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Editorial

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Volume 1 Number 1, January - June 2015

Orthopedics Practice is Changing

Sudhir Singh

Musculoskeletal problems continue to represent a growing source of death and disability world-wide, particularly with the growing burden of disease associated with an aging population. Similarly, the potential areas for investigation within the field of orthopedics continue to grow, particularly as the basic and applied scientific knowledge and technology develop. More and more scientific publications are needed to disperse the newly acquired knowledge to the readers. To achieve this specific goal we start this publication with a humble beginning.

In this very first address, I wish to share my own personal observations. During the last 27 years which have passed since I have qualified as an orthopaedic specialist, I have noted several notable changes in the field of orthopaedic surgery. Most prominent among them are:

1. The trend from orthopedic generalist to orthopedics specialist;
2. The trend from complete musculoskeletal care to procedural care; and
3. The trend from a research-based specialty to a practice-based specialty.

There is no question that the trends which we have experienced toward specialization and procedural care have produced enormous benefits for patients, and most certainly for orthopedic surgeons. But has the pendulum swung too far in this direction? It is my belief that one should be a good doctor first, a good orthopedist second, and an orthopedic specialist third. In many ways, I think we have lost sight of our larger obligations as physicians who care for patients with musculoskeletal problems. This situation is now causing our specialty some problems. The trend away from a research-based specialty toward a practice-based specialty is even more disturbing, and has a potentially chilling effect upon the future advances in orthopaedic care.

Generalist Vs Specialist

In US, the proportion of orthopaedic surgeons completing a specialty fellowship more than doubled in last few decades. More revealing is the fact that most of today's practicing orthopaedic surgeons under the age of 40 have completed formal fellowship training. The change from being a general Orthopedic surgeon to Specialist Orthopedic surgeon is a disturbing trend. Is this super specializing really needed or justified? Should this be a cause for concern or does it reflect the desirable maturation of our specialty?

More and more our residents are being taught by faculties who have done a fellowship in some special area. These faculties even though employed in a teaching medical college shy away from teaching other areas of the subject "orthopaedics" and try to function only as specialist teacher of that area alone. We need a greater emphasis on orthopedic medicine and rehabilitation in our teaching programs.

Comprehensive care Vs Procedural Care

As a result of sub-specialization, we have trended from comprehensive musculoskeletal care to more procedural care. The major disadvantage of this trend is to exaggerate the importance of surgical procedures to the totality of patient care and to diminish the importance and desirability of non-operative care and often to distance the doctor from the patient as a caring and involved physician. The procedure itself should not be the "be all" and "end all" for surgeon rather, it should represent an additional acquired skill to help people get well. Francis Peabody said it best: "An essential quality of the physician is humanity, for the secret of patient care is in caring for the patient" [1]. The American Society of Internal Medicine in late 1980's promoted the term "Cognitive physicians" for doctors in the specialties of internal medicine and referred to surgeons as "Proceduralists". The contrast emphasized their own value as "thinking doctors". Now, the internists have developed other terms for their own procedural colleagues in internal medicine, such as "interventional" cardiologists whom, we assume, are still "cognitive". But there is a message for us all in the unwelcome use of the word "Proceduralist" and the inference that orthopedic

surgeons and others in surgery lack cognitive or non-operative skills. If this perception is shared by general doctors, it certainly can adversely affect general population. Most patients with musculoskeletal complaints do not need an operation - they need diagnostic evaluation, non-operative care, or rehabilitation.

Charles V. Heck (1986) [2] recognized the use of the term "Orthopedic surgeon" as a problem. He recommended that the name of the specialty be changed from 'Orthopedic surgery' to 'Orthopedics', and its practitioners be referred to as 'Orthopaedists, not as 'Orthopaedic surgeons". Joel Goldthwait (1933) [3] **,** commented that - "*In our special line of work, with the great interest in the operative side of the work, with the general indifference to the non-operative... one can but wonder if the basic ideals which justify our work have not been lost sight of. If we are to see only the operation... we cease to be true orthopedic surgeons, but just surgeons doing bone and joint work*". He also stated: "*The opportunity is great, and if we choose operative work only, which is the easier, instead of the harder and more general, some other specialty or school will take this over.*"

Research emphasis Vs Practice emphasis

The third trend, that of a decreasing emphasis on research is the most subtle trend, but one which has grave implications for the future of the specialty.

There has been cause for alarm in the orthopaedic research. Some of the warning signals are as follows:

(1) The award rate for orthopaedic scientists from the National Institutes of Health and the number of awards to orthopaedic surgeons as principal investigators has decreased [4].

(2) The Kappa Delta awards were established in 1950 to recognize, each year, the most outstanding orthopaedic research investigators. The first recipient of this award was Dr. Marshall Urist. During the 20 years from 1950 to 1970, 88% of these awards were presented to orthopedic surgeons as lead investigators. For the next 20 years, from 1971 to 1990, only 53% were given to orthopedic surgeons and since 1990, only 48% of the awards made by the Kappa Delta Sorority were presented to orthopaedic surgeons.

Even our clinical outcomes research is being done by others - primarily by internists, epidemiologists and those in public health. The root causes of this trend away from research are probably several. Among them are certainly the increasing emphasis on clinical practice income by faculties of academic medical centers, and the lure of rupees which attracts orthopedic residents and fellows to the world of private practice. Sources of funding for orthopaedic research have never been great and are becoming scarcer as the research budgets of academic health centers are non-existing or have been reduced. To better realize the future for orthopaedics, I see two pathways—one which is already being created by the market place in our changing health care delivery system. The second is one which we must create ourselves by changing the way we teach orthopaedics.

I believe there will be a gradual return of many practicing orthopedic surgeons to primary musculoskeletal care, non-operative care and rehabilitation. This will occur because of the constraints being placed on the numbers of procedures we do by those who pay for health care. The economics of the new practice environment will gradually force more specialists into doing more primary care and more surgeons into doing more non-operative care.

Academic orthopedic departments would do well to consider the post-graduate educational needs orthopedic residency education program by increased emphasis on general orthopedics, geriatrics and rehabilitation, as well as providing adequate pathways for research. As well, we need to teach the basics of outcomes research and other kinds of health services research at the residency level. I am suggesting that we need to return to our roots—in orthopedic practice, as well as musculoskeletal research. If and when we do go back to the future, we will have more Campbells, Steindlers, Larsons, Ponsetis and Coopers—and that will be good for orthopedics and for orthopaedic surgery.

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Clinical Prediction Rules for the Hip Disorders: Are We up to the Mark?

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Abstract

This letter to editor brings into notice the dearth of research in the area of clinical prediction rules (CPR) and clinical decision rules (CDR) on examination and treatment of orthopedic hip disorders. There were three studies that reported CPRs/CDRs which are described in this letter. There was one study each on hip pain/osteoarthritis, septic arthritis versus transient synovitis, and nursing home stay after hip fracture.

Keywords: Hip Disorders; Physical Examination; Predictive Validity; Orthopedic Examination.

Dear Sir,

This letter to editor brings into notice the dearth of research in the area of clinical prediction rules (CPR) and clinical decision rules (CDR) on examination and treatment of orthopedic hip disorders.

Hip pain/ Osteoarthritis

Sutlive et al [1] determined the diagnostic accuracy of common clinical examination items and constructed a preliminary CPR for diagnosing hip osteoarthritis (OA) in individuals with unilateral hip pain in their prospective cohort study of 72 patients of whom 21 had radiographic evidence of hip OA. The CPR comprised of 5 examination variables, and if at least 4 of 5 variables were present, the positive LR was equal to 24.3 for increasing the probability of hip OA to 91%.

Septic arthritis versus Transient Synovitis

Kocher et al [2] validated a previously published CPR for differentiating between septic arthritis (SA) and transient synovitis (TS) of the hip in 51 SA and 103 TS children who were operationally defined on the basis of the white blood-cell count in the joint fluid, the results of cultures of joint fluid and blood, and the clinical course. The four independent predictors of septic arthritis of the hip (a history of fever, non-weight-bearing, an erythrocyte sedimentation rate of 40 mm/hr, and a serum white blood-cell count of >12,000 cells/cu.mm were identified and reported.

Prolonged nursing home residence after hip fracture

Steiner et al [3] developed (DS) and validated (VS) a CPR for nursing home residence 6 months after a hip fracture in two of their prospective cohort studies, on 344 and 239 community-dwelling hip fracture elderly patients respectively from 92 and 11 healthcare units respectively. Whilst 18.7% of patients in the DS resided in nursing homes 6 months after hip fracture, the four independent risk factors identified for institutionalization were (1) being unmarried, (2) incontinence, (3) dependence in ambulation, and (4) cognitive impairment. In the VS, 6.1% of patients resided in nursing homes after 6 months, with a range from 50.0% of patients with four risk factors to 0% of those with no risk factors.

There were three studies that reported CPRs/ CDRs which are described in this letter. There was one study each on hip pain/osteoarthritis, septic arthritis versus transient synovitis, and nursing home stay after hip fracture.

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Original Article

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The Functional Outcome of Tibial Plateau Fractures (Schatker Type V & VI) with Locking Compression Plate

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Abstract

High energy complex tibia plateau fracture due to intra-articular are usually associated with injury to ligaments, capsule and other soft tissues surrounding the joint. They present multifaceted problems of difficulty of achieving accurate joint reconstruction. It also contributes to other complications i.e. infection, fixed flexion deformity, knee stiffness. These complications make treatment of tibia plateau fractures a difficult task for an orthopaedic surgeon. This study was undertaken to evaluate and explore locking compression plate fixation in tibia plateau fractures, which is expected to provide a stable fixation with minimum exposure, early mobilization, less complications and a better quality of life.

Keyword: Tibialplateau; Intra-Articular Fracture; Locking Compression Plate.

Introduction

High energy complex tibial plateau fracture due to intra-articular are usually associated with injury to ligaments, capsule and other soft tissues around the joint. They present multifaceted difficulties in achieving accurate joint reconstruction.Various classification systems are available for classifying these fractures including Schatzker classification system and AO classification [1–3]. The Schatzker classification system for tibial plateau fractures, which divides these fractures into six types, is widely recognized by orthopaedic surgeons to assess the initial injury, plan management and predict prognosis.

Proximal tibial locking compression plate is based on biomechanical principle of external fixators and internal fixators since the angle-stable interface between the screws and the plate allows placement of the plate without any contact to the bone giving the advantage of preserving the periosteal blood supply and bone perfusion. Thus significantly less soft tissue dissection may be required resulting in preservation of the local blood supply and enhancing the healing of the fracture [2]. The complications are more probable to result from high energy than from low energy fractures. The management of these fractures remain controversial because the rate of complications is high regardless of treatment. The reported complications include: wound breakdown, deep infection, deep vein thrombosis, compartment syndrome, non-union, myositis ossificans, peroneal palsies, hardware failure, and arthro-fibrosis. Moreover, extensive surgery on a severely comminuted fracture may result in less than optimal internal fixation and a need for postoperative immobilization, often resulting in the joint being neither stable nor freely movable. [6]In our study we hereby study the functional outcome of proximal tibial fractures treated with locking plates.

Materials and Methods

This was a prospective study for evaluation of tibial plateau fractures managed with locking compression plates. The study included 20 cases of fracture of tibial plateau presenting to the emergency and OPD of KLE' University's J.N Medical college & Dr. Prabhakar Kore Hospital, Belgaum The results were compiled and analyzed using *sanders 40 point functional evaluation scale.*

The surgical approach to complex tibial plateau fractures was individualized on the basis of particular fracture configuration. Three standard approaches [9] were used including:

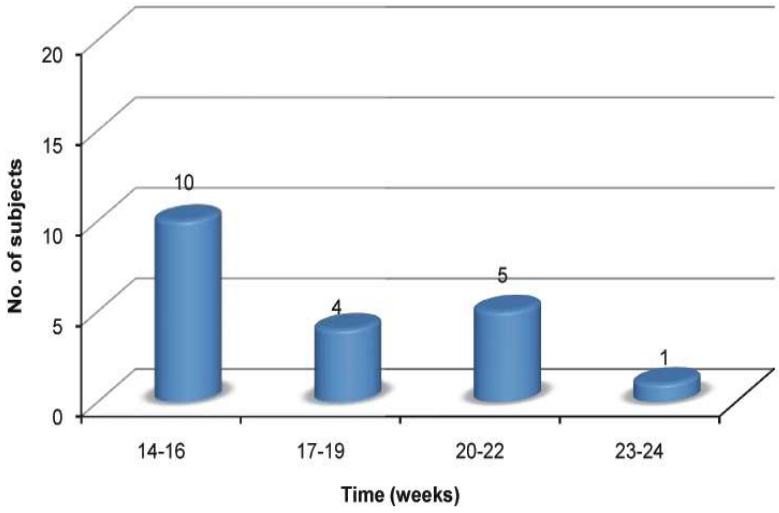
- Antero-lateral-parapatellar approach,
- Posteromedial approach.

Regular follow up of the patient in OPD with X-rays was done. All long term complications like non union, mal union, angular deformity, implant breakage, shortening or infection were recorded. Secondary surgical procedures which were done in the patients were also analyzed. The patient was under follow up till the bony union of the fracture occurs or up to 6 months, whichever is earlier. The final result was based on the functional and radiological outcome.

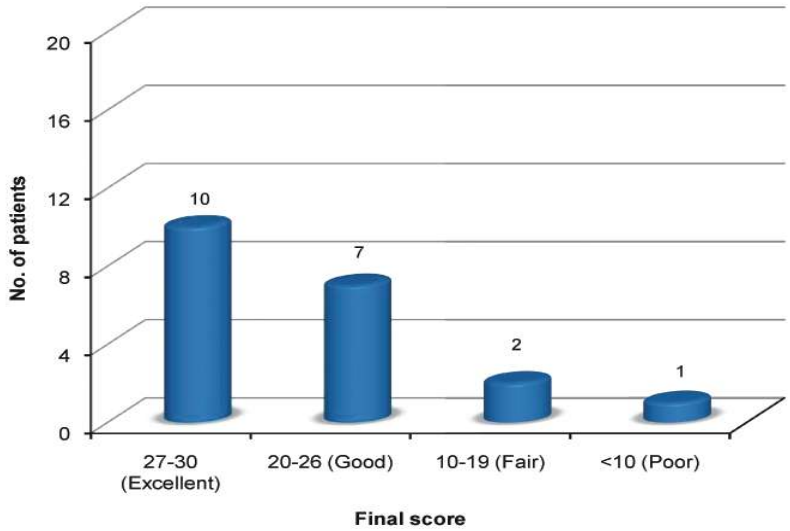
Results

In case of highly comminuted fractures, i.e, Schatzker Type V & VI, Dual plating *(Lateral L.C.P and Medial buttress plate)* was applied in (14) 30%

Graph 1: Graph showing time taken for union

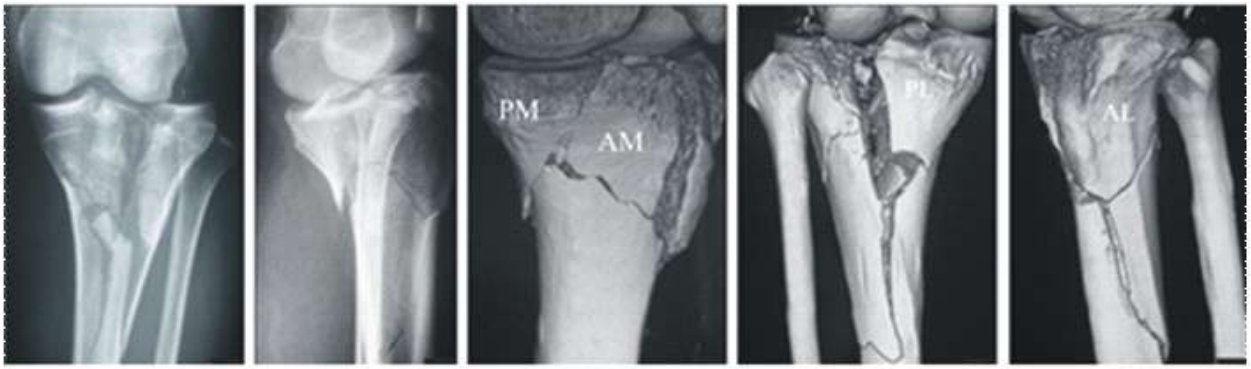


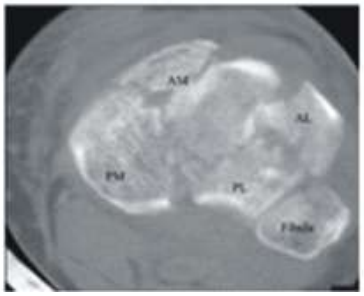
Graph 2: Graph showing functional outcome using sanders knee score



Pre operative planning

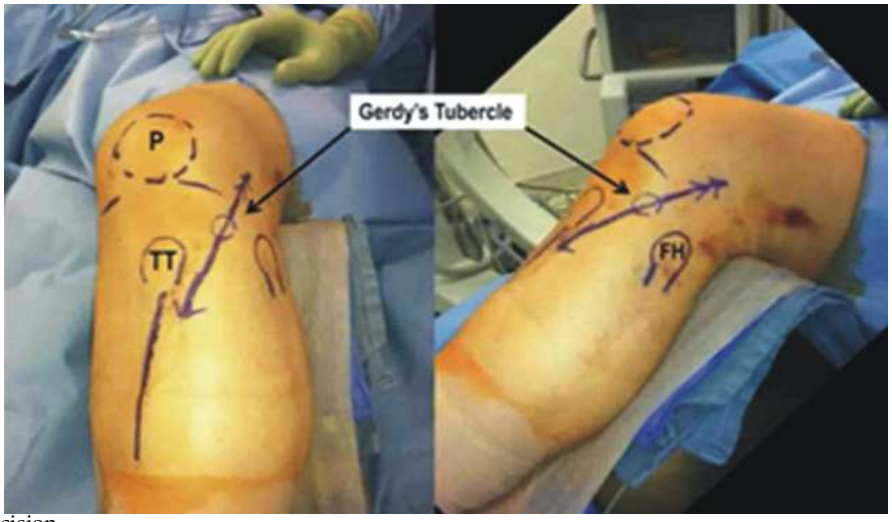
XRAY, CT and 3d reconstruction



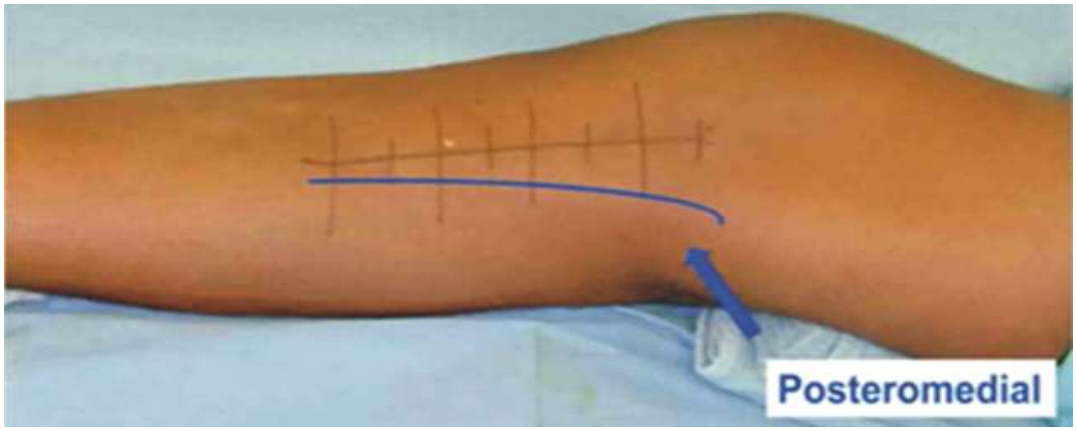


Intra-operative planning

Lateral Incision



Medial Incision



Intra Operative Steps Using Flouroscopy

Intra Operative Steps
Articular surface restored using tenaculum clamp
With knee flexed over wooden plnk

Lateral View
Articular surface restored using, 6.5 mm
Cannulated cancellous screws

Lateral Locking Plate Application

Medial Buttress Plate Application

Result–Excellent case

Pre op x-ray

Post op

Follow up

6 weeks 3 months 6 Months

Flexion **Functional results**

Extensio

of the cases , (6 cases), (2 Type V & 4 Type VI) were operated with Lateral Locking plate. The healing process was determined both clinically and radio graphically. In our study the mean time to union was 17.6 weeks, with 50 % of fractures uniting in 14-16 weeks. Complication in the form of infection was observed in two cases (10%). Also there were four cases of compartment syndrome and one case each of malunion. Additional procedure of cortico-cancellous bone grafting (in four patients) in view of depressed fracture fragments. This was done in the primary setting itself. Sanders score was applied to analyze the functional outcome among the cases. After evaluation it was observed that 85% of patients had done good to excellent performance. Two patients had fair results and one performed poorly.

Conclusion

Locking plate is a sound option for the treatment of bicondylar tibial plateau fractures. It provide stable internal fixation with a low rate of complications and very good clinical results [10]. Thus, proximal tibial locking plate is a good device to stabilize the fractures of proximal tibia especially when used in conjunction with meticulous intra operative handling of soft tissues and active participation of the patients in rehabilitation programme [7–9]. No method can be used routinely for all fractures, and each patient must be evaluated individually. Although the initial results in patients with variety of fractures with locking plates are encouraging, it is increasingly evident that failures do occur In summary, locking compression plate is an efficient bone stabilization device even in cases with soft tissue injuries.

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Original Article

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Open Reduction and Internal Fixation of Depressed Intra-Articular Calcaneal Fractures with Locking Calcaneal Plate

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Abstract

Background: Management of intra-articular calcaneal fractures has always been a matter of debate among orthopaedic surgeons. We prospectively analyzed radiological and functional results of depressed intra-articular calcaneal fractures fixed by locking calcaneal plates. *Materials and Methods:* We operated 28 intra-articular joint depression type calcaneal fractures (as per Essex-Lopresti classification system) using the standard extended lateral approach and fixed them with locking plate during the period, October 2011 to September 20014. Patients were followed up clinically and radiologically for at least 1 year. Radiological assessment was done by Bohler's angle and Gissane's angle along with measurement of calcaneal height and width. Functional outcome was assessed using the American Orthopedics Foot and Ankle Society (AOFAS) scale. *Results:* Wound healing complications were 7/28. Four patients had flap necrosis, two had superficial and one had deep infection. Preoperative size of Böhler's angle corrected to normal range in all cases. The overall results according to the AOFAS Ankle Hindfoot Scale were good or excellent in 84%. None of the patients had compartment syndrome, heel pad problems, peroneal tendinitis, reflex sympathetic dystropy or implant failure. *Conclusion:* Open reduction and internal fixation of intra-articular calcaneal fractures has become a standard surgical method. Fewer complications and better results related to treatment with locking compression plates have been observed for all Sanders types of intra-articular calcaneal fractures.

Keywords: Calcaneal Locking Plate; Intra-Articular Calcaneal Fracture; Lateral Extensile Approach.

Introduction

Management of fractures of the calcaneus is one of the most challenging problem among the orthopaedic surgeons. Calcaneal fractures account for approximately 2% of all fractures and 75% of fractures of foot. Of these 10% are bilateral, 10% have associated injuries, and 60% to 75% are displaced intra-articular fractures.These fractures are uniformly caused by an axial load mechanism, such as a fall or a motor vehicle accident, and may be associated with other axial load injuries, such as lumbar, pelvic, and tibial plateau fractures [1-5]. Debate continues regarding the management of calcaneal fractures, between open reduction and internal fixation and closed treatment. The conservative treatment invariably leads to long-term consequences. Calcaneal shape restoration by means of open reduction - internal fixation is a necessary prevention of late complications seen with conservative treatment such as malposition, flattening of the longitudinal arch, anterior ankle impingement syndrome, lateral impingement syndrome, and axial malalignment of the hind foot [[7-10].

The locking compression plate (LCP) has improved the functional results, limited the indications for bone grafting, and shortened the treatment. The purpose of our study is to assess the functional results and complications of calcaneal

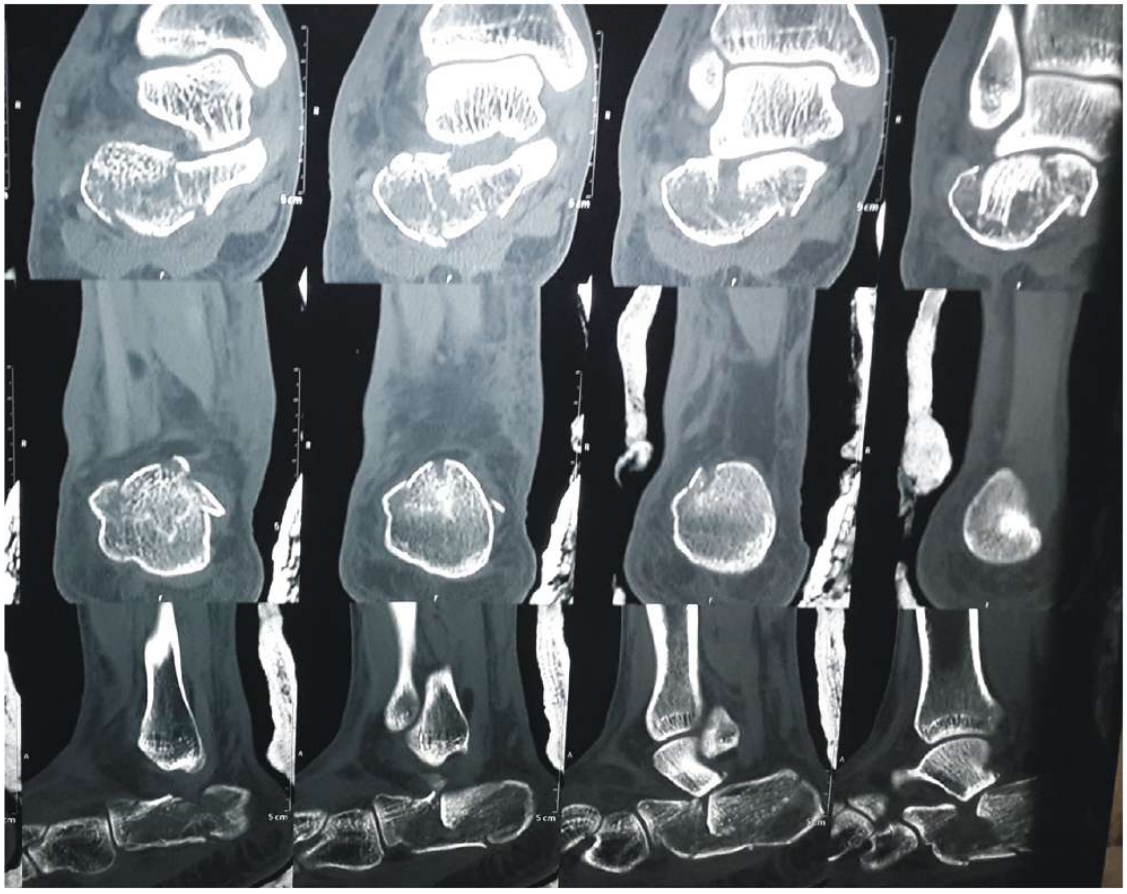
fractures treated with calcaneal locking compression plates.

Materials and Methods

30 intra-articular joint depression type calcaneal fractures (as per Essex-Lopresti classification system [11]) in 28 patients (2 simultaneous bilateral fractures) were treated by means of open reduction and internal plate fixation with locking compression plate, from October 2011 to September 2014. The most frequent mechanism of injury was fall from height. There were 22 males and 6 females with an average age of 44 years (range 23–73 years). Patients with extra-articular undisplaced or tongue type intra-articular calcaneal fracture or compound calcaneal fracture were excluded from the study. Patients operated on after 3 weeks were also excluded from the study. Ethical clearance was obtained from the ethical committee. Patients were evaluated for associated injuries and X-rays of anteroposterior, lateral and axial views of calcaneum were done (Fig-1a). CT scan was done to assess the amount of comminution and articular depression whenever

Fig. 1a:

Fig. 1b:



possible (Fig-1b). Initially below knee slab in neutral, limb elevation and ice pack fomentation were used to decrease swelling.

Operative Procedure

Surgical treatment of the fractures took place once soft tissue conditions allowed (usually between 10 to 21 days), when the soft tissue edema decreased and there were positive wrinkles. The surgery was started with the patient placed in lateral decubitus position, antibiotics administered and tourniquet applied. Exposure was done with standard lateral approach with L-shaped incision type and no-touch technique was used. The approach was developed as a full-thickness flap. The lateral cortical fragment (bulge fragment) was then hinged away. Subsequently, a good view into the subtalar joint was obtained. The soft tissue flap was held back by K-wires, which had been inserted into the talus and bent. Use of the joy-stick technique with a Schanz-screw placed through the tuber calcanei achieves reduction and in particular the length and axis is regained (Fig-2a & b). Depending on fracture type and size of the defect, we filled up the defect with autogenous cancellous bone and locking compression plate was applied. Plate was fixed with fully threaded locking screws and confirmed in lateral and axial fluoroscopic views. Closed suction drainage was done for 24 to 48 hours until drainage was less than 25 ml per 8 hours. Removal of the short leg splint was done at 3 to 5 days postoperatively. If the flap showed uncomplicated healing, and the wound was sealed, early active range of motion was begun at that time. At the second postoperative week, active range of motion of the ankle and subtalar joint was instituted. Patients learned to draw the alphabet

Fig. 2a:

Fig. 2b:

Fig. 3 a b:

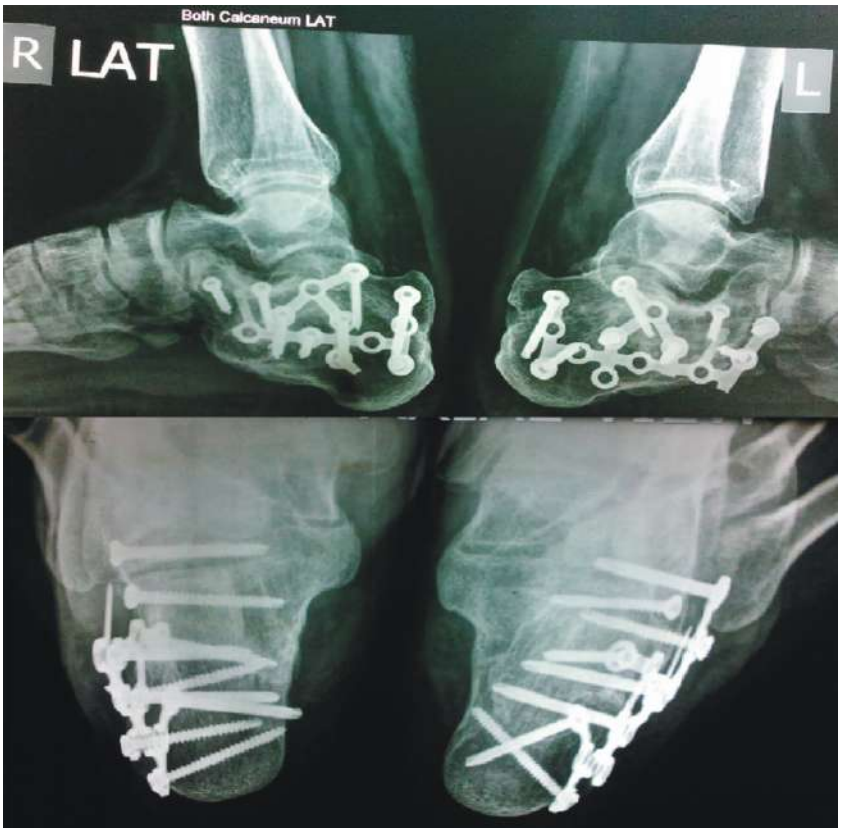


Fig. 4 a b c d:

with the hallux of their injured limb or make progressively larger circles with their feet. No weight bearing was allowed for 12 weeks. Patients were followed up clinically (Fig.-4a, b, c, d) and radiologically (Fig.-3a & b) at least for 1 year. Radiological assessment was done by Bohler'sangle[12] and Gissane's angle [13] along with measurement of calcaneal height and width. Functional outcome was assessed using the American Orthopaedics Foot and Ankle Society (AOFAS) scale [14].

Results

28 patients with 30 joint depression types of calcaneal fractures (2 bilateral calcaneal fractures) were operated, of which 2 patients were lost in follow-up. Hence only 26 patients with 28 calcaneus fractures were included in the study.

Wound healing

During postoperative treatment we detected 4 cases with superficial wound edge necrosis, of which all healed completely with dressing and antibiotics. Three cases had wound infection, of which one case recovered and two cases developed persistent implant infection where implant was removed about 6 months after surgery. No fragment redislocations occurred after forced plate removal. No patient developed deep osseous infection.

Until follow-up upto an average period of 8.6 months, no case required an arthrodesis. At the final follow up examination only 20 patients were able to return to work. 6 patients had to change their vocation because they were all manual labourers. More than 85% of the patients had no or only mild occasional pain with no limitation of daily activity and no gait abnormality and were able to walk at least more than 200 mts. with only some difficulty on uneven surface. All patients had stable ankle joint with all having dorsiflexion and plantar flexion more than 30°. The average subtalar range of motion was 17°, with only 3 cases having near normal restriction (75%-100%), and 6 having severe restriction (<25%).

Average AOFAS score at final follow-up was 85 (range 66 to 97), with 84% having excellent to good results and 2 (8%) and 1 (4%) had fair and poor results respectively. The mean Bohler's angle improved from preoperative 5.5° (range -15° to 18°) to immediate postoperative 28° (range 17° to 31°), which was decreased to 25.3° (range 13° to 29°) at final follow-up. It was maintained in normal range (20° to 40°) in all the patients except three who had highly comminuted fractures.

The mean Gissane's angle improved from preoperative 153° (range 131° to 169°) to immediate postoperative 119° (range 112° to 142°), which fell to 122° (range 116° to 146°) at final follow-up.

The mean calcaneal height improved from preoperative 3.1 cm (range 3.4 to 4.1 cm) to immediate postoperative 4.5 cm (range 4.3 to 4.8 cm) and decreased to mean 4.32 cm at final follow-up.

The mean calcaneal width improved from preoperative 4.2cm (range 3.9 to 4.2 cm) to immediate postoperative 3.7 cm (range 3.5 to 3.9 cm) and lost to mean 3.8 cm (range 3.7 to 4.0 cm) at final follow-up.

Discussion

Open reduction and internal plate fixation of displaced intra-articular calcaneal fractures has become a standard surgical protocol with low complication rates and better quality of life after the surgery. Use of locking compression plate makes the fixation more stable even without bone grafting and enables earlier weight-bearing[15-17]. Brauers anglicised the cost-effectiveness of surgery versus conservative treatment for intra-articular calcaneal fractures and showed economical advantage of ORIF[15]. Most of the conservatively treated patients later underwent arthrodesis procedure. Poorer prognosis is related to males, heavy workers, bilateral fractures, and Sanders type IV fractures [18]. Canadian Orthoapedic Trauma Society performed a prospective, randomized, multicenter trial and compared operative with nonoperative treatment of displaced intra-articular calcaneal fractures in 424 patients with 471 fractures. There was no difference in overall outcome between the operative and non-operative groups; however, those having non-operative treatment of their fracture were 5.5 times more likely to require a subtalar arthrodesis for post-traumatic arthritis than those undergoing operative treatment[19]. Radnay et al [20] studied the outcome of patients with a displaced intra-articular calcaneal fracture that eventually required arthrodesis; patients who had initially been treated operatively had superior results compared with those who had initially been treated nonoperatively. This might have been due to the comparatively better preservation of the calcaneal geometry after operative treatment. We also believe that arthrodesis surgical technique is less

demanding when the arthrodesis follows operative treatment of such a fracture compared with non-operative treatment. Wound related complications leading to implant removal have also been reported after operative treatment in many studies [21]. Wound related problems in the present study was slightly high compared with those in other studies. This may perhaps be due to increased prevalence of nosocomial and antibiotic-resistant infections such as MRSA in our clinical scenario. In our series average AOFAS score was 85, with 84% having excellent to good results, whereas two (8%) and one (4%) had fair and poor results respectively which is similar to previous studies [22-30]. All patients except one were able to walk at least more than 200 m with only some difficulty on uneven surface. The better functional outcome assessment as seen in our study is considered due to use of the locking plate, which provides better stability and fixation as compared to conventional plates. In our study, the immediate postoperative mean Bohler's angle, mean Gissane's angle, calcaneal height and width were 28°, 119°, 4.5 cm and 3.7 cm respectively, which was decreased to 25.3°, 122°, 4.3 cm and 3.8 cm respectively at final follow-up. Restoration of Bohler's angle is associated with a better outcome, which can only be attained by open reduction and maintained with locked plating. In our series, Bohler's angle was maintained in normal range (20° to 40°) in all the patients except three patients who had highly comminuted fractures.

It is concluded that open reduction and internal fixation with locking plate is a good treatment option for joint depression type intra-articular fracture of calcaneum, resulting in restoration of calcaneal height, width, Bohler's and Gissiane's angles, and allowing early mobilization, provided adequate care and importance is given to local conditions and meticulous soft tissue dissection because of a chance of slightly higher incidence of infection.

Footnotes

Source of Support: Nil

Conflict of Interest: None.

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Original Article

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A Prospective Study of Biological Fixation with Either Plate or Interlocking Nail on the Mean Duration of Union in Diaphyseal Fractures of Tibia

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Abstract

Objective: To study the results of Biological plating or Interlocking nail for the closed diaphyseal fracture of tibia in department of Orthopaedics, K.L.E University's Dr. Prabhakar Kore Hospital and medical research center, BELGAUM. The aim of this study was the evaluation of the results of biological plating or interlocking nail for closed diaphyseal fractures of tibia. *Materials and Methods:* The study included 30 patients. All the patients underwent a comprehensive orthopedic examination and work up was done to diagnose and classify tibial fractures. The treatment modalities were suggested accordingly. *Results:* Intra-medullary nailing should be the method of choice for treating the closed type of Tibial shaft fractures. Biological plating should be considered as an alternative in IMILN in specific indications. *Conclusion***:** Comprehensive orthopedic examination with detailed study of fracture pattern, types of fracture help to evaluate the different modalities of treatment.

Keywords: Intramedullary Interlocking Nail (IMILN); Plating; Union; Biological fixation.

Introduction

Fractures of Tibial shaft are important as they are common and are controversial. An average of 26 tibial fractures per 100,000 people are common as tibia is sub-cutaneous by its location. Operative treatment is controversial as good results are achieved with closed reduction, casting and functional brace [1].

Internal fixation has gained widespread acceptance in treatment of fracture of Tibia, good anatomical reduction, stability of fracture, early mobilization and decrease in postoperative infection [3]. Biological fixation of fractures is an important advancement in the fracture management in which the utmost respect is given to soft tissues and vascularity of bone. Fixation maintains fracture alignment without compression. The principles are limited exposure, indirect reduction methods, with vascularity intact. Biological internal fixation can be achieved by three conventional techniques–(a) splinting stabilization with external fixators,(b) Intramedullary nails and (c) with the use of plate and screw as pure splints, i.e, without the additional lag screw effect at fracture site [1, 2]. Surgical options are Intra-medullary nailing, Plate and Screw fixation and External fixation in Open Fractures. Appropriate treatment is still controversial.

Materials and Methods

Patients with closed diaphyseal fractures of tibia are treated with either plate or IMILN. It's a prospective study, source of data: patients admitted with closed diaphyseal fractures of tibia in KLE hospital, Belgaum. Sample size: 30. Inclusion criteria: 1. All closed diaphyseal fractures of tibia who were medically fit and indicated for surgery. 2. Patients aged >18yrs. 3. In patients where IMILN wasn't possible like severe comminuted/ segmental fracture,

long spiral, vertical split closed diaphyseal fracture, wound over knee, were treated with biological plate and screws. Exclusion criteria were: Fracture upper and lower end of tibia, open fracture of tibia, Patients who have concurrent infection or previous local infection, Patients who had previous injury with residual deformity. Patients who had not provided informed consent for participation.

Biological Plating X-Rays and Clinical Photographs

Preoperative X-Ray

Immediate Post Operative X-Ray

X-Ray Showing Uniting Fracture 12 Weeks Post Operatively

United fracture 17 weeks post operative

excellent results with full range of motion at knee and ankle

Clinical photograph showing excellent results with full range of motion at knee and ankle

Interlocking Nailing X-Rays and Clinical Photographs

Fracture United at 16 Weeks

Pre operative X-ray

Immediate post operative X-ray

Uniting fracture at 12 weeks

Fracture united at 17 weeks

Excellent results with full range of motion at knee and ankle

Excellent results with full range of motion at knee and ankle

Results

All patients with biological plating were declared clinically united at 11–20 weeks. In interlocking nailing group 88.90% fractures united clinically at 11–15 weeks and 1 fracture united clinically at 5–10 weeks. All patients (100%) with biological plating united radiologically within 21. 3 weeks with mean duration of union of 19. 5 weeks (16.6–21. 3 weeks). In patients treated with interlocking nail, mean duration of union was 18.1 week (13. 2–24. 6 weeks).

Discussion

More flexible fixation should encourage the formation of callus, while less precise, indirect reduction will reduce operative trauma [4] IMILN permits a minimally open approach but its advantages are somewhat offset by extensive damage to intra-medullary circulation and local as well as general intra vascular thrombosis due to tissue damage and fat intravasation due to high intramedullary pressure during reaming and insertion of nail [2]. Minimally invasive technologies of plating are an alternative when biology is the most important concern [3]. Conventional stable internal fixation with precise reduction, requires fairly extensive surgical approaches to bone. This contributes to increasing necrosis, which has been initially produced by injury. IMILN is preferred method of treatment in diaphyseal fractures, but not always appropriate depending on fracture type and location. IMILN maintain length and prevent rotation, needs special training and costly instrumentation & longer operative time. In IMILN group patients were started on partial weight bearing within 10–20 days and full weight bearing within 5-10 weeks. In plating system first 4 weeks above knee cast, later 2 weeks below knee cast. Allowed partial weight bearing after 6 weeks and removal of cast and full weight bearing after 16–24 weeks depending upon union [5].

Conclusion

Biological internal fixation is safe and reliable method for closed diaphyseal fracture of tibia**.** IMILN has got wide range of indications with respect to pattern of fracture and should be the method of choice for closed type of fracture of tibial shaft [6]. In extensive comminuted type 4 fractures and for vertical split closed fracture of tibia, plate osteosynthesis is a good method of treatment. Plate is used when wound is present at nail insertion site to decrease post operative infection**.** Biological fixation promotes early union as it does not disturb anatomy and biology at fracture site**.** Plating is easier, has a shorter learning curve and requires minimal instruments**.** IMILN nail requires greater skills and has got separate set of costly instruments. Biological fixation does not require additional procedure like bone grafting**.** Advantage of IMLIN is early union, can be achieved with early ambulation of the patient **[**1]. Biological fixation causes minimal damage to soft tissues and vascular supply to long bone**.** Biological fixation has no risk of infection. Functional recovery with biological internal fixation is early [5].

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Original Article

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Negative-Pressure Wound Therapy in Wounds with External Fixators: A Simple and Cost Effective Technique

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Abstract

Introduction: Negative Pressure Wound Therapy (NPWT) is now an established modality of treatment used to treat various complex acute and chronic wounds in all surgical fields. However in treatment of wounds with external fixators, creation and maintenance of an air tight seal using conventional adhesive dressings is usually cumbersome and not effective. We present a simple, novel, cost effective technique of NPWT application using sterile cellophane dressing for wounds with external fixators. *Material and methods*: We present a series of 15 patients where NPWT was applied using sterile cellophane (cling wrap). All wounds with external fixators not amenable to skin grafting or flap in the primary setting were included. Sponge based continuous NPWT was used. The end point of NPWT was achieving healthy granulation tissue for wound cover. *Result*: All patients were successfully treated with NPWT. The mean duration of NPWT application was 15days. Healthy granulation tissue and wound contraction was noted in all patients making wounds amenable for cover. *Conclusion*: NPWT using cellophane is simple, cost effective and can be easily used to treat wounds with external fixators.

Key words: Negative Pressure Wound Therapy (NPWT); Cellophane; External Fixators.

Introduction

Negative pressure wound therapy has become a vital component in the armory of wound management and has been successfully used to augment and treat complex acute, sub-acute and chronic wounds. It has been used in orthopedics following spinal surgery, arthroplasty, open fractures, trauma etc [1–6].

However in treatment of wounds with external fixators, application of an air tight seal for NPWT with conventional adhesive dressings is not only difficult to apply but also leads to frequent failure to maintain air tight seal in between the pins of external fixator. We propose a novel , simple and cost effective technique of applying negative pressure in such wounds using a sterile plastic covering of cellophane(cling wrap).

Materials and methods

This is a prospective study performed at a tertiary care center in India between September 2014 and March 2015. The inclusion criteria included all wounds with external fixators not amenable to skin grafting or flap in the primary setting due to patient being unfit for surgery, hemodynamically unstable, wound infection, patient unwilling for free flap. All wounds with active bleeding, necrotic tissue, exposed vessels or nerves and patients allergic to cellophane were excluded from the study. All patients were who meet the prescribed criteria were explained about the

study. After obtaining informed consent, 15 patients were included in the study. Demographic details, details of injury and wound, tissue culture sensitivity, pre-NPWT photographs and photographs of every dressing were recorded. NPWT was changed every 3rd day or when NPWT stopped working. The end point of NPWT was achieving healthy granulation tissue for wound cover (tissue culture negative). Total number of dressing change and total duration to attain healthy granulation tissue was noted. No statistical analysis was performed due to small sample size.

Results

Total of 15 patients was included in the study. The mean age of the patients was 37 years (range 18–66 years). There were 11 males and 4 females in this study. Upper limb was involved in 3 patients and 12 patients had lower limb injuries. Out of the 15 patients included in the study, 8 patients had associated crush injury, 5 patients had wound infection and the 2 patients were hemodynamically unstable. The duration of NPWTapplication ranged from 5-12 days with a mean of 8days. All 15 patients having wounds with external fixators could be successfully treated with NPWT. An Airtight seal could be easily created and maintained using sterile cellophane around the external fixators. The dressings were changed on every 3rd day as planned in 13 out of 15 patients. 2 patients required re-application of NPWT more than once in between the dressing period for bedside debridement following which good response was noted. Granulation tissue was noted in all patients. No instances of bleeding requiring cessation of therapy were noted.

Discussion

The concept of Negative Pressure Wound Therapy (NPWT) dates back to 1940's [7, 8] . Its effectiveness in wound healing was first published by Charker et al in 1989 [9]. Fleischmann et al. was the first to manage chronic wounds with sub-atmospheric pressure in 1993 [10]. Morykwas et al. was the first to describe the efficacy of NPWT [11]. In 1997, Argenta et al. successfully used open pore polyurethane dressings under negative pressure for complicated wounds of the torso and extremities [12]. Vacuum Assisted Closure (VAC) a commercially available form of NPWT was first introduced in the United States of America by Kinetic Concepts Inc. (Texas) in 1996 which was approved later by FDA in 2002 December. Since the inception of NPWT, it has been successfully used to accelerate wound healing in wide range of acute, sub-acute and chronic wounds [13] including pressure ulcers [14,15], diabetic ulcers [16,17], traumatic wounds [18,19], open fractures [1–3], following failure of arthro-plasty or spinal surgery [4–6], burns[20], before and after skin grafting [21], etc.

Mechanism of action

It involves application of negative pressure with the help of a suction tube connected to a suction apparatus applied over gauze or sponge placed over the wound and sealed in an airtight manner with an adhesive dressing. NPWT acts by stimulating angiogenesis, increase tissue perfusion, removal of excess exudate, reducing peri-wound edema, provides a moist environment, contraction of wound edges and promoting granulation tissue [22–25] NPWT is an adjuvant to promote wound healing is not a replacement to traditional wound management measures to control infection and surgical debridement.

It is contraindicated in the presence of exposed vessels, nerves or anastomotic site, in the presence of active bleeding, malignancy, allergy to adhesive dressing or silver based foam, overwhelming infections requiring debridement [1].

The problem statement

Complex wounds with extensive tissue loss, for example, Type lllGustillo fractures with skin loss and exposed bones often requires complex microvascular tissue transfer. With the advent of negative pressure wound therapy, many such wounds can be made to granulate and subsequently treated with a simpler procedure like split skin graft. However, the presence of external fixators poses a challenge in obtaining air tight closure due to the difficult maneuverability in application over wounds with external fixators and to maintainan uniform airtight seal. Repeated dressings with transparent adhesive adherent dressings add to thecost. The cellophane on the other hand is easily available and costs only Rs 75 for 100 meters. It can be rolled and cut to different sizes prior to sterilization by ethylene oxide, thus making its maneuverability around the external fixator pins easy. The cost of the entire NPWT dressing utilizing a ryles tube and cellophane comes to around Rs. 34 per dressing (excluding sterilisation charges).

In our study technique, Sponge based NPWT with sterile cellophanewith continuous negative pressure

obtained via wall suction device connected via a Ryle's tube was used. The cellophane was sterilized by ethylene oxide method after unwrapping and rolling it around plastic sticks of size required. This sterilized cellophane could be cut into different sizes to easily roll around and under the external fixators to maintain airtight dressing. In our study we found NPWT could easily be applied and maintained over these wounds with external fixators. The easy availability of the equipment, simplicity of procedure, low cost, ease of sterilization & easy maneuverability of cellophane over any surface make it a cost effective alternative to the VAC system and can be easily used for all kinds of wounds promoting wound healing.

Table 1: Patient and Wound Details

Sl no.	Age (yrs)	Gender	Diagnosis	Size of the wound (cm)	Duration of application of NPWT(days)	Number of dressing changes
1	55	M	Right leg Type III b tibia fracture	5cm x 8 cm	12	4
2	22	F	Left Footcompound metatarsal heads fracture	7 cm x 10 cm	9	4
3	54	M	Right leg Type III a fracture tibia	4 cm x 6cm	8	3
4	50	M	Type III b Left Lower limbboth bone fracture	10cm x 8cm	11	4
5	29	M	Left forearm compound radial fracture	4cm x 8cm	10	4
6	28	F	Left leg Type IIIa tibia fracture	2cm x 3cm	5	2
7	42	M	Right footcompound metatarsal head fracture	4cm x 7 cm	7	3
8	18	M	Rightcompound femur fracture,	12cm x 10cm	12	6
9	31	M	Left leg Type III b compound fracture tibia	3cm x 2cm	6	3
10	51	M	Right compound femur fracture	13 cm x 10cm	12	4
11	47	M	Right Type III b tibia fracture	6cm x 8 cm	8	3
12	51	M	Left leg type III a tibia fracture	4cm x 4 cm,	5	3
13	66	M	left leg Type III b fracture tibia,	5cm x 3 cm	6	2
14	33	F	Open right distal 1/3rd radius fracture	4cm x 2cm	5	2
15	27	F	Both bonefracture Right upper limb	3cm x 2 cm	6	3

Fig. 1: Sterilized Cellophane roll

Fig. 2: Cellophane NPWT Dressing in situ

Conclusion

NPWT using cellophane is simple, cost effective and can be easily used to treat wounds with external fixators.

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Review Article

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Foot Function Index: An Overview of Its Measurement Properties and Application in Orthopedic Examination

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Abstract

The objective of this review article was to update the measurement properties and application of Foot function index (FFI) in orthopedic examination. There were studies found on description of FFI, short-form FFI, revised FFI and revised short-form FFI. Studies on measurement properties were on validity, reliability, and side-side reliability. Population-specific use was on rheumatoid foot deformities and post-surgical outcomes. There were studies on comparison with other measures such as SF-36, the Ankle Osteoarthritis Scale (AOS), and the American Orthopedic Foot and Ankle Society (AOFAS) Ankle Hindfoot Score. Cross-cultural adaptation studies were on Italian, German and Taiwan-Chinese languages. The presented evidence suggested that FFI and its modified measures are valuable tools in evaluation of functional status and disability in orthopedic foot disorders.

Keywords: Functional Status; Disability; Activity limitation; Foot Function; Orthopedic Examination.

The objective of this review article was to update the measurement properties and application of Foot function index (FFI) in orthopedic examination.

The Foot Function Index

Budiman-Mak et al [1] developed the FFI to measure the impact of foot pathology on function in terms of pain, disability and activity restriction. The FFI is a self-administered index consisting of 23 items divided into 3 sub-scales. The FFI was examined for test-retest reliability, internal consistency, and construct and criterion validity in 87 patients with rheumatoid arthritis were used in the study. The study had following findings; "Test-retest reliability of the FFI total and sub-scale scores ranged from 0.87 to 0.69. Internal consistency ranged from 0.96 to 0.73. Strong correlation between the FFI total and sub-scale scores and clinical measures of foot pathology supported the criterion validity of the index."

The foot function index with verbal rating scales (FFI-5pt)

Kuyvenhoven et al [2] assessed the Dutch version of the Foot Function Index (FFI) in comparison with the original FFI using verbal rating scales (FFI-5pt) rather than visual analog scales (VAS) on 206 patients with non-traumatic forefoot complaints. Two scales (Pain and Disability) were identified with high internal consistency and good agreement between both versions. Test-retest reliability was high, responsiveness to change was low to moderate, and concurrent validity was good.

FFI versus FFI-R

Budiman-Mak et al [3] reviewed the uses of FFI and FFI-revised (FFI-R) as reported in medical and

surgical literature through a systematic literature search of PubMed/Medline and Embase databases. FFI and FFI-R were used in 78 studies of foot and ankle disorders in 4700 people worldwide. Re-analysis of FFI-R subscales' confirmed uni-dimensionality, and the FFI-R questionnaires' response categories were edited into four responses for ease of use, so as to enhance its user friendliness for measuring foot health.

FFI-R

Budiman-Mak et al [4] developed and field-tested a revised FFI (FFI-R) based upon a theoretical model of foot functioning. The FFI-R items were developed from the original 23 FFI items, and developed FFI-R which consisted of four subscales and comprised 68 items with a six-point response scale. The FFI-R was assessed on 92 patients and construct validity of FFI-R was supported based on the correlation of 50-ft walk time resulting in a short form with 34 items. Both long and short forms were found to have very good psychometric properties.

Measurement properties

Validity

SooHoo et al [5] evaluated the validity of the Foot Function Index (FFI) by examining its level of correlation to the Medical Outcomes Study Short Form-36 (SF-36) on 69 patients and found that all three FFI domains had moderate to high levels of correlation to many of the SF-36 scales which supported that the FFI was a valid measure of health status.

Reliability

Agel et al [6] assessed the reliability of Foot Function Index (FFI), in a population of patients with foot complaints without systemic disease. The first trial was completed by 96 patients and the second trial was completed by 54 patients. The authors found acceptable reliability with 23.5% of the patients providing retest values within one point of the initial response and an average of 45.3% of the patients providing the same response, for a total of 68.8% of all respondents answering within one point between their initial and second questionnaire. The findings of the study suggested that FFI appeared to be a reasonable tool for low functioning individuals with foot disorders and may not be appropriate for individuals who function at or above the level of independent activities of daily living.

Side-to-side reliability

Saag et al [7] assessed the side-to-side reliability of the seven-question Foot Function Index pain subscale since one foot serves as an internal control in orthopedic studies. The authors studied 30 patients with rheumatoid arthritis and found high internal reliability, good left versus right discriminatory abilities.

Population-specific application

Rheumatoid foot deformities

Bal et al [8] evaluated the type, frequency and impact of foot deformities on FFI in 156 feet of 78 rheumatoid arthritis (RA) patients and 76 feet of 38 healthy controls. The frequency of deformities was 96.2% in RA patients and 97.4% in controls and frequency of each deformity was markedly increased in RA patients, with the exception of calcaneal valgus deformity. There was significant correlation between SFC and HAQ with FFI and subscales. For FFI and subscales, HAQ was the most important predictor factor, followed by gender and hallux rigidus.

Post-surgical outcome- Revised Foot Function Index Short Form

Dux et al [9] used FFI-R SF to evaluate functional outcome after surgical correction for hallux valgus using the Foot Function Index Revised short formin 59 patients who underwent 68 osseous and soft tissue procedures. The following findings were noted;"the Foot Function Index Revised scores had improved by 39% at 6 months and 50% at 12 months. The improvement in all scores indicated an improvement in health-related foot function after hallux valgus surgery, evidencing effective surgical intervention."

Comparison with other measures

Madeley et al [10] compared four commonly used scores, the SF-36, the Ankle Osteoarthritis Scale (AOS), the American Orthopedic Foot and Ankle Society (AOFAS) Ankle Hind-foot Score, and the Foot Function Index (FFI) to determine their responsiveness and validity, and found that all four scores showed acceptable responsiveness, and when using the validated SF-36 as the standard the three region or disease specific scores all showed similar criterion validity. The study recommended use of a purely subjective score such as the Ankle Osteoarthritis Scale or Foot Function Index as the

region–or disease-specific score of choice in this population.

SooHoo et al [11] compared the responsiveness of the Foot Function Index (FFI), American Orthopedic Foot and Ankle Society (AOFAS) Clinical Rating Systems, and Medical Outcomes Study Short Form-36 (SF-36) in 25 patients with foot and ankle surgery of whom 13 patients (52%) had conditions affecting the ankle, hind-foot, or mid-foot, while 12 patients (48%) had conditions affecting the forefoot. This study demonstrated increased responsiveness of foot and ankle specific outcomes tools compared to the SF-36.

Cross-cultural adaptation

Italian version

Martinelli et al [12] translated the Foot Function Index (FFI) into Italian, and performed a cross-cultural adaptation by evaluating the psychometric properties in 89 patients. The Italian version of the FFI consisted in 18 items separated into a pain and disability subscales. It had satisfactory psychometric properties for use in Italian patients with foot and ankle diseases.

German version

Naal et al [13] cross-culturally adapted the Foot Function Index (FFI) in German language for 53 patients with foot complaints. The German FFI (FFI-D) was feasible, with excellent reliability and internal consistency which suggested that the German version of the FFI was a reliable and valid questionnaire for the self-assessment of pain and disability in German-speaking patients with foot complaints.

Taiwan Chinese version

Wu et al [14] evaluated the reliability and validity of the Taiwan Chinese version of the Foot Function Index (FFI) among 50 patients with plantar fasciitis and 29 with ankle/foot fracture."The internal consistency of the 21-item FFI was high and the test-retest reliability was satisfactory, moderate correlation existed between the FFI total and subscale scores to the physical component summary scores rather than to the mental component summary scores of the SF-36."The adapted Taiwan Chinese version of the FFI was found to be reliable and valid and was recommended for use in traumatic and non-traumatic foot disorders.

There were studies found on description of FFI, short-form FFI, revised FFI and revised short-form FFI. Studies on measurement properties were on validity, reliability, and side-side reliability. Population-specific use was on rheumatoid foot deformities and post-surgical outcomes. There were studies on comparison with other measures such as SF-36, the Ankle Osteoarthritis Scale (AOS), and the American Orthopedic Foot and Ankle Society (AOFAS) Ankle Hand-foot Score. Cross-cultural adaptation studies were on Italian, German and Taiwan-Chinese languages. The presented evidence suggested that FFI and its modified measures are valuable tools in evaluation of functional status and disability in orthopedic foot disorders.

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Case Report

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Isolated Tuberculosis of Right Talus in a Teenage Girl

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Abstract

Isolated tuberculosis of talus is a rare form of tuberculous involvement. We report a case of isolated tuberculosis of talus in a young immune-competent female with no evidence of tuberculosis involvement in any other part of the body. An 18 year old female patient presented with a 5 month history of pain and swelling in her right ankle joint. Routine investigations indicated positive etiology of tubercular infection. Bone curettage was performed and a below knee fiber cast applied along with administration of antitubercular treatment (ATT) which resulted in a favorable clinical outcome.

Key words: Tuberculosis; Talus; Immuno-Competent Female; Curettage.

Tuberculosis is one of the major causes of morbidity in a developing country like India. To add to the disease burden the severity is on an upsoar due to various immunocompromised states, increasing multi drug resistant (MDR) and extensive drug resistant (XDR) tuberculosis. The prevalence of osteoarticular tuberculosis is approximately 1–3 % with incidence of isolated osseous lesion being even less. It most often affects the axial skeleton followed by the weight-bearing large joints such as the hip and the knee joint.The incidence of ankle tuberculosis is less than 5 per cent of all osteo-articular tuberculosis. Isolated tuberculosis of talus is very rare with only few cases reported so far in the literature [1]. We report a patient with isolated tuberculosis of the talus bone of right side.

Case report

An 18 year old female patient presented to our outpatient department (OPD) with a 5 month history of pain and swelling in her right ankle joint more towards the anteromedial aspect. She was also complaining of fever, weakness and loss of appetite with loss of weight. Complaint of decrease in girth of right leg was also presented by the patient. There was no significant history of any trauma or pus discharge. On examination dorsiflexion and plantar flexion were painful. On laboratory investigation patient was anemic with Hb level 8.6. ESR by Wintrobes method was 36 in 1st hour. C reactive protein (CRP) was positive by semi quantitative method. PPD test (10TU) after 72 hours was positive. The skiagram of chest was normal. Anteroposterior (AP) and lateral skiagram of the right ankle showed an extensive lytic lesion of the talus bone, without the involvement of surrounding bones or the ankle joint (Fig 1). Magnetic Resonance Imaging (MRI) of right ankle joint showed necrotic and lytic lesion involving the dome, neck and body of talus (Fig 2). Aspirated fluid from swelling was straw coloured, which showed acid fast bacilli on Ziehl Nelson staining. Bone curettage was performed and sample sent for histo-pathological examination which confirmed the diagnosis of tuberculosis.

Postoperatively a below knee fiber cast was applied for 3 months and patient was advised not to bear weight. Four drugs anti-tubercular treatment (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol) for 5 months , followed by 3 drugs (Isoniazid, Rifampicin, Pyrazinamide) for 4 months, and 2 drugs (Isoniazid, Rifampicin) for 9 months was given. Physiotherapy for ankle range of motion with hot saline fomentation was advised after 3 months. Partial weight bearing was allowed 4 months after the operation and full weight bearing was allowed after 9 months. At the end of the complete treatment patient had full and painless motion at the ankle and subtalar joint.

Fig 1: Lateral view showing (arrow head) area of involvement.

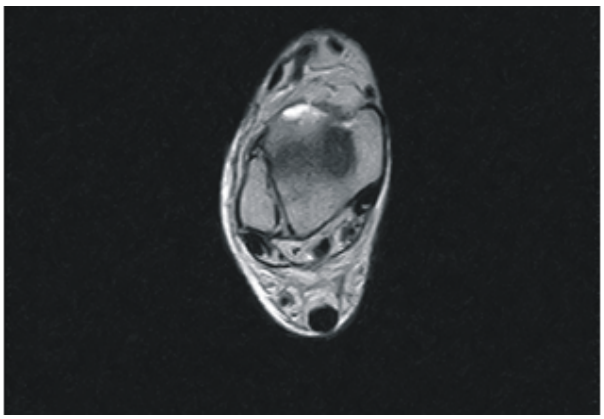

Fig 2: MRI image showing involved area(arrow head)

Discussion

Tuberculosis is an infectious disease caused mainly by Mycobacterium tuberculosis. It still remains a serious disease burden with a rate of mortality [2, 3]. It mainly affects the lungs but other parts of the body can also be involved in the disease process (extra pulmonary involvement). Extra pulmonary involvement of tuberculosis is seen in about 23–30% of patients infected with the disease [2], out of which only 1–3% have osseous involvement. Majority of patients with osseous involvement have affliction of the axial skeleton [3, 4]. Involvement of appendicular skeleton is less frequently seen, mainly involving the weight bearing large joints of the lower extremity such as hip and knee joints. Tuberculosis of ankle and foot are very rare and constitutes only 1% of the disease burden [2, 3, 5, 6,]. In a study of 74 patients with foot or ankle tuberculosis, Dhillon and Naji found only one case of tuberculosis of talus [3]. Symptomatology mainly consists of gradually progressive pain in the ankle causing functional disability [7, 8, 9]. Inflammatory symptoms are non-specific and can mimic septic arthritis [5, 10]. Varying characteristics of the symptoms result in difficult and delay in diagnosis, also noticed by Anderson [5]. X-ray usually shows non-specific changes with signs of bone destruction and osteolysis appearing in later stages. Computed Tomography (CT) scan and Magnetic Resonance Imaging (MRI) are better radiological investigations. CT scan reveals bony lesions like destruction and extension of lesions. MRI is the best radiological investigation revealing bone destruction at an earlier stage [3, 11]. Conformation of diagnosis can only be

done by the identification of Mycobacterium Tuberculosis from the local lesion or by a bone biopsy. There are mainly two aims of surgical treatment. First, for the conformation of diagnosis by histo-pathological examination and secondly curettage of the diseased part improves the outcome of the disease. This treatment should always be complemented with immobilization in plaster cast for a period of minimum three months, followed by physiotherapy [7]. The treatment was completed with 18 months of anti-TB drug regime. As mentioned above talus tuberculosis is an extremely rare disease but it should be considered while dealing with any inflammatory ankle symptoms with unspecific lesions. Symptomatology is often varying and may result in the late diagnosis. We can get the best result with proper anti-tubercular treatment and early surgery, as in our case.

Conclusion

Tuberculosis of talus is a very rare disease and its atypical presentation makes it difficult to diagnose solely on clinical basis. Hematological investigations varies from case to case. This case has been reported to highlight the unusual and rare manifestation of tuberculosis of talus so as to prevent its misdiagnosis and delayed treatment.

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Short Communication

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Shoulder Pain and Disability Index: An Overview of Its Measurement Properties

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Abstract

The Shoulder Pain and Disability Index (SPADI) was developed to measure shoulder pain and disability. The objective of this short communication was to explore the measurement properties of SPADI. There were studies on measurement procedure, reliability and validity, predictors, comparison with other measures such as Shoulder Disability Questionnaire (SDQ), Western Ontario Rotator Cuff (WORC) index and Oxford Shoulder Scale (OSS), and studies on cross-cultural adaptation into German and Italian languages. The SPADI had good clinometric properties warranting its routine use in orthopedic practice, education, research and administration.

Keywords: Psychometric Properties; Clinimetrics; Measurement Properties; Physical Examination; Outcome Assessment; Shoulder Orthopedics.

The objective of this short communication was to explore the measurement properties of SPADI.

Shoulder Pain and Disability Index (SPADI)

The Shoulder Pain and Disability Index (SPADI) were developed to measure shoulder pain and disability. The SPADI contains 13 items that assess two domains; a 5-item subscale that measures pain and an 8-item subscale that measures disability. There are two versions of the SPADI; the original version with visual analogue scale (VAS) and a second version with a numerical rating scale (NRS).

Measurement procedure- reliability and validity

Breckenridge and McAuley [1] provided a detailed description on the methodology of measurement and scoring SPADI as follows; "In the original version the patient was instructed to place a mark on the VAS for each item that best represented their experience of their shoulder problem over the last week. Each subscale is summed and transformed to a score out of 100. A mean is taken of the two subscales to give a total score out of 100, higher score indicating greater impairment or disability. In the NRS version the VAS is replaced by a 0-10 scale and the patient is asked to circle the number that best describes the pain or disability. The total score is derived in exactly the same manner as the VAS version. In each subscale patients may mark one item only as not applicable and the item is omitted from the total score. If a patient marks more than two items as non-applicable, no score is calculated." The authors comprehensively summarized the reliability and validity of SPADI as follows: The SPADI had good reproducibility, high internal consistency, good construct validity, highly responsive to change over time, good discriminated validity, and without large

floor or ceiling effects. The minimal clinically important difference was reported to be 8 points and the minimal detectible change was 18 points.

Predictors of SPADI

Engebretsen et al [2] identified the predictors for pain and disability (measured using SPADI) and work status in 104 patients with sub-acromial shoulder pain.

Low level of education (less than equal to 12 years), previous shoulder pain, and a high baseline SPADI score predicted poor results in outcomes.

Comparison with other measures

Dogu et al [3] compared the responsiveness of the two region specific questionnaires Shoulder Disability Questionnaire (SDQ) and Shoulder Pain Disability Index (SPADI) and the disease specific Western Ontario Rotator Cuff (WORC) index in 64 patients with sub-acromial impingement syndrome (SIS) who received physical therapy or sub-acromial corticosteroid injection. The three measures performed well and SDQ, SPADI, WORC index were highly responsive for SIS. The SDQ, the SPADI and the WORC index were suitable for measuring changes in patients with SIS. Of these three indices, the SPADI was found to be more suitable for a rapid assessment

Ekeberg et al [4] compared the responsiveness and minimal clinically important change (MCIC) for the disease-specific Western Ontario Rotator Cuff index (WORC) and the two region-specific questionnaires Shoulder Pain and Disability Index (SPADI) and Oxford Shoulder Scale (OSS) in 121 patients with rotator cuff disease receiving corticosteroid injection therapy. Shoulder Pain and Disability Index was found to be more responsive than OSS at 2 and 6 weeks. Western Ontario Rotator Cuff index was more responsive than OSS in at 6 weeks. Shoulder Pain and Disability Index was more responsive than WORC at 2 weeks. Minimal clinically important change was estimated to 5, 275, and 20 points for OSS, WORC, and SPADI, respectively.

German version

Simmen [5] adapted the Shoulder Pain and Disability Index (SPADI) from English into German, and tested the reliability and validity of the German version by studying one hundred and eighteen patients who had undergone shoulder arthroplasty. "The cross-cultural adaptation procedure revealed no major problems with the content or language. The intra-class correlation coefficients for the individual items of the SPADI were between 0.68 and 0.89, and that for the SPADI total score was 0.94. The SPADI total score showed a correlation of 0.61-0.69 with the SF-36 physical scales, of 0.88 with the DASH and of 0.92 with the ASES."

Italian version

Marchese et al [6] translated, culturally adapted and validated an Italian version of UCLA Shoulder Scale, SPADI and SST in 66 patients treated with neck dissection for head and neck cancer and 40 patients completed the same questionnaires a second time one week after the first to test the reproducibility of the Italian versions. For all three scales, Cronbach's α was > 0.89. The Pearson correlation coefficient was $r > 0.91$. With respect to validity, there was a significant correlation between the Italian and the English versions of all three scales. This study shows that the Italian versions of UCLA Shoulder Scale, SPADI and SST are valid instruments for the evaluation of shoulder dysfunction after neck dissection in Italian patients.

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Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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