients with follow-up less than 6month. 40 cases (28males and 12 females) with fractures of average age of 9.8 years were included in the study were followed up for mean of 36weeks. A detailed history of injury and all investigations were made at our institute. X rays of affected limb Anteroposterior and Lateral views were taken. Mode of Injuries were due to motor vehicle accident, fall from height and sports related injuries. In 32 patients the fracture was reduced by closed means, whilst in the other 8 open reduction was required due to difficulty in reduction and soft tissue interposition. Indication for surgery was inability to attain stable reduction with closed treatment. After consent planning for surgeries were done. Among long bone fractures 80% femur, 20% tibia. Fractures classified according to AO classification2, like 40%transverse, 10%communited, 20% oblique, 30%spiral.

SURGICAL PROCEDURE

Surgical procedure was performed in supine position. Selection of nail done by Flynn etals formula or intra operatively assessed. Nail diameter: 40% of the width of the narrowest point of the medullary canal on AP and LATERAL view (Flynn et al's formula). Nail length was assessed under fluoroscopy intraoperatively; In Femur distal to proximally, extension of the nail was from the distal femoral physis to proximally 2 cm distal to the capital femoral physis and 1 cm distal to the greater trochanteric physis. In Tibia, nail was inserted from proximal to distally, nail extension was 2cm from the proximal physis to 5mm proximal to the distal physis. Bone was exposed with a longitudinal incision. Soft tissue was spread using artery forceps. The periosteum was incised longitudinally with cortex exposed. With the help of sharp awl, entry was made through the cortex to obtain access to the medullary cavity. Care was taken to ensure that growth plate was not breached in any of the cases while making the entry point. In the lower limbs two nails were inserted for tibia and femur, these nails were bent prior to insertion and were inserted manually using T- handle. Once fracture site was reached two nails then fracture was manipulated under C-Arm guidance to obtain reduction and nails were passed further into metaphysis and adequate three point fixation was ensured with tip of nails facing opposite directions by this symmetrical bracing action of two elastic nails inserted into the metaphysis, each of which bears against the inner bone at three points was followed. Position of the nail was confirmed in Anteroposterior and Lateral views. Post-operatively, patients are immobilized with long leg slab. The period of immobilization was followed by active hip and knee/knee and ankle mobilization with non-weight bearing crutch walking. Full weight bearing is started by 8 - 12 weeks depending on the fracture configuration and callus response. At each follow up patients are assessed clinically, radiologically and the complications are noted. At the end of

each follow up the patients were evaluated clinically by using Flynn's criteria.

Table I. - TENS out come score (Flynn et al) 1

Variables at 24 wks	Poor Result	Satisfactory Result	Excellent Result
Limb-length inequality	> 2.0	< 2.0 cm	< 1.0 cm
Malalig nment	> 10 degr	10 degrees	5 degre
Pain	present	none	none
Complication none	Major and lasting morabi dity		Minor and resolved

RESULTS & OBSERVATION

Age incidence: In the present study 12(30%) of the patients were 5-8 years, 12 (30%)were 9 to 12 years and 16(40%) were 13 to 16 years age group with the average age being 9.8 years. J. N. Ligier12 et al studied children ranged from 5-15 years with a mean of 10.2 years. Wudbhav N Sankar3 et al studied children ranged from 7.2-16 years with a mean of 12.2 years. Sex incidence: There were 12(30%) girls and 28(70%) boys in the present study. In their study J. N. Ligier12 et al, out of 118 cases, had 80 (67.7%) boys and 38(32.3%) girls. In their study, Gamal El-Adl11 et al. out of 66 patients, there were 48 (72.7%) male and 18 (27.3%) females. Mode of Injury: In the present study RTA was the most common mode of injury accounting for 24 (60%) cases, sports injury accounted for 8 (20%) cases and fall from height accounted for 8 (20%) of the cases. J. M. Flynn4 et al, in their study assessing 234 cases, 136(58.1%) were following RTAs, 46(19.6%) were following self fall and remaining 43(28.8%) were as a result of fall from height. Bone affected: out of 40 fractures occurred in that 32(80%) femur fracture and 8(20%) tibia fracture happened. In D.Furlan & Z. Pogorelic study had 42 (24.28%) femoral, 36(20.80%) tibial fractures. Side affected: right side fractures are very high 60% when compared to left side (40%). Pattern of Facture: In our study, 40% transverse, 10%communited, 20% oblique, 30% spiral. In their study J. N. Ligier12 et al out of 123 femoral fractures studied (38.2%) were transverse fractures, oblique fractures 7(23.3%), spiral fractures19 (15.4%) and 4 (3.2%) were segmental fractures . Time interval between trauma and surgery: In the present series, 16(40%) patients underwent surgery within 3 - 4 days, 20(50%) in 5 - 7 days and 4(10%) patients after 7 days (Avg- 5.6 days). In the study Gamal El-Adl11 et al operated 56.1% of cases between 3-4days after injury, 21.2% cases between 3 -4 days and 22.7% cases after 7days. K C Saikia19 et al. operated 77.27% patients within 7 days of injury. Mean duration of hospital stay was of 8.7 days (range 5 - 16 days). The average operative time for nail insertion was 30 minutes (Range of 20 to75 minutes). In Khurram Barlas et al. study, the average duration of surgery was 70mins. In a study by K C Saikia19 et al., the duration of surgery ranged from 50- 120mins with a median of 70 minutes. All patients attained complete healing at mean of 12.2 weeks (range 7-16 weeks). Oh C.W20 et al reported average time for union as 10.5 weeks. In a retrospective review of 60 diaphyseal tibial fractures treated with flexible intramedullary fixation, Gordon22 achieved 45 bone unions within 18 weeks (average 8 weeks). Time of full weight bearing: In the present study, unsupported full weight bearing walking was started in <12 weeks for 4(10%) of the patients, between 12 and 18 weeks in 20 (50%) and after 18 weeks in 16 (40%) patient. Outcome was graded by Flynn's criteria as excellent, satisfactory and poor. In our present study we achieved 90% excellent outcome 10% satisfactory, no poor outcome. M. Flynn4 et al. treated 234 femoral shaft fractures and the outcome was excellent in 150(65%) cases, satisfactory in 57 (25%) cases

and poor in 23(10%) of cases. Hossam M kandil21, treated thirty-two children, age 4.9-13.2 years, with femoral shaft fractures, the outcome scoring to evaluate functional results showed excellent results in twenty-six patients (81.25%), satisfactory results in six patients (18.75%), and no poor results In K.C. Saikia19 et al in their study of 22 children with femoral shaft fractures 13 (59%) excellent, in 6 (27.2%) satisfactory and 3(13.6%) poor results. In a large series reported by Vrsansky23, 308 fractures were treated by flexible nailing technique and all children had fracture union and reported satisfactory function. However, they cautioned that these nails should not be used in children under 5 years of age.

In the present study, 2(5%) patients had developed pain at site of nail insertion during initial follow up evaluation which resolved completely in all of them by the end of 16 weeks. Superficial infection was seen in 1(2.5%) case in our study which was controlled by antibiotics. No patient in our study had major limb length discrepancy (i.e. > ± 2cm). Some degree of angular deformity is frequent after femoral shaft fractures in children, but this usually remodels after growth. 1(2.5%) patient presented with varus angulations. No patients had anteroposterior angulations. No patient in our study had significant rotational deformity. Bursitis at insertion site was found in 2 (5%) patients which later debrided open and healed with antibiotic treatment. None of the patients in our study developed compartment syndrome during their course of treatment which was different from findings of Sanker at al who reported four patients developing compartment syndrome during course of treatment

DISCUSSION

Treatment of long bones fractures in children continues to improve as newer techniques evolve. Previously most of the fractures were effectively managed conservatively & only unstable and displaced fractures were taken up for fixation. Immobilization with spica cast alone or along with traction was associated with complications like prolonged bed rest, limb-length discrepancy, angulations, and malunion. External fixator resulted in pin tract infection, loss of reduction; refracture after removal of external fixator, malunion. Wound infection and impingement was found to be associated with minimally invasive plate osteosynthesis (MIPO) used in management of pediatric tibial fractures. In case of femoral fractures, MIPO has been associated with malalignment and delayed union. An ideal implant for the treatment of pediatric lower extremity long bone fractures should be load sharing, allowing early mobilization, without disrupting the blood supply of epiphyseal growth plates, maintains limb length and alignment till the fracture healing marked by bridging callus occurs. TENS has been designed for the treatment of diaphyseal fractures in children and is being used presently for the treatment of pediatric femoral fractures, and, increasingly, for surgical management of pediatric tibial fractures. In our study, closed reduction of the fracture, leading to preservation of fracture hematoma, improved biomechanical stability and minimal soft tissue dissection led to rapid union of the fracture compared to compression plate fixation. In present study hospital stay is more compare to other studies, Our average operative time, bone healing time, and nail removal time were quite similar to other data in literature. In accordance to O'Brien's18 observations, our series didn't have any physeal arrest or proximal tibial growth disturbance. Rotational Malalignment was not noted in this study due to utmost care being taken during intraoperative limb positioning. Ligier12 et al, Flynn4 et al and Gamal11 et al. have reported a similar finding; supporting the concept that TENS can give rotational stability

provided adequate care is taken during nail insertion and following operation. None of the patients in our series required any secondary surgical intervention or readmission following discharge, except for nail removal. No major complications were encountered but few minor complications were like superficial infection, and bursa at tip of nail.

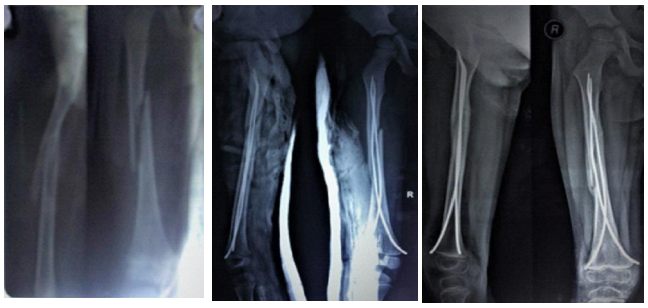
CONCLUSION

Based on our experience and results, we conclude that TITANIUM ELASTIC NAILING SYSTEM (TENS) is an ideal method for treatment of pediatric long bone fractures. It gives elastic mobility promoting rapid union at fracture site and stability which is ideal for early mobilization with lower complication rate. This technique has many merits over a more traditional plating technique including a minimally invasive technique. It is a simple, easy, rapid, reliable and effective method for management of pediatric femoral and tibial fractures between the age of 5 to 16 years, with shorter operative time, lesser blood less, lesser radiation exposure, minimally invasive, physeal-protective surgical method, shorter hospital stay and easier metal work removal. Because of early weight bearing, rapid healing and minimal disturbance of bone growth, intramedullary fixation by TENS may be considered to be a physiological method of treatment.

Our study confers all the advantages which the previous studies have shown at various institutes and is fairly a simple, reliable technique with a shorter learning curve imparting lot of advantages over other methods followed for management of paediatric diaphyseal long bone fractures.

A CASE OF FRACTURE FEMUR MANAGED WITH TENS

A: Preoperative; B: Immediate postoperative; C: Four month after operation.



A CASE OF FRACTURE TIBIA MANAGED WITH TENS

A: Preoperative; B: Immediate postoperative; C: Four month after operation.

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A RETROSPECTIVE ANALYSIS OF VARUS PLACED UNCEMENTED FEMORAL STEM IN TOTAL HIP ARTHROPLASTY

Dr. Sibasish Panigrahi*, Dr. Satyajeet Ray, Dr. Basanta Kumar Behera*****

Abstract

Abstract: Historically, cemented total hip arthroplasty (THA) femoral stems inserted in varus have yielded poor clinical results. Few studies to date have addressed the question of the effects of varus alignment on cementless stems. We conducted a retrospective review of 100 uncemented THA femoral stems implanted by a single surgeon from 2012 to 2016. We conducted a retrospective radiographic review of 100 cementless primary THA femoral stems implanted in a single institute by southern approach; we identified 13 stems implanted in varus, defined as> = 5° and thus analyzed the effect of varus alignment on functional outcome. We matched varus stems to a cohort of 13 nonvarus cementless stems and measured radiographic signs of loosening and subsidence, defined as > 2mm. At 2 years postsurgery, there was no significant difference in range of motion or in Harris Hip Score ($p > 0.5$), and no cases showed evidence of radiographic loosening or subsidence ($p = 0.226$). Study results suggest there is no consequence of varus femoral alignment in the cementless stems. Although it is not recommended to implant stems in varus, there were no apparent radiographic or clinical consequences observed at up to 2 years postoperative in this small case series.

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Introduction:

Poor functional outcome and survivorship of cemented stems implanted in varus have been well documented. Premature failure in this setting has been attributed to femoral varus alignment creating unfavourable proximal stresses in the cement mantle, which has been thinned in zones 3 and 7 by the varus placement of the stem, with consequent predilection for failure. In a long-term retrospective review of the cemented Charnley total hip at 16-25 years postoperative, Devitt and colleagues[1] determined a 75% survival rate of the implant at 20 years postoperative. For the stems placed in varus, the authors' cite a 35.7% revision rate. They also found that radiographic loosening of the acetabular component was well tolerated, but loosening of the femoral component was significantly associated with pain. In modern primary total hip arthroplasty (THA), short cementless stems are increasingly regarded as implants of first choice, especially in young and active patients[2].

Despite the poor results of cemented varus stems, few studies to date have addressed the question of the effects of varus alignment on cementless stems. The fundamental reason for this is self-evident in that, given their experience with cemented stems, surgeons will make every effort to avoid placing the stem in varus. The purpose of this study is to evaluate stems implanted in varus relative to the long axis of the femur. The functional and radiographic outcomes of these stems were reviewed and compared with a matched control group of cementless stems implanted in neutral alignment.

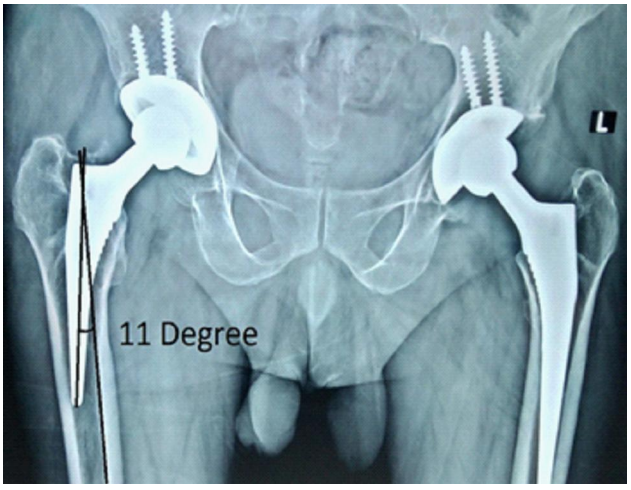

Fig. 1. Postoperative anteroposterior radiograph of cementless stem implanted in > 5° of varus. Varus alignment measurement technique, in line with Kahlily and others. Arrow indicates angle in degrees.

METHOD:

We conducted a retrospective radiographic review of a cohort of 100 cementless primary total hip arthroplasties (THAs) to identify femoral stems implanted in varus. The proximally coated nontapered stem (Smith & Nephew, DePuy, Meril, Stryker) THAs were implanted at our institution from 2012 - 2016. The surgeons used the Southern approach. Within this group, we identified 13 stems implanted in varus relative to the long axis of the femur. The surgical technique involved reaming and broaching. In line with Khalily and colleagues[3], we defined varus alignment as femoral stem alignment >= 5° on radiographic assessment. The angle formed between the medial endosteal cortex of the femoral shaft and the shaft of the implant was used to determine the degree of varus angulation (Fig. 1). All analyses were conducted with anteroposterior (AP) radiographs of the affected hip. Of the study cohort, 13 of 100 (13%) femoral stems were confirmed in varus. These 13 varus stems (9 porous coated, 4 hydroxyapatite coated) were matched 1:1 for preoperative diagnosis, age, sex and implant Type to a cohort of 13 nonvarus uncemented stems implanted over the same study period. All patients underwent radiographic and functional assessment conducted by a resident at routine assessment intervals, including 1 week preoperative and 6 weeks (standard deviation [SD] 1 wk), 6 months (SD 2 wk), 1 year (SD 4wk), 2 years (SD 4 wk) postoperative. Functional outcome included Harris Hip Score, pain and presence of limp as measured by the Harris Hip Score and global hip range of motion. The Harris Hip Score rates pain on a scale ranging from 10 to 44 points, with a score of 10 indicating marked pain with serious limitations, 20 indicating moderate pain, 30 indicating moderate occasional pain, 40 indicating slight pain and 44 indicating no pain. Limp is rated on a scale ranging from 0 to 11 points, with a score of 0 indicating severe limp/inability to walk, 5 indicating moderate limp, 8 indicating slight limp and 11 indicating no limp. All primary THA patients underwent the same standard postoperative physiotherapy protocol including exercises, mobility and gait training commencing 1 day after surgery. Standard discharge criteria was based on independent patient transfer, ability to climb stairs as appropriate, walking safely with a walker, ability to manage exercise protocol independently, and demonstrated knowledge and safety in hip precautions (i.e., flexion, adduction, limited rotation). At our institution, a standardized anteroposterior radiograph of the hip was taken with the hip in neutral rotation. Radiographic signs of loosening and subsidence were measured. According to the method described by Engh and colleagues[4], loosening was defined as the presence of radiosclerotic lines in femoral zones 1-7, where stems with a reactive line < 50% of porous coated area are stable and stems with a reactive line > 50% are deemed unstable. Subsidence was defined as > 2 mm, according to Engh and

others[4]. radiographic analysis of subsidence was calculated as the difference in 2-year and 6-week postoperative distance of the greater trochanter tip to the neck angle (using head diameter measurements to correct for variation in radiographic magnification/technique). However, the measurements obtained retain an element of measurement error and are not comparable for accuracy and precision. Paired t tests were conducted on all continuous outcome variables; the chi-square test and Fisher's exact test were used on categorical variables. A value of $p < 0.05$ was considered statistically significant.

RESULTS:

The matched cohorts comprised 10 men with mean age 66 (standard deviation [SD] 6.4) years and 3 women with mean age 62 (SD 17) years. 12 of 13 patients in each group underwent primary THA for osteoarthritis and 1 of 13 for avascular necrosis

Of the study cohort, 87 (87%) hips were in neutral alignment, compared with 13 (13%) varus hips. Given the limitations of the radiographic measurements, mean stem angulations of 6.22° (SD 0.88°) and 0.39° (SD 1.96°) ($p < 0.005$) were calculated for varus and nonvarus groups at 2 years postoperative, respectively. All varus stems were initially placed in varus. Given the limitations of the radiographic measurements, we were unable to identify any progression of the varus angle of the stem suggestive of adaptive remodelling of the femur.

We could not show any statistically significant difference in Harris Hip Score, hip range of motion, pain or limp scores between the varus and nonvarus hips at any of the assessment intervals, including 1 week preoperative and 6 weeks, 6 months, 1 year and 2 years postoperative ($p > 0.05$). At 2 years postoperative, the mean Harris Hip Score was 88.3 (SD 11.4) in the varus group and 91.5 (SD 9.2) in the nonvarus group ($p= 0.599$). Mean global hip range of motion was 219.4 (SD 24.7) for the varus group and 228.8 (SD 27.8) for the nonvarus group (Table 2). At 2 years postoperative, we did not find any significant difference in pain scores among any of the rated pain scale attributes between the varus and nonvarus groups: no pain $p = 0.723$, slight pain $p = 0.719$ and moderate occasional pain $p = 0.484$. Likewise, we could not find any significant difference in limp scores at 2 years

postoperative, with 12 of 13 patients in each group indicating the absence of a limp at this follow-up interval ($p > 0.05$). After retemplating, 2 of the nonvarus stems were felt to be potentially undersized by an order of 1 stem size, whereas all 13 of the varus stems were

undersized by an average of 1.6 (SD 0.63) sizes. Additionally, only one of the nonvarus stems showed a slight trace of distal lateral endosteal reaming on the initial postoperative film,

whereas 8 of 13 varus stems showed unequivocal (varying grades) distal lateral endosteal reaming . Of the 4 varus stems that did not show evidence of distal lateral endosteal

reaming, all were undersized by at least 2 sizes on retemplating. One calcar crack fracture in each group was treated by circlage wiring, with no clinical or radiographic consequences

being noted. No distal fractures were encountered in either group. No cases showed evidence of radiographic loosening at 2 years postoperative, and no radiosclerotic lines were apparent in either group. Given the limitations of the radiographic measurement

technique available to us, we could not identify any difference in subsidence between

the varus and the nonvarus hips. At 2 years postoperative, none of the varus stems had gone on to subsequent revision THA. But in 1 patient we had a periprosthetic fracture which was revised with a long stem and encirclage wiring.(Fig .2)

Fig. 2. (left) Periprosthetic Fracture of varus stem (right) Revised with long uncemented stem and Encirclage wiring

DISCUSSION:

Numerous studies in the literature support the poor outcomes seen in cemented femoral stems implanted in varus[5,6,7]. Ebramzadeh and colleagues[5] used survival analysis over a

21-year period to assess the long-term outcome in 836 cemented femoral components. Progressive loosening, fracture of the cement and radiolucent lines at the stem- cement or bone-cement interfaces were more likely to develop in stems that were oriented in >= 5° of varus. The noted correlations were true regardless of the implant material (titanium and stainless steel). Jaffe and others[7] found a similar result when they examined 215 cemented

femoral stems. Of the stems implanted in varus, 37.5% went on to failure and subsequent revision. It is hypothesized that the increased rate of failure of cemented stems oriented in

varus is a result of a combination of significantly decreased posteromedial calcar cement mantle and abnormal forces through the calcar and at the distal lateral tip of the prosthesis. For the most part, orientation is under surgeon control and is avoidable. Cementless femoral stem fixation has become a widely accepted procedure with favourable clinical outcomes. Very few studies have shown poor clinical results, with most studies reporting a high degree of good to excellent results with 4-9 years follow-up. Laupacis and others[8] recently reported a significantly higher revision rate for both cemented

acetabular and cemented femoral components at an average of 6.3 years follow-up. The study compared 124 patients with cemented stems to 126 patients with cementless stems.

Of the femoral revisions, 12were

cemented and 1 was cementless. The authors did not report whether the revisions were implanted in varus or neutral. This is one of the only known studies to compare femoral stem fixation in a prospetive, randomized controlled trial. When examining the literature on cementless stems, the consequences of varus orientation seem to be less important. These findings are based on the few studies that

Have compared varus and normally aligned femoral prostheses. Pernell and colleagues[9] studied strain distribution and subsidence in a canine model and found that stems implanted in varus have an improved fit along the proximal-medial and distal-lateral cortices, resulting in an increase in tensile hoop strains. Varus alignment thus showed similar failure properties and a nonsignificant difference in subsidence than properly aligned and sized stems. Schneider and others [10]reported on 3732 cementless femoral stems. No significant correlations were found between varus stem alignment and function, survival, migration or radiolucent lines. In this series of patients, varus alignment of the prosthesis did not have any adverse effects on radiographic or clinical outcomes, as measured by

the Harris Hip Score. These results are directly comparable with those published by Khalily and others[3]. In a radiographic review of 585 cementless femoral components with a minimum 5-year follow-up, Khalily and colleagues identified 23 stems implanted in varus (4%) with no significant difference in radiographic (radiolucent lines) or clinical outcome as measured by the Harris Hip Score. None of the 585 cases required revision at 5 years postoperative. These data support the findings in our current study. Similarly, we could

not show any statistically significant difference between the varus and non-varus group among any of our outcome measures, including range of motion, Harris Hip Scoreand pain and limp as measured by the Harris Hip Score. Despite the lack of adverse consequence demonstrated in the current study with varus stem placement, the results should be considered with caution. Although we did not identify any difference in subsidence between

the varus and the nonvarus hips, given the limitations of the radiographic measurement technique available to us, the measurements retain an element of measurement error and are not comparable for accuracy and precision. Owing to the very small sample size in the current study, the power is limited. Having said this, the incidence of varus stem implantation is low, making it unlikely to yield a sample size of adequate power, nor do we feel it would be desirable to have a large series to report. This unique cohort of one institutions experience at least allowed us to determine whether there were any detrimental effects of varus stem placement; none could be identified in the short-term with this particular stem. Although it is not recommended to implant cementless stems in varus, the study results suggest that radiographic and clinical problems associated with implanting cementless femoral stems in varus appear to be nonconsequential in the short-term. Compared with the literature, varus stem placement may be better tolerated without cement. This study only reports 2-year follow-up data for all cases, thus patients will need

to be followed for a longer duration to further examine the effect of varus implantation of cementless femoral stems. There is potential for the stresses associated with these varus

stems to induce bone remodelling in the proximal femur, which may be prejudicial to the long-term survivorship of the implant.

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