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GOA E-JOURNAL

Foot And Ankle Edition -(October 2024)

Year 2024 - 2025

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FROM THE PRESIDENT'S DESK



Dr Vijay R. Sata

"That's one small step for man, one giant leap for mankind." That in true sense is being brought out by enthusiastic, visionary and very dedicated Dr. Rajiv Shah, the guest editor for this special issue, along with team of equally enthusiastic “foot soldiers”!!

Yes, the foot and ankle remained quite an enigma and may be somewhat neglected for quite a long time, not anymore! Anyone going through this treatise will be having clear understanding about this lesser talked issues and patients coming to them will be definitely benefited with a possibility that they may stand on their own feet once again!

We have witnessed specially prepared teasers, perhaps for the first time, before publication of an e-journal from GOA; all thanks to Dr. Rajiv Shah who not only thought but implemented this innovative idea! He is showing the path how a journal may be launched!

The duo, Dr. Pareen and Dr. Ketan, as chief editors are always happy to work silently on the background. All the contributors for this special edition are very well known for their penchant for details and advancement of knowledge. GOA is very thankful to each contributor for their energy and time! All the varied aspect related to foot and ankle issues have been covered in just one edition thanks to your hard work and Dr. Rajiv Shah's master skills along with chief editors working on post-production!

Kudos to the whole team and ofcourse the master team leader Dr. Rajiv Shah for this wonderful treasure of knowledge that , I am more than sure, will serve as easy reference for vast majority of Orthopaedic Surgeons! Also be ready for many more such issues coming your way and be in touch with your zonal representative, if you want to contribute to such e-journal.

Dr. Vijay R. Sata
President
Gujarat Orthopaedic Association

FROM THE DESK OF SECRETARY



"The human foot is a masterpiece of engineering and a work of art."

Dr Ketan Thakar

This quote comes from the pioneer engineer and an avant-garde artist- the trailblazer- Leonardo da Vinci. Remember, he was the scientist-anatomist who gave us the concept of the ideal body proportions of an archetypal human being- the Vitruvian Man.

Foot is our sole soul connection to mother earth. It keeps us grounded. Foot is a fetish, it's a fete! A celebration of being human. Along with the unique ability of innate intelligence, the capability to stand on two feet is a distinctive attribute conferred to us by God. In the recent past, Ankle and Foot Orthopedics super specialty has grown and developed like the proverbial king's daughter. Arthroplasty, Spine and Arthroscopy have seen eye-catching progress but the better understanding of the biomechanics and functional assets of foot and ankle have surely opened a Pandora's Box of pleasant surprises.

The perception, the comprehension, the analysis of foot and ankle problems and innovative solutions with implants have widened the horizons of treatment of previously overlooked and acceptable issues. CT scans and their 3-D interpretations have metamorphosed the treatment options. Reconstructions - both primary and secondary (in case of deformed, mal-united feet and ankle injuries) have considerably improved. Even complex dilemmas are resolved by stupendous salvages and rejuvenating reincarnations. Ankle Arthroplasty, the rather invincible frontier has also witnessed the revolution- "Veni Vidi Vici" We came, we saw, we conquered.

It is a matter of pride and privilege that Gujarat has been the seed, the root and the blossom for the tree of Ankle and Foot in India. It is a breeding ground for some excellent specialists in this field led by the leading light Dr. Rajiv Shah, who has been an authority in this specialty, not just in India, but worldwide. His teaching aptitude and acumen has cultivated a culture of core academics; his enterprise has been aptly rewarded with the prize of dissemination of knowledge and skills amongst more and more enthusiasts.

Dr. Rajiv Shah has bestowed us with his coordination and leadership as guest editor of this special issue of GOA E-journal.

This E-journal of Gujarat Orthopaedic Association (GOA) is a milestone to commemorate the achievements and successes of Gujarat Foot and Ankle surgeons; it is a landmark to announce, " Hum apne pairo pe khade ho gaye, aur mila li hai taal...!" It is a pleasure to collaborate with the experience and expertise of stalwarts and young guns of Gujarat. As always, the navigating nuances of Dr. Ketan Shah and Dr. Pareen Kantesaria- our chief editors have been amazing and awesome.

Heaven is not just above our heads, it is also under our feet. To be on our feet again, is paradise regained. Happy reading and assimilation for all of you!

Dr Ketan Thakar
Secretary, Gujarat Orthopaedic Association
GOA 2024-25

GUEST EDITOR MESSAGE



Dr Rajiv Shah

It's a great pleasure and honour to present a bouquet of foot and ankle articles and cases to Orthopaedicians of Gujarat. Foot and ankle orthopaedics, a niche area within the broader orthopaedic discipline, is rapidly gaining traction in India and worldwide. Daunting problems of foot and ankle orthopaedics, such as complex trauma, arthritis, deformities, and issues of tendons and ligaments, have gained a better understanding of management. The increasing prevalence of lifestyle-related conditions, such as diabetes, which can lead to severe foot complications, is driving the demand for specialised care to prevent amputations. Additionally, rising awareness about sports injuries and the growing elderly population are contributing to the expansion of this field.

India has witnessed significant advancements in its medical infrastructure in recent years. More hospitals and clinics now offer specialised foot and ankle care. Adopting advanced surgical techniques and technologies, such as minimally invasive procedures and ankle joint replacement, further enhances treatment outcomes. Gujarat is leading the nation from the front. The country's foot and ankle orthopaedics flame was ignited only in Gujarat. Today, Gujarat has the highest number of qualified foot and ankle surgeons in practice!

I firmly believe that foot and ankle problems in India are singularly unique due to their late presentations, complexities, and ignorance. Methods adopted by the Western world may not be suited to solve these issues. It's with our innovative methods that we need to figure out solutions to our problems. We should gear up not only to solve our issues with varied innovations but also to make the world aware of our way of resolving these issues. Research and publications are the way forward! Maybe this issue is the first action towards that! I congratulate Team GOA for thinking positively about this.

I thank contributors, a team of young aspiring foot and ankle Orthopaedicians who spent their time enlightening others.

Finally, thanks, Team GOA, for bestowing me the pleasant responsibility of editorship. Pleasure was singularly mine!

Dr Rajiv Shah
Orthopaedic foot & ankle surgeon

UNCOMMON INJURIES IN FOOT AND ANKLE:



Dr Kashyap Ardeshhana

Dr Kashyap is a senior orthopaedic surgeon at Junagadh. His areas of interest include complex trauma and reconstruction.



Dr Malhar Dave

Dr Malhar Dave is a private practising Foot and ankle surgeon at Vadodara since 25 years. He has been awarded the prestigious AOFAS foot and ankle fellowship in 2007 and has been an international and national faculty and various scientific meetings.

Below are examples of uncommon foot and ankle injuries that were managed successfully.

Case1:

A 28-year-old male with a vehicular accident had isolated injury to his foot with injury to his navicular and a comminuted injury to the cuboid bone.

The patient was operated on with ORIF of navicular fracture, and a lateral-based frame for cuboid injury was applied, which was maintained for six weeks.

The take-home message would be to always look for the other column injury and associated injuries when dealing with fractures around the chopart joint (Figures 1a, 1b, and 1c).

Figures 1a, 1b, and 1c: Injury X-ray (1a), post-operative X-rays (1b and 1c) of a case with fracture cuboid.







Case2:

A 57-year-old male patient, a mechanic by profession, came to the emergency department with a history of falling while coming down the staircase. He had twisted his ankle and foot in inversion, with his foot plantar flexed. The patient complained of severe ankle-foot pain and swelling and not being able to bear weight on the affected ankle-foot. On examination, there was severe tenderness and swelling over the anterolateral ankle and restricted ankle-foot movement due to pain. There was no neurovascular deficit.

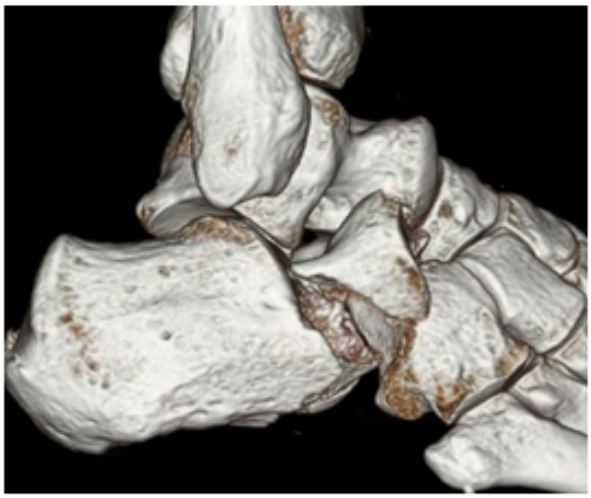
Radiographs suggested some fracture in the anterior part of the calcaneum, but the fracture configuration was not well-defined (Figures 2a,2b, and 2c).

Figures 2a, 2b, and 2c: Figures demonstrate radiographs of the patient with an injury to the anterior process of the calcaneus.



For further details, a multi-planner CT scan was advised (Figure 3).

Figure 3: CT scan of the same patient demonstrating displaced and comminuted fracture of the anterior process of the calcaneus.



The CT scan suggested a fracture of the anterior process of the calcaneum (APC) with superior dislocation of the fractured fragment.Surgery was planned after soft tissue swelling subsided and

wrinkles appeared. A sinus tarsi approach was used with obliquity towards the calcaneocuboid joint. An open reduction was done, the fragment was reduced with pointed clamps, and temporary fixation was held with K-wires. The final fixation was done using an explicitly made locking calcaneal plate for the anterior part (Figures 4a, 4b, and 4c).Stitch removal was done on the 12th day when ankle, subtalar, and midfoot movements started intermittently.Partial weight bearing started at ten weeks, and full weight bearing at about 14 weeks. The patient returned to the pre-injury level at six months with minimal discomfort (Figure 5).

Figures 4a, 4b, and 4c: Intraoperative images of the same patient demonstrating sequential reduction and fixation of the fracture.



Figure 5: Postoperative images of the same patient.



Case 3:

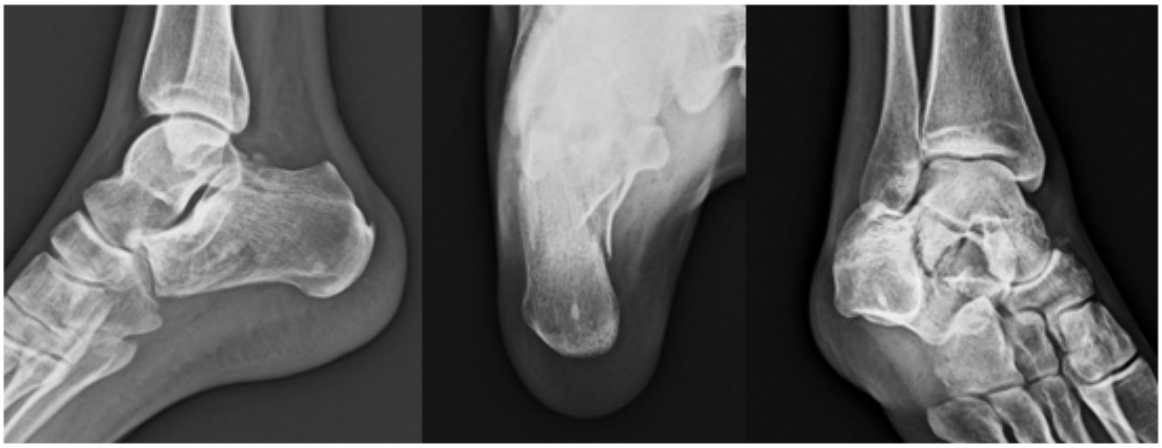
A 30-year-old female presented to the hospital with right heel pain, swelling, and ecchymosis due to a fall from a table of about 5 feet in height. The patient took primary treatment elsewhere and was diagnosed with a heel fracture. The patient presented to our hospital on the 4th day of trauma.On examination, there was mild swelling around the heel with wrinkles appearing, and a few areas of ecchymosis were seen on either side of the heel. The skin was intact, and distal neurovascular status was normal (Figure 6).

Figure 6: Clinical picture at presentation.



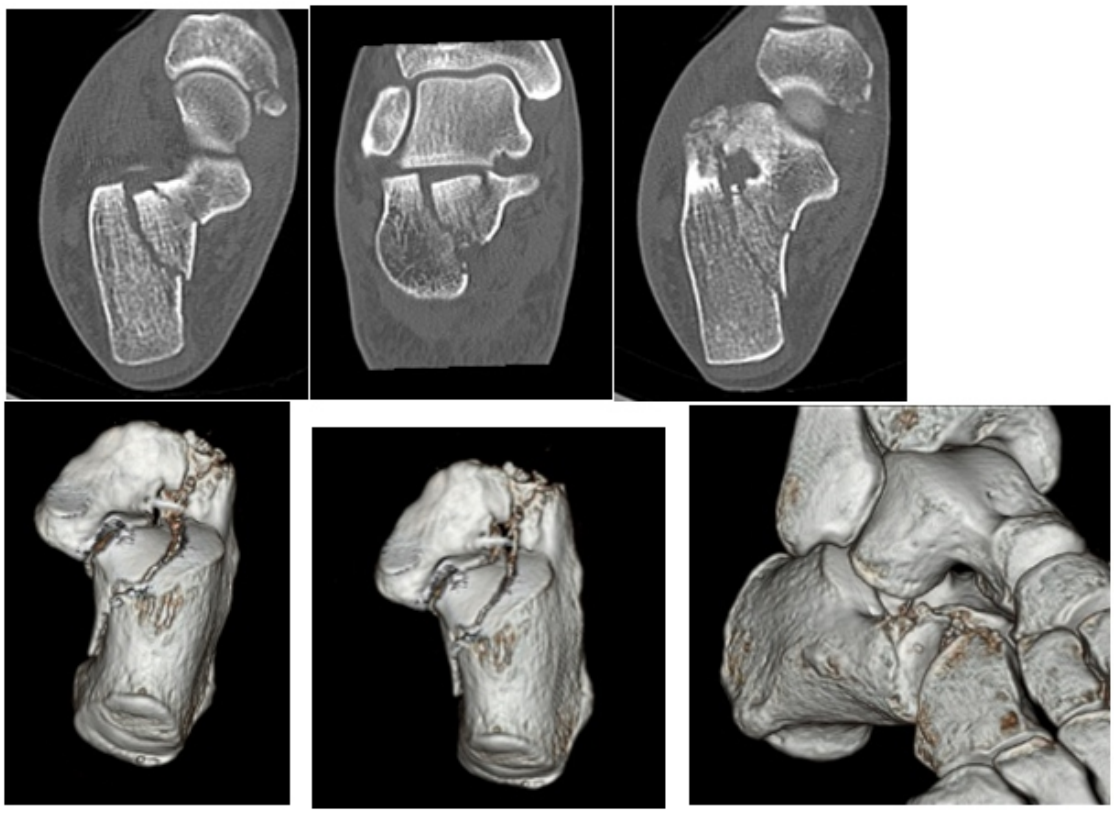
Heel lateral, axial, and Broden's views demonstrated a calcaneum fracture; x-rays showed intra-articular fracture calcaneus, but the lateral wall was intact on axial x-rays (Figure 7).

Figure 7: Injury x-rays of the same patient showing calcaneus fracture.



CT scan with multiplanar and 3D reconstruction was done to understand the fracture pattern (Figure 8).

Figure 8: The collage of CT scan images of the patient demonstrating a comminuted sustentacular fracture.



On CT scan, Sanders Type 3AC fracture was confirmed by a comminuted fracture with two fracture lines extending into the subtalar joint, but notably without the lateral wall calcaneal fracture involvement.

Surgical intervention was planned,considering the fracture's intra-articular nature and the involvement of the subtalar joint. Open reduction and internal fixation (ORIF) were done using sinus tarsi. The intra-focal articular reduction was achieved using k-wires and maintained using k-wires, and final fixation was achieved using a locking calcaneal plate (Figure 9) (Figure 10).

Figure 9: Intraoperative clinical pictures of reduction and fixation of the fracture.

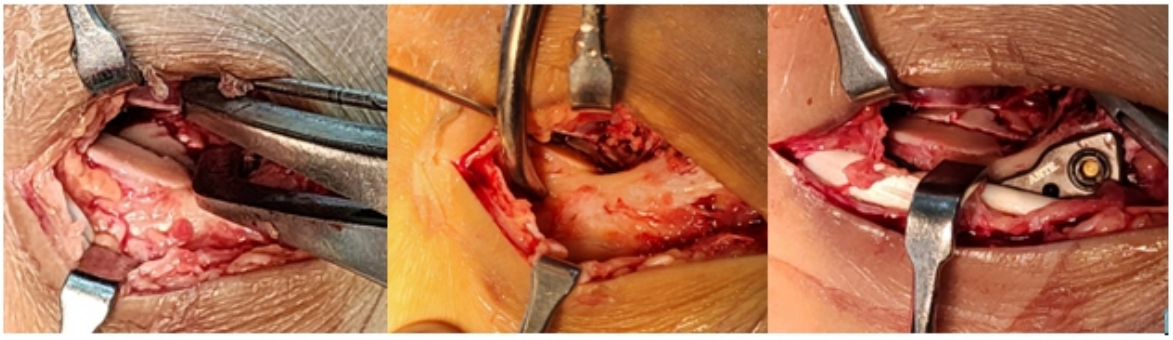


Figure 10: Postoperative images showing fixation of fracture.



Postoperative management included a removable back slab, intermittent ankle, subtalar, and midfoot exercises, and stitch removal on the 12th postoperative day. The patient was in non-weight-bearing status for ten weeks, followed by gradual weight bearing. Full weight bearing was achieved by 14 weeks, and at the end of the fourth month, the patient was back to routine life.

Case 4:

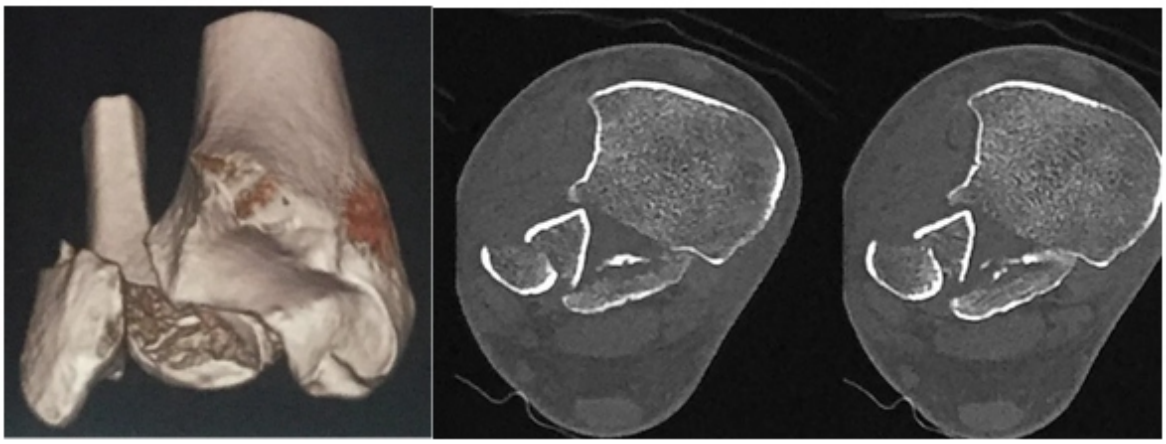
A 58-year-old male farmer presented to the orthopaedic trauma department after falling from a motorcycle. Presenting complaints were severe pain in the right ankle with deformity and swelling and inability to bear weight on the ankle and foot. On clinical evaluation, severe tenderness and swelling in the right ankle withrestricted ankle movement, apparent postero-lateral subluxation, and external rotation of the ankle. Distal neurovascular status was normal.After initial management, Anterior, lateral, and oblique X-rays of the ankle were done, suggesting a trimalleolar fracture ankle with posterolateral subluxation of the ankle and widely posteriorly displaced proximal fibula. The X-ray of the knee to the leg was normal (Figure 11).

Figure 11: preoperative radiographs demonstrating fracture dislocation of ankle.



As per our institutional protocol, after proper analgesia, we tried to reduce the ankle in the emergency department before sending it for a CT scan and further management. However, a close reduction was unsuccessful, so we sent a CT scan without reducing it (Figure 12).

Figure 12: CT scan of the same patient showing a Bosworth fracture-dislocation.

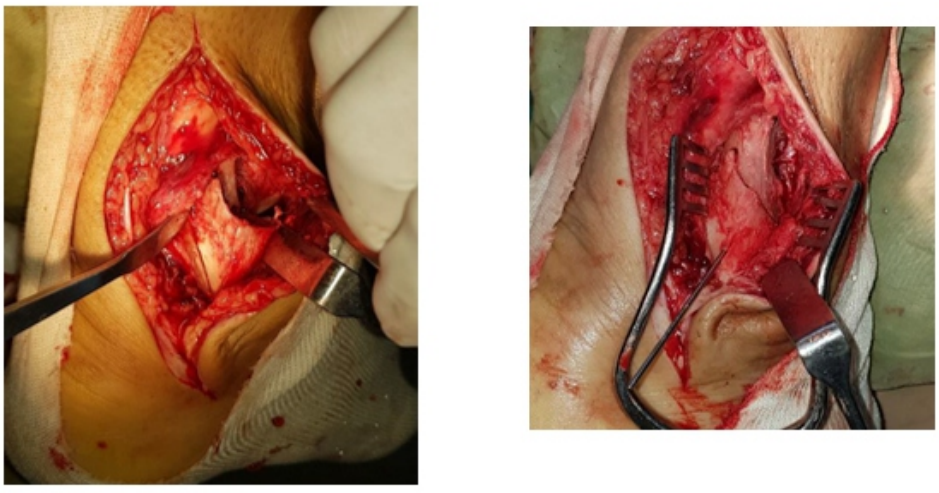


CT scan images were suggestive of classical features of Bosworth's ankle fracture dislocation, which is a special type of locked ankle fracture-dislocation characterised by displacement of a proximal fragment of the fractured fibula from the fibular notch behind the posterior surface of the distal tibia. Fibula fracture was typically Weber-B type. The posterior malleolus was also fractured.

After initial management and medical fitness,the patient underwent surgery in the next available slot. The patient was operated on under spinal anaesthesia in a lateral position.

A posterolateral incision was made. The fibula was first exposed, and the proximal fibula was lifted from its locked position using a bone-holding clamp. Fracture comminution was cleared intra-focally. The fibula fracture was reduced with the help of a pointed clamp, and temporary fixation was achieved with a K-wire (Figure 13).

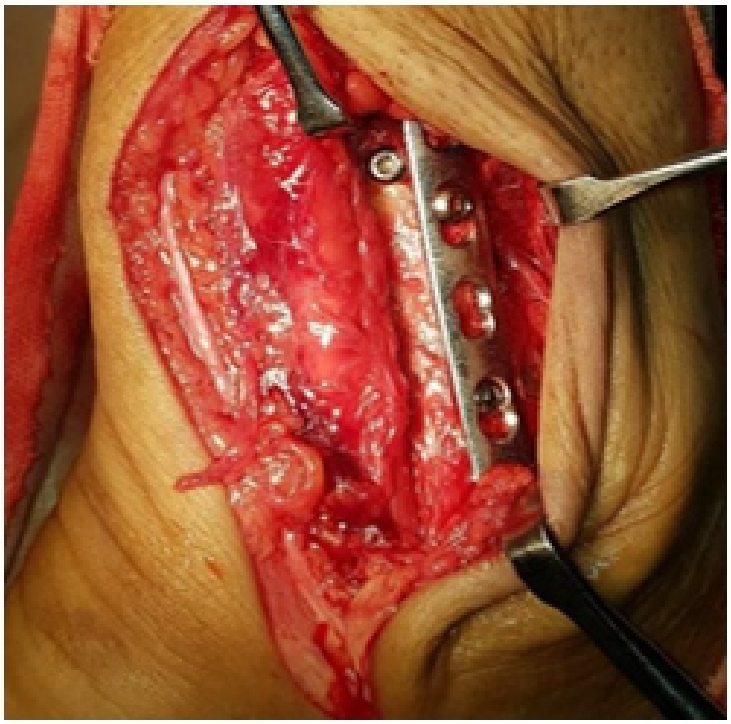
Figure 13: Intraoperative pictures showing fracture reduction maneuvers.



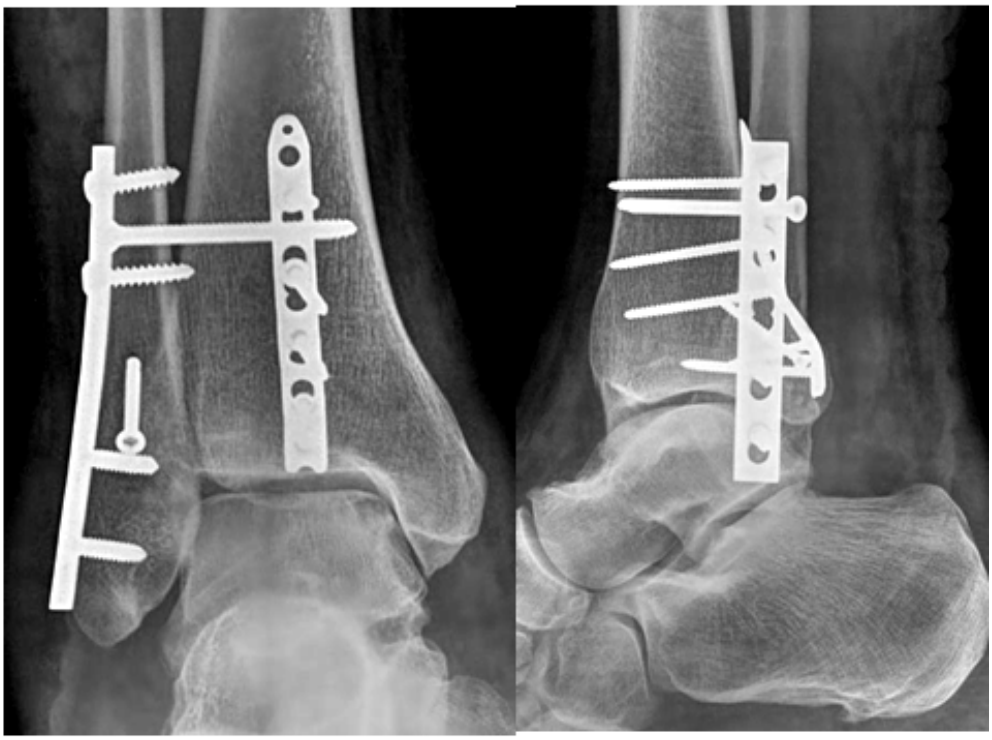
The next step was the reduction and fixation of the Posterior malleolus fragment and recreating the fibular notch, then the fixation of the lateral malleolus, and then the stabilisation of the fibula with a lag screw and a plate. Borderline syndesmotic laxity was protected with a syndesmotic position screw. Medial stability was checked under the C-arm, and no medial exploration was performed (Figure 14).

Figure 14: Intraoperative images showing implant placement.

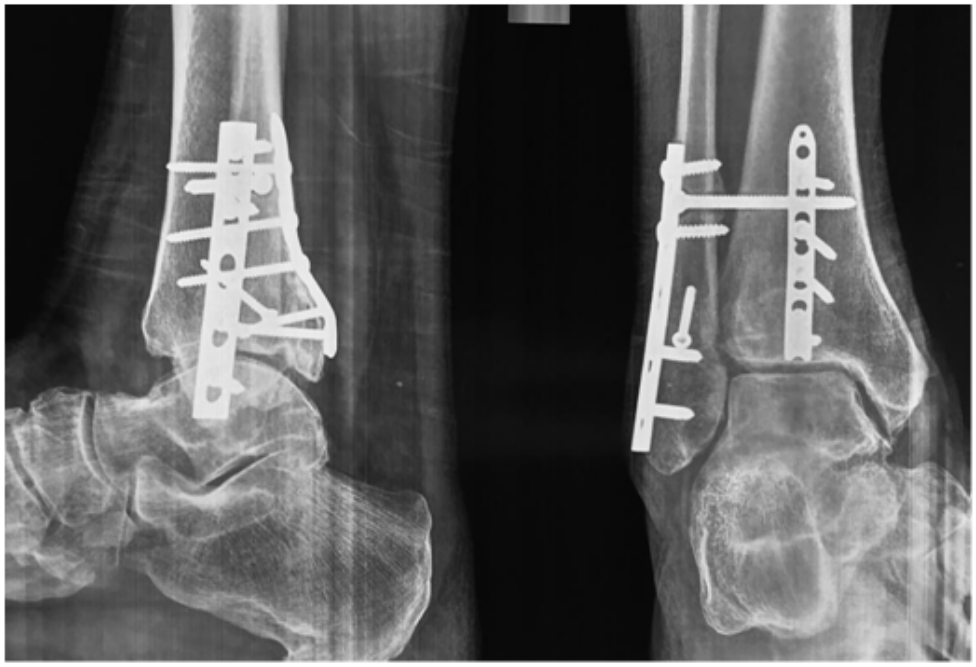




Postoperative radiographs suggested satisfactory reduction and fixation of all components (Figure 15).



Postoperatively, a posterior BK splint was applied, IV antibiotics were given for 24 hours, the limb was kept elevated, and toe and knee movements were initiated. The patient was discharged the next day. Stitch removal was done on the 12th post-operative day when intermittent ankle ROM was initiated. The patient was kept non-weight-bearing for six weeks. Gradual weight bearing commenced with a walker and ankle support. Full weight bearing was achieved at 12 weeks. At six months, the patient was comfortable with a nearly full ROM and returned to his pre-injury work. Clinically and radiologically,the fracture was united.



DIRECT LATERAL APPROACH TO THE DISTAL TIBIA AND FIBULA

(A single incision technique for distal tibial and pilon fractures)



Dr Jignesh Pandya

Dr Jignesh Pandya is a senior orthopaedic surgeon practising in Surat. His keen interest is in complex trauma and periarticular fractures.

Introduction:

Distal tibia and fibula fractures pose problems of delayed bony healing over and above soft tissue healing because of a poor envelope. Fractures could be intra- or extra-articular, but the issues encountered remain the same. Therefore, the surgeon is confused about selecting a proper approach to operate these daunting fractures that prevent wound healing problems. Ida is to have fewer approaches to avoid further soft tissue compromise. The requirement of a comprehensive new approach was fulfilled by Tanawat et al. when they described a novel approach, the Direct Lateral Approach, published in the IOWA journal in 2009. The author has used this approach extensively in his practice with satisfying results. The following are the details of this approach, along with a few case examples.

Approach:

· The patient is supine with a bump under the ipsilateral hip. A thigh tourniquet is in position.

· The incision starts from the fourth metatarsal base to the lateral malleolus's tip and ends at the posterolateral border of the fibula (Figures 1a and 1b).

Figures 1a and 1b: Incision markings(a) and exposure (b).



· Skin and subcutaneous tissue with fascia are incised up to the fibula, leaving the peroneus brevis and peroneus longus muscles posterolaterally.

· Anterolateral dissection proceeds from the lateral border of the fibula with the release of origin of peroneus tertius and extensor hallucis longus muscles, superior & inferior extensor retinaculum.

· A perforating branch of the peroneal artery is identified between the superior and inferior retinaculum over the interosseous membrane. It is protected, provided it is not damaged by fracture or

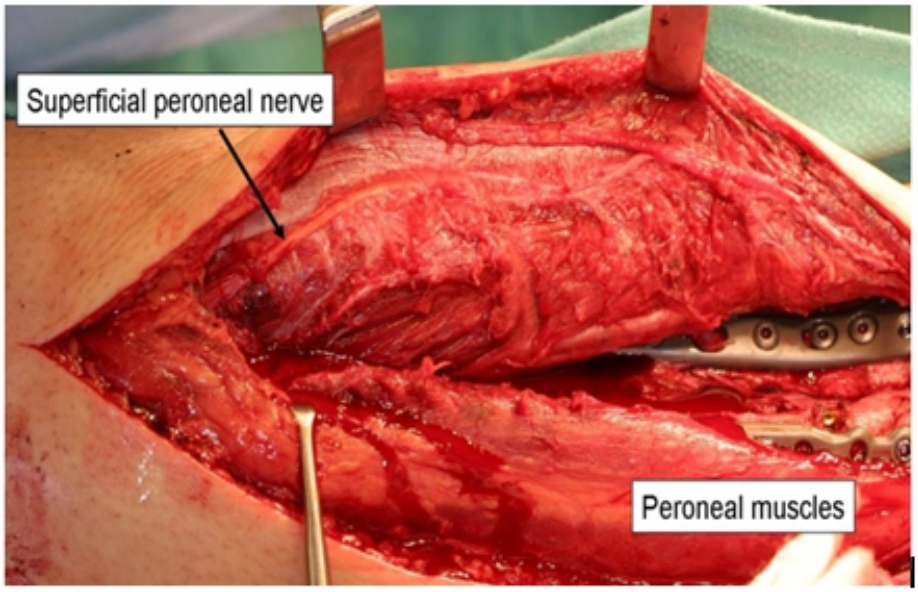
injury.

· The anterior compartment is retracted medially to simultaneously expose the fibula and tibia fracture.

· The superficial peroneal nerve is in the proximal part of the wound, and anterior tibial access can be seen in the distal part of the wound.

· Fixation of fracture fibula follows the fixation of a tibia fracture (Figure 2).

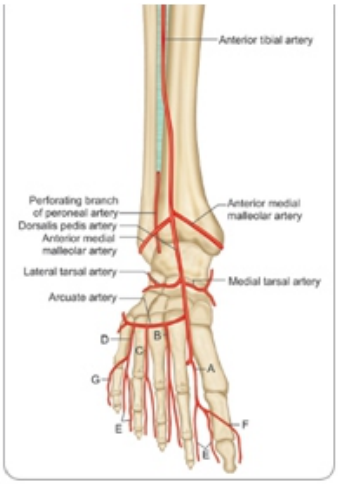
Figure 2: Implants in position with muscle coverage.



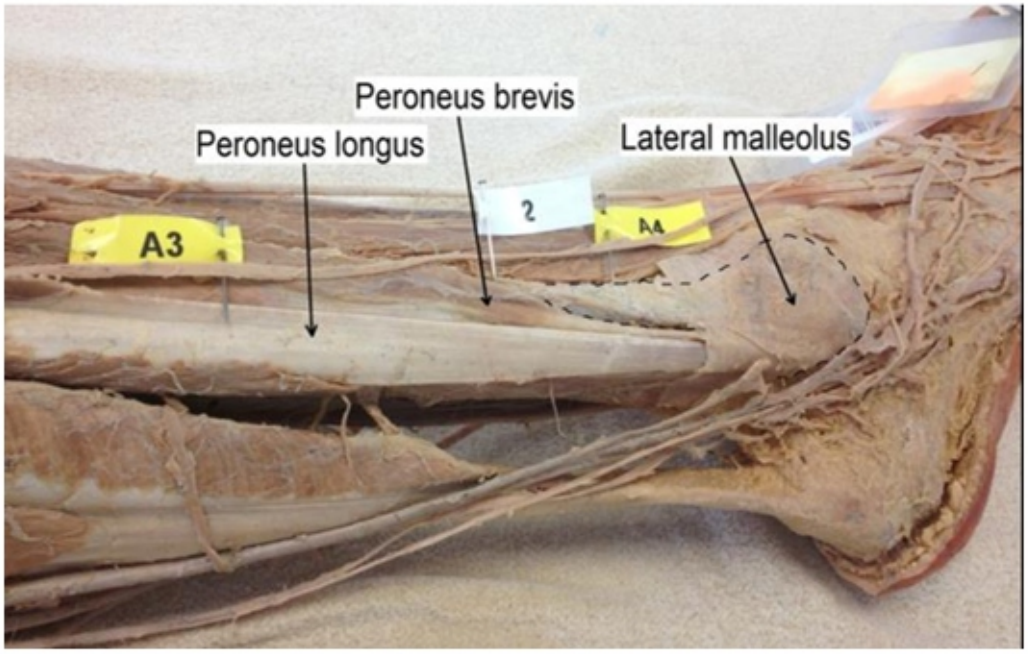
· Reduction on the medical aspect of the tibia can be done through this approach, and augmented fixation can be done Percutaneously from the medial side with plate and screws.

Applied anatomy of the direct lateral approach :

1. Perforating branch of peroneal artery coming out of interosseus membrane and its anastomosis with the anterior lateral malleolar artery (Figure 4).



1. The superficial peroneal nerve emerges over the interosseous membrane to run between the peroneus longus and brevis muscles and under the extensor hallucis muscle (Figure 5).



Indications:

This approach can treat all lower-end fractures of the tibia-fibula, either extra-articular or intra-articular. The same incision can also address cases with fractures of the talus neck or body, which can be supplemented with an anterolateral capsulotomy.

Contraindications:

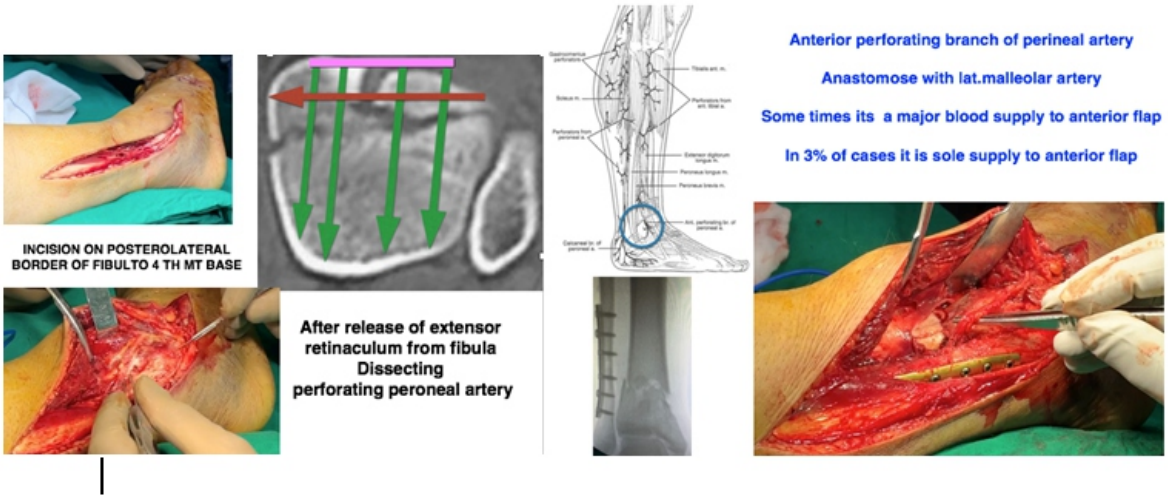
As such, this approach has no clear-cut contraindications, but the author has not used it in cases where a posterior fragment is present, requiring reduction and exposure.

Advantages:

It is a single approach with fewer soft tissue complicationsand wound healing concerns. Oedema is always a concern for surgery. Oedema needs to delay surgery, but with this approach, surgery can be done early, and a two-stage surgery plan can be avoided. Both tibia-fibula fractures can be fixed with the same approach. Full-thickness skin coverage for surface implants on the lower end of the tibia and fibula avoids implant prominence and exposure.

Case examples:

Case 1: 42 years old patient with pilon fracture. Fibula plus anterolateral tibia plating was planned. Figures 6a and 6b demonstrate exposure and relevant anatomy.



Figures7 aand bhave collages of intra and post-operative pictures of the same case.

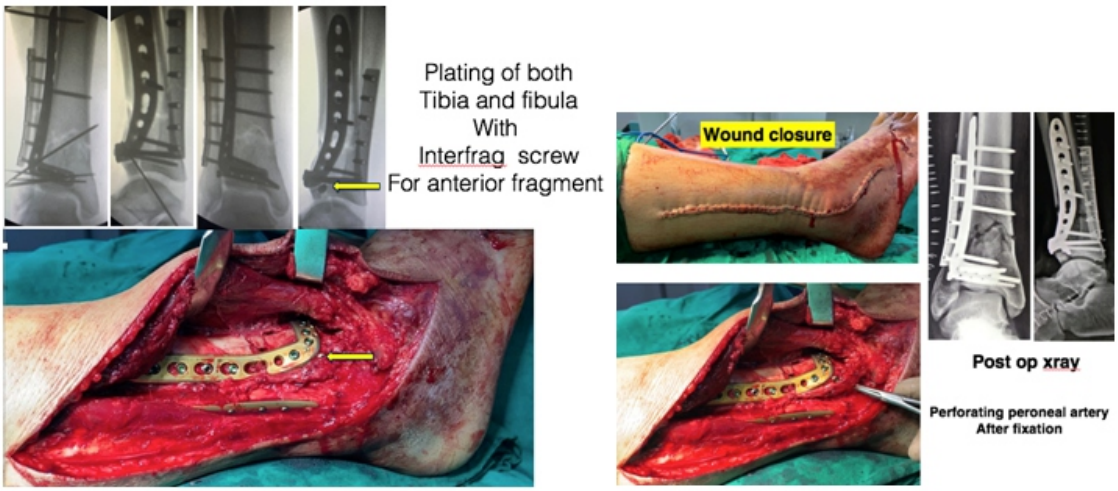


Figure 8 shows clinical and radiological follow up of the same case at six months.



Case 2: This is another case of a complex pilon fracture in which a staged protocol was followed: primary external fixation followed posterior plate fixation, and direct lateral approach assisted fixation of the tibia and fibula.

Figure 9 shows X-rays, CT scans, and a plan for fixation.

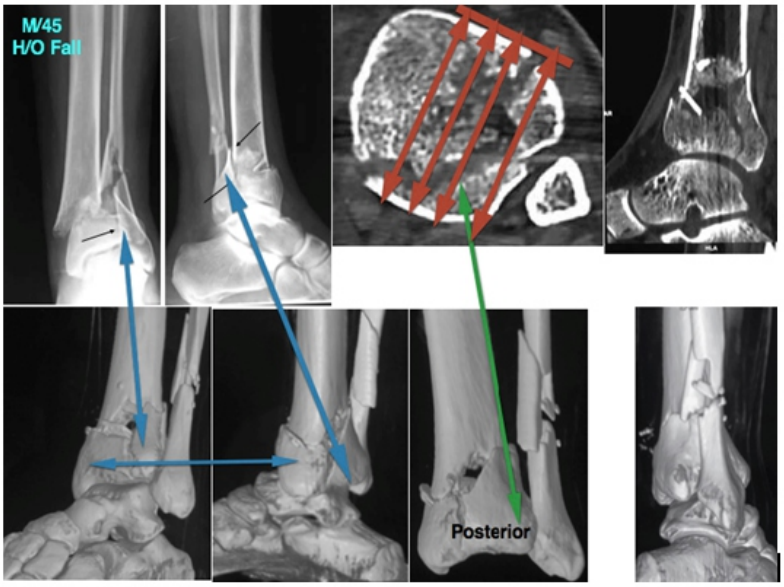
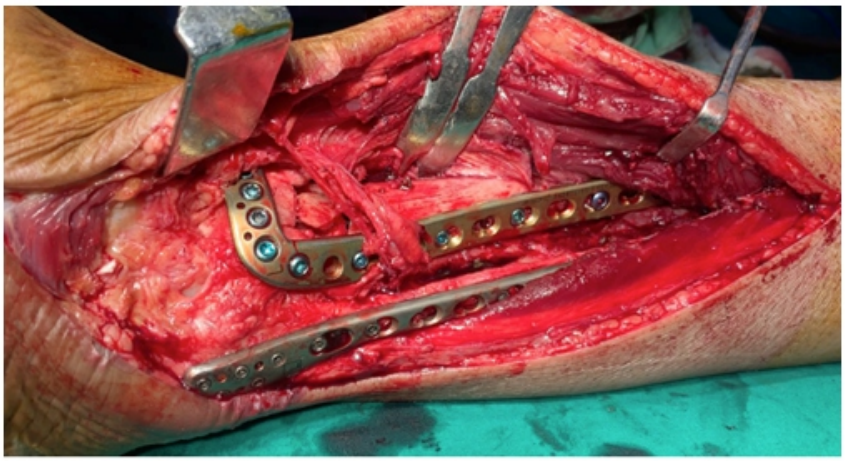
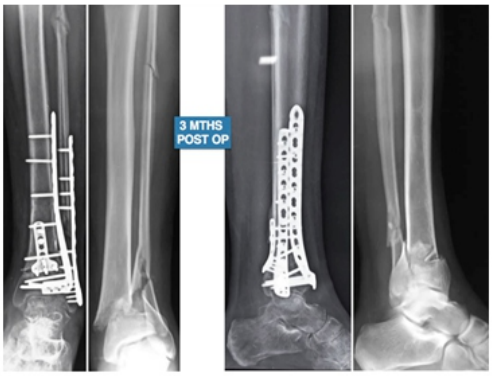


Figure 10 demonstrates exposure after the placement of implants.



PERFORATING BRANCH OF PERONEAL ARTERY

igure 11 demonstrates radiology at three months.

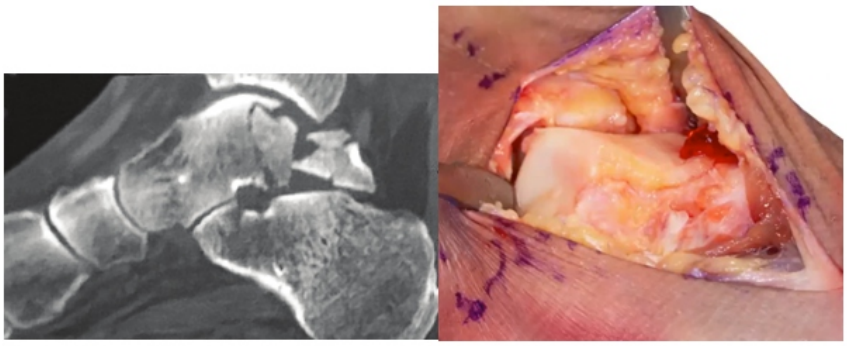


TRANSLIGAMENTOUS APPROACH FOR TALAR BODY FRACTURE FIXATION



Dr Kishor Dudhat

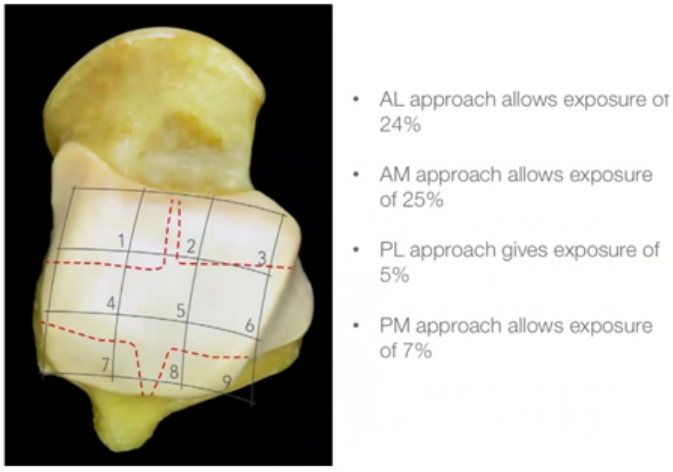
Dr Kishor Dudhat is a practising orthopaedic surgeon at Surat. He is interested in foot,ankle, and hand surgery. He had a foot and ankle fellowship at NHS Golden Jubilee, UK.



Fractures of the talar body are uncommon injuries often associated with fractures of other long bones and in polytraumatised patients. They occur because of high-velocity trauma and are therefore associated with considerable soft tissue damage. Axial compression with supination or pronation is the standard mechanism of injury. Anatomic reduction of talar body fractures is critical in restoring congruency to the talocrural joint. Surgery is indicated in most cases, and different approaches have been described. The dual approach is the most utilised approach with or without malleolar osteotomies.

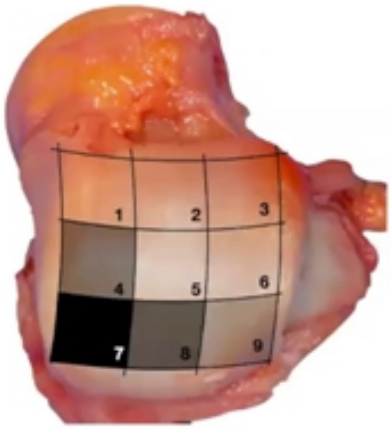
The goal of surgical treatment of talar body fractures is a precise anatomical reduction to restore congruity of the tibiotalar and talocalcaneal joints. However, manoeuvring instruments orthogonally at the talar dome is not easy with these approaches, and gaining access to the central-medial and central-lateral talar body is technically challenging (Figure 1).

Figure 1: Figure diagrammatically describes the exposure of the talar body by every approach.



We describe a soft tissue approach, the lateral transligamentous (LTL) approach, that incorporates ligament reconstruction and avoids fibular osteotomy, dual incisions and the potential for the necrosis of the interposing skin flap (Figure 2). It's a modified anterolateral approach that elevates the anterior talofibular ligament (ATFL) and the calcaneofibular ligament (CFL) from their origin on the fibula. The potential implication of this approach is that it lies beyond the vascular entry points and may lessen a secondary iatrogenic insult to the talus.

Figure 2: Figure demonstrates the talar body areas to which the LTL approach can yield exposure.



Grid of accessibility. Black represents area inaccessible

Grid number	%	Grid number	%	Grid number	%
1	100%	2	100%	3	100%
4	60%	5	100%	6	100%
7	0%	8	45%	9	80%

Method:

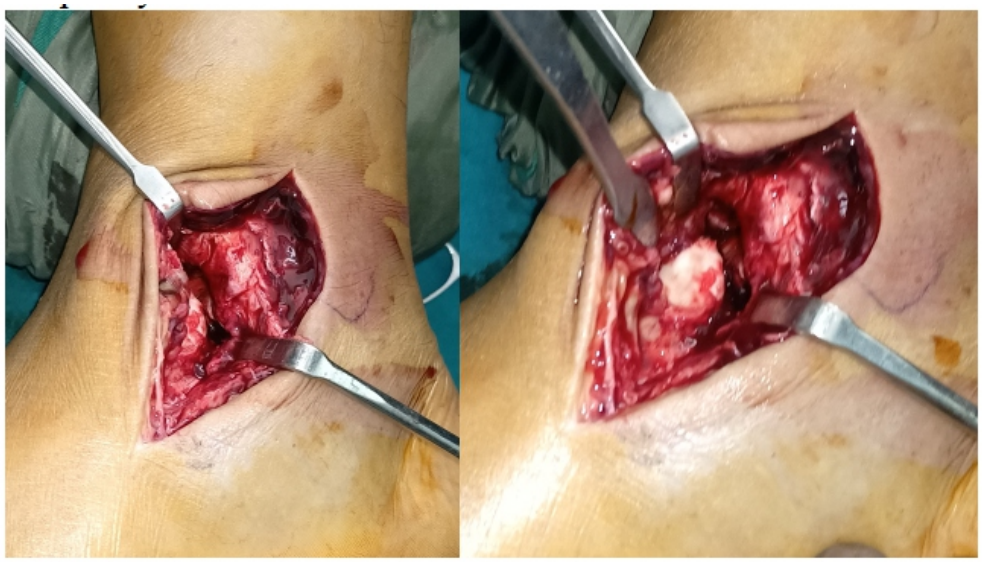
The patientispositioned supine with a thigh tourniquet. The incision is marked (Figures 3a and 3b).

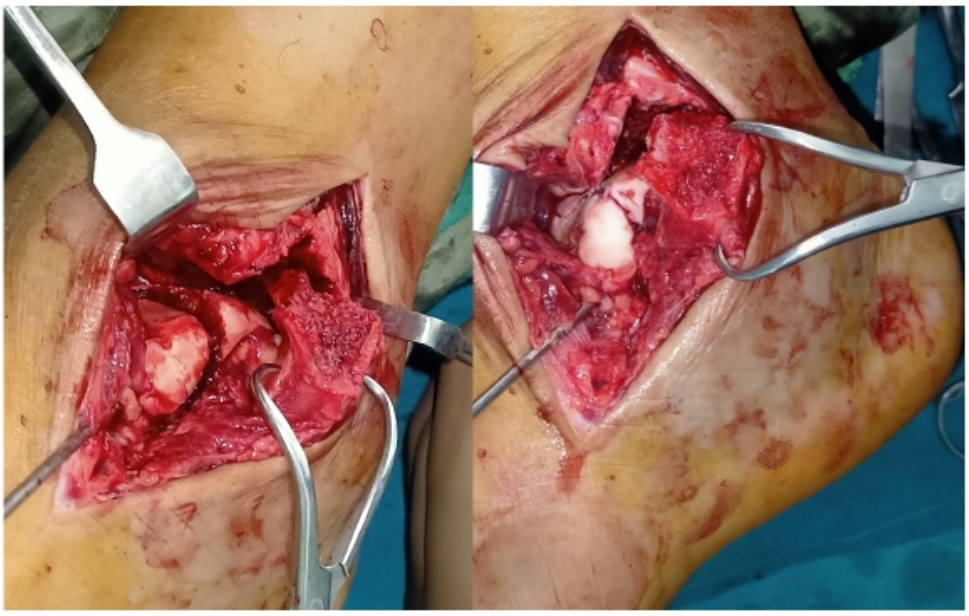
Figure 3a and 3b: Medial and lateral sided markings of incision.



The medial incision is taken first, starting from the anterior border of the medial malleolus to the navicular tuberosity between the posterior tibial tendon and the anterior tibial tendon. The capsule is incised to assess the fracture, which is temporarily reduced using a K-wire as a joystick.The fracture is stabilised with one or two K-wires (Figures 4a and 4b). If needed, a medial malleolar osteotomy can be added.

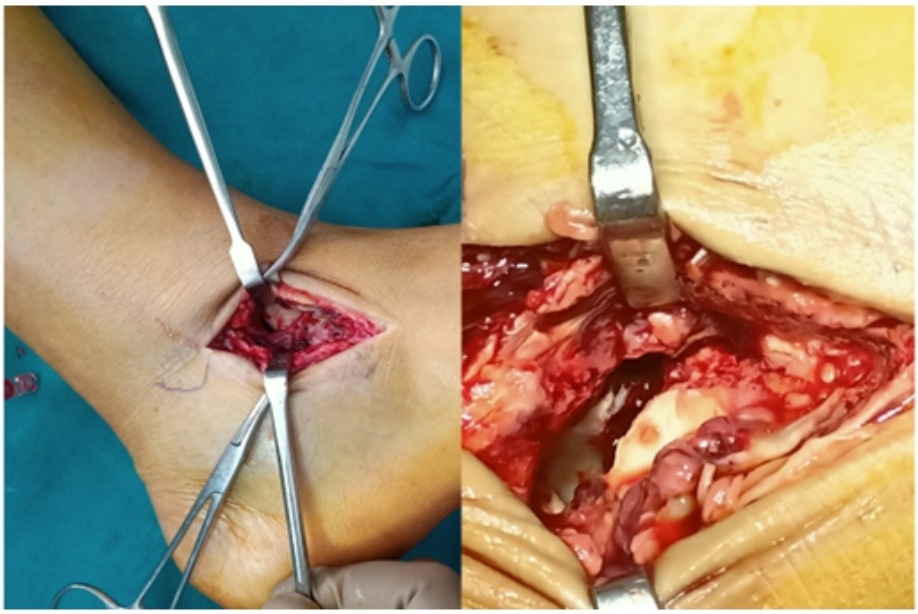
Figures 4a, 4b, 4c and 4d: Exposure of the medial side and temporary fixation of fracture on the medial side





The lateral side incision starts from the posterior border of the lateral malleolus to the 4th metatarsus base, between the superficial peroneal and sural nerve. Identify the peroneal tendons, erase the attachment of the anterior talofibular ligament (ATFL) from the anterior border of the fibula and once it later wards, open the subtalar capsule in the line of the skin incision (Figures 5a and 5b).

Figure 5a and 5b: Lateral exposure.



A Hohman retractor is put at the posterior part of the talar bodyto bring it forward through this lateral approach (Figure 6).

Figure 6: Method of pulling talar body anteriorly using Holman retractor.



Once adequate reduction is achieved, the fracture is stabilised with headless compression screws. ATFL is repaired with a 3mm anchor in the fibula at its original footstep. The wound is closed in layers, and a below-knee plaster slab is applied for six weeks.

Case example: A 32-year-old male patient presented with a talar body fracture. Figure 7 demonstrates x-rays and CT scans of this patient in collage form.

Figure 7: X-rays and CT films of the same patient with a talar body fracture.



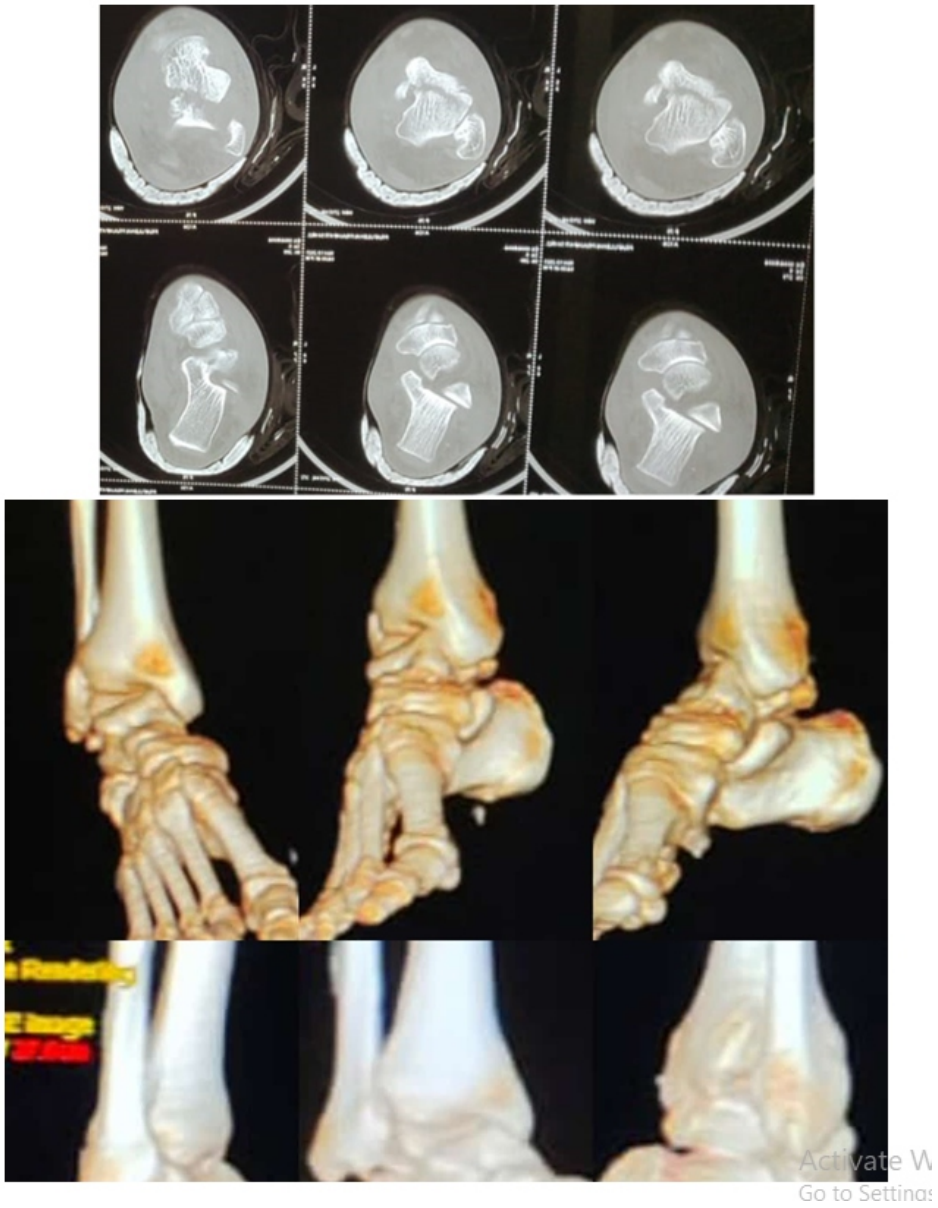


Figure 8 demonstrates a femoral distractor in situ with a medial approach.

Figure 8: Femoral distractor with a medial approach.

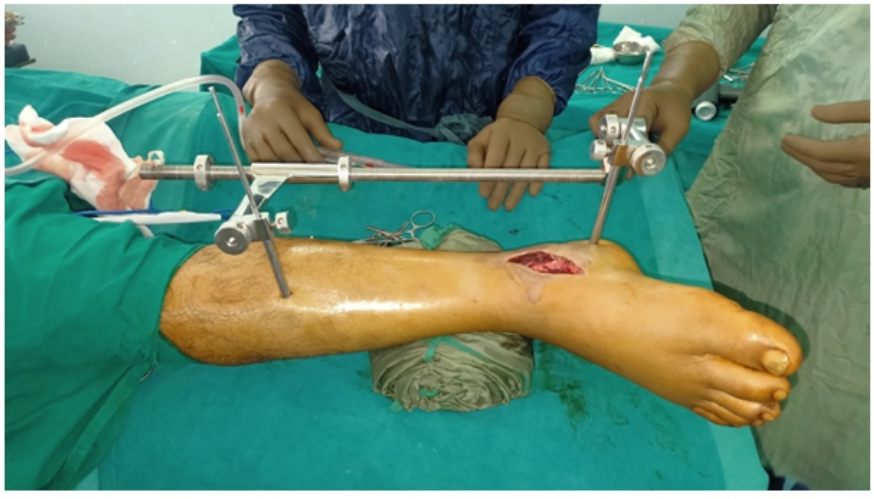
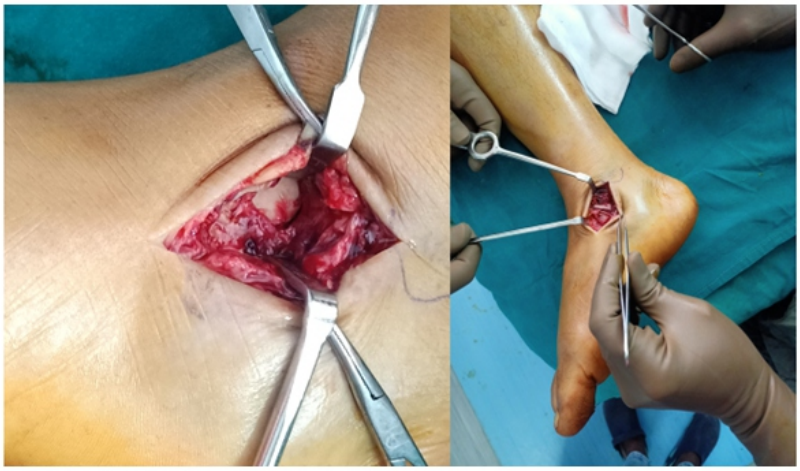


Figure 9 demonstrates the lateral approach and fracture fixation.

Figure 9: Lateral exposure.



At two years, the patient had complete radiological healing with excellent function (Figures 10a and 10b).

Figures 10a and 10b: Radiological (Figure 10a) and clinical (Figure 10b) results of the same patient at two years.





Advantages of the LTL approach:

- The lateral transligamentous approach to the talus provides significantly greater access to the talar domethan standard approaches.
- It allows orthogonal instrument placement.
- There are fewer chances of damage to vascularity.

PLANTAR HEEL PAIN



Dr Nikesh Shah

Dr Nikesh Shah is a foot and ankle surgeon practising in Vadodara. He was the past president of the Indian Foot and Ankle Society and is an international and national faculty member in the field of foot and ankle orthopaedics.

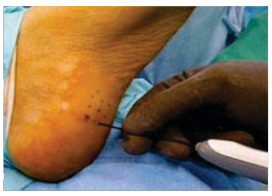
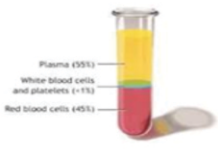
Plantar heel pain is a common problem that presents itself in orthopaedic OPD. Treating the problem while allowing ambulation is an inherent challenge. The long recovery period can be a great source of frustration for the patient and physician. Conservative modalities should be tried for 6 to 12 months before considering surgical intervention.

Differential diagnosis

Differential diagnosis	Distinguishing clinical findings/ features
Chronic heel fat pad atrophy	Tenderness directly over the inferior aspect of the calcaneus.
Fibromatosis	Palpable nodules,
Inflammatory arthropathy with associated enthesopathy	Systemic symptoms and signs
Calcaneal stress fracture	Medial and lateral compression over the posterior inferior body of the calcaneus may produce significant pain.
Plantar fascia rupture	H/o trauma or following multiple injections of steroids. Acute onset of pain, swelling, tenderness, and ecchymosis. Painful popping or snapping on the plantar aspect of the foot.
Nerve entrapment or Lumbar stenosis with atypical radicular symptoms	A history of proximal or distal radiation, numbness, or paresthesiasuggests nerve entrapment or lumbar vertebral stenosis.

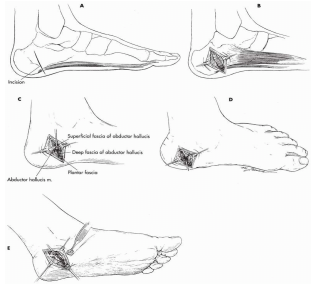
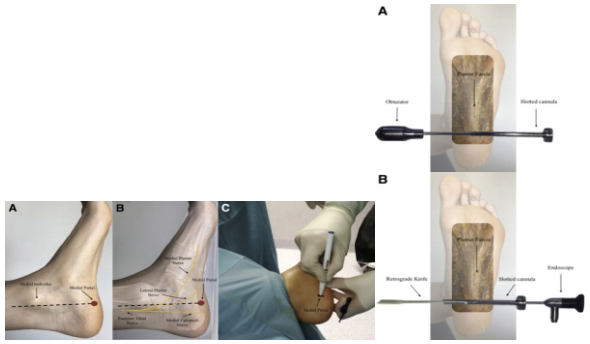
Nonsurgical Treatment

Plantar heel pain should initially begin with nonoperative treatment for six months to 1 year with a success rate of up to 95%.

First 3 to 6 months of treatment	
Minimised overuse—cross-train athletes, weight loss, Orthotic devices—heel pads or cups, arch supports, custom orthoses Night splint—maintain 5° ankle dorsiflexion	
Achilles and plantar fascia stretching 2 to 3 times per day	
Steroid injection	good pain relief, risks include plantar fascia rupture, heel pad atrophy
After 3 to 6 months of the above treatment, we can add the following options for further treatment.	
Extracorporeal shock wave therapy success rate up to 85%	
Radiofrequency ablation of plantar fascia -Radiofrequency nerve ablation is a minimally invasive procedure that uses high-frequencyradio waves to heat the affected sensory nerves that cause plantar heel.	 success rate up to 90%
affected sensory nerves that cause plantar heel.	success rate up to 90%
Botulinum toxin A (Botox) injections botulinum toxin A (BTX A) injection can be administered in a fan-shaped manner directly at the calcaneal origin of the plantar fascia.	Botox is injected into the plantar fascia of the affected foot, paralysing the muscles Abductor Hallucis and Quadratus Plantae and decompressing nerves. This relieves the neuropathic component of Plantar Heel Pain Syndrome.
Platelet Rich Plasma as effective as Steroid injection at achieving symptom relief and offers better and more durable symptom relief than cortisone injection.	
After 9 to 12 months of failure of all modalities- surgery is offered to the patient.	

Surgical Procedures

Surgical alternatives have included plantar fasciotomy, nerve decompression (abductor digiti quinti), calcaneus drilling, calcaneal spur excision, endoscopic fasciotomy, or some combination of these. Studies have reported sound and excellent results ranging from 75% to 100%

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Ç╙ś ▒śŕ╨Ă▄ne-third to on-half of the central slip of the plantar fascia is released at its origin.	Ç╙ś ℓ♫j ’nl’Ă■ L’ś ’ns▒▫▫ōśŕ ĵ ℓ╙■┼Ă ℓ▒Ă▄’n▫■■┼śĵ ’nĂźĠ’n stripping the muscles.
Theabductor hallucis's deep fas and the quadratus plantae's fasc are divided to release the nerve the abductor digiti quinti as it passes laterally.	
9 ■ŕ ▫ℓl’▫♫╨’ ♫▄Ă■ĊĂ’n fascia release less morbidity wi-h success rate of 90%	

SINUS TARSI IMPLANT: MYTH OR REALITY ?



Dr Parth Parekh

Dr Parth Parekh is an orthopaedic foot and ankle surgeon at Marengo Cims Hospital in Ahmedabad.Dr Parth has a keen interest in flat foot reconstruction procedures and sports medicine.

Over the past several decades, an incredible amount of attention has been directed to using a titanium spacer, a stent, placed into the sinus tarsi to realign the hindfoot in cases with flat feet. During this time, certain myths or misconceptions about the procedure have arisen. This article aims to create greater awareness of this procedure so that more patients can be helped.

How can a titanium spacer placed into the sinus tarsi "fix a flatfoot?"

Sinus tarsi implants maintain the open space of the sinus tarsi while allowing motion to occur within the subtalar joint. The importance of the "open" space is equated to the alignment of subtalar "joints." The partial dislocation of the talus forces the navicular to sag, leading to the collapse of the medial arch. This can be easily seen in comparison to weight-bearing radiographs of someone in a resting stance position and with the hindfoot placed in a neutral position. (Figure1).

A comparison of weight-bearing radiographs of pre- and post-stent placement shows the angular normalisation of the talar second metatarsal angle in the anterior-posterior view and the talar declination in the lateral view. Additionally, visualisation of the navicular position on the lateral view will show the elevation of the navicular position. (Figure 2).



The section to follow discusses myths and realities of sinus tarsi implants.

This procedure should only be performed in pediatric patients!

The birth of talar stabilisation without fusing the talus to the calcaneus began as a treatment option for pediatric flatfoot. Earlier devices were carved from silicone and other non-metallic materials. These materials did not withstand the test of time and were only used in pediatric individuals. Eventually, titanium use increased, and because it is a stronger material, it was used as the preferred material for sinus tarsi implants.

Another school of thought suggested that sinus tarsi implants should not be used in adults because the bones have already formed, and "it was too late." However, this was not the case. Many studies have shown the successful use of sinus tarsi implants in osseous mature individuals (2). Adult recipients have reported excellent results once their foot has been realigned with a sinus tarsi stent (3).

This procedure should only be performed in adult patients!

Some have argued that sinus tarsi implants should not be used in pediatric patients. Their main argument is that the bones are still growing, so waiting is better. But does this make sense? When we look at the reference of the orthopaedic symbol, a bent tree, isn't it better to try and straighten the tree while it is still young and growing rather than to wait for it to mature? At that point, it is too late. With every step taken, one must think about the pathologic forces acting on the foot and up the ankle, knee, hip, and back. Those excessive forces eventually take their toll on the joints and soft tissues, creating secondary tissue pathology. Many studies have been published to establish the basis of evidence for using sinus tarsi implants in pediatric patients. (4)

If performed on a child's foot, the stent will have to be replaced upon the individual's osseous maturity; therefore, it is better to wait until osseous maturity to perform the procedure.

There are a range of stent diameters available to pediatric and adult individuals. They are the same; there is not one set of sizes for osseous immature individuals and another set for osseous mature individuals. While it could be possible that a child may need to have a revision once they achieve osseous maturation, it is very unlikely. As previously mentioned, realigning and stabilising the talus "sooner than later" is better to prevent damage to the support joints and soft tissues. Even if the stent had to be resized upon osseous maturity, it would be a more efficient foot structure than having the talus partially dislocate with every step.

Recipients of a sinus tarsi stent are restricted from participating in sports activities.

When looking at the lateral radiograph after placing a sinus tarsi implant, one questions whether there would be an impaction fracture of the stent into the talus or calcaneus.

The reality is that no fracture should occur if placed adequately per the manufacturer's instructions. That's because most forces act on the articular surfaces of the subtalar and talonavicular joints (5). There is only a small amount of force acting on the stent itself. Even in that case, the stent was removed, and there was no damage or harm to the patient. Sinus tarsi recipients are noted to resume normal sports activity once fully healed and cleared by their surgeon (6). Patients have reported increased activity levels following the stent placement because their muscles work more efficiently.

The stent will cause arthritis within the subtalar joint after a few years.

The sinus tarsi stents are placed into the sinus tarsi. The sinus tarsi is not a joint; it is a naturally occurring space that divides the weight-bearing forces passing posteriorly to the back of the calcaneus and anteriorly onto the navicular and distal portion of the calcaneus. “Arthritis” occurs within a joint, not within the sinus tarsi. It is not reasonable to suggest a sinus tarsi implant can lead to arthritis. Considering the normalisation of joint forces acting within the subtalar joints, it makes sense that a sinus tarsi stent should reduce the incidence, not increase the incidence of subtalar joint arthritis (7).

Tarsal coalitions are a contraindication for the use of a sinus tarsi stent.

A primary indication of a sinus tarsi stent is that the sinus tarsi space must be recreated by repositioning the talus onto the articular facets of the calcaneus. A tarsal coalition could prevent the realignment of the talus on the calcaneus. If the coalition can be resected in such a manner as to maintain the integrity of the chamber of the sinus tarsi, then it should be possible to insert a sinus tarsi implant. A calcaneonavicularcoalition is a great example of a tarsal coalition that could be resected without altering the sinus tarsi chamber. A talocalcaneal coalition is usually a deal breaker for inserting a stent post-resection.

There is limited research on the use of sinus tarsi implants.

An extensive amount of data has been published on sinus tarsi implants over the past many decades. These studies range from finite element, cadaver, retrospective, prospective, and comparative against traditional osseous reconstructive procedures. These studies have all concluded the positive effects of using sinus tarsi implants without the limitations and issues reported with traditional reconstructive surgery (8). The evidence clearly shows sinus tarsi implants are safe and effective when treating patients with a partially dislocating talus. The patient-reported outcomes show positive effects, with patients being more active and fewersymptoms (9).

The time has arrived to accept sinus tarsi implants as a reality, not a myth.

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TOTAL ANKLE REPLACEMENT: A RAY OF HOPE



Dr.Rajiv Shah
Dr Shivam Shah

Dr Shivam Shah is anarthroscopy and arthroplasty surgeon practising at Sunshine Global Hospital, Vadodara. His areas of interest include foot and ankle arthroscopy, endoscopy, and total ankle joint replacement.

Ankle replacement is still a mystery in India!

For most Indian orthopaedic surgeons in all stages of practice, the idea of total ankle replacement (TAR) has been almost equally elusive and unexplored. Despite the booming growth of joint replacement surgery in knee, hip and shoulder, ankle replacement enjoys this unfortunate place of ignorance in the minds of most Indian orthopods. The reasons for this are not as elusive as the surgery itself.
Firstly, degenerative primary ankle arthritis is uncommonin the Indian population compared to knees and hips. Secondly, most ankle arthritis cases are secondary to traumatic complications with complex deformities or compromised soft tissues, which makes fusion a better choice over arthroplasty. Thirdly, ankle fusion, which is presently the gold standard for end-stage ankle arthritis, is reproducible by most surgeons and has shown time-tested successful outcomes. Fourthly, the limitations of total ankle replacement, having modest survivorship and functional improvements, also play a role. Lastly, total ankle replacement prostheses are expensive, unlike those for knees and hips.

Does our Indian population need total ankle replacement?

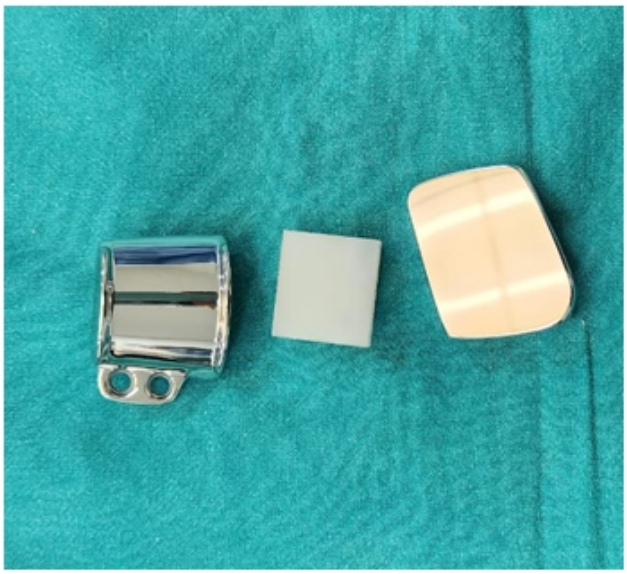
But things are changing in India towards TAR with growing indications. The need for preserved ankle joint motion is now well recognised and is desired by patients who want to live an active lifestyle. Moreover, in patients suffering from bilateral ankle arthritis or those with ankle and hindfoot arthritis, multiple fusions, such as tibiotalocalcaneal or pantalar fusions, can grossly affect mobility and quality of life. These patients are forced to accept a low-demand lifestyle with multiple fusions. Some end up choosing a dependent lifestyle with the use of chronic pain medications. Post-ankle fusion, adjacent joint arthritis (subtalar and talonavicular) is a known long-term complication of ankle fusion, potentially leading to pain and fusion surgeries in future. This is potentially avoided with TAR. With a growing number of foot ankle specialists and the ability to import prostheses from abroad, performing TAR is logistically possible, unlike when it was never an option!

The past and presence of total ankle replacements

Many Western countries have adopted TARs, and the trends over the last two decades show a steady increase in their use. 1st generation of TARs were developed in the 1970s, which were non-anatomical and utilised cement fixation. These had a high failure rate, with a minority surviving beyond five years. The need for excessive bone resection, cement bone loosening, instability, wear, and non-anatomical biomechanics (uniplanar movement, unlike the complex 3D movement of the native ankle) were some

of the many issues. The 2nd generation prosthesis in the 1980s utilised non-cemented fixation with bony ingrowth. They attempted to replicate anatomical articulation of the ankle joint by giving three components (tibial, talar and polyethene insert), which mimicked 3D movements to some extent. Prostheses such as STAR (Scandinavian total ankle replacement) have succeeded and been accepted in Western societies. However, ankle fusion remained the gold standard for end-stage ankle arthritis. The 3rd generation prosthesis has been utilised since the 1990s. Numerous designs have succeeded, including "H3 and H2 Hintermann" prostheses (Figure 1).Not only anterior but also trans fibular lateral approaches have also been utilised. (Insert table of prosthesis names with basic design details. The survivorship of third-generation TAR prosthesis isup to 10-15 years in more than 80% population. The indications of performing TAR have expanded. Deformity and instability at the ankle and foot are no more contraindications to TAR.

Figure 1: Three-component Hintermann H3 total ankle replacement.



Our experience with total ankle replacement

Since the first total ankle replacement took place in India as a demonstration surgery in 2012 in Delhi at the Parekh Indo-US foot and ankle meeting, the senior author was involved as the primary surgeon. A 34-year-old pharmacologist from Nagpur got a STAR total ankle replacement for ankle malunion. The implant has lasted for more than 12 years without any issues. The cumulative experience of another nine STAR and Cadence TAR cases made it number ten. All these cases were demonstrated in conferences under the guidance of international faculties, where the respective companies gifted implants.
We have independently operated on three total ankle replacements for the last year using the H3 Hintermann prosthesis. Two patients were middle-aged females who developed degenerative ankle OA, while one was a young female with debilitating secondary ankle arthritis due to unrelenting gout. Although we encountered certain interop and postoperative challenges in each case, all patients showed satisfactory results at ten months follow-up. The table below summarises patient details, challenges, and AOFAS scores. The first TAR of Gujarat state plus the highest number of total ankle replacements in Gujarat state (by September 2024, numbers will reach five) is credited to this team of authors.

A 51-year-old obese female came to us with degenerative subtalar and ankle arthritis (Figure 2) (Video 1). After discussing options, she opted for salvage of ankle motion with a two-stage surgery.

Figure 2: X-rays demonstrating ankle and subtalar arthritis.



Video 1: Preoperative gait of the same patient.

In 1st stage, a standard subtalar fusion was performed using two screws (Figure 3).

Figure 3: Radiological and clinical weight-bearing status of patient after subtalar fusion.



After four months, once the subtalar joint showed early fusion, we performed a total ankle replacement on her. Intraoperatively we had to exchange the subtalar screws to a shorter length to allow talar cuts as well as to retain support for the subtalar joint. This patient also required concomitant lateral ligament reconstruction (Figures 4 and 5) (Video 2). She is more than six months postop and enjoys a painless gait with fair mobility of the ankle joint, which would not have been possible had she chosen tibiotalocalcaneal fusion.

Figure 4: Intraoperative pictures of total ankle replacement surgery.



Figure 5: Radiological and clinical postoperative status of the same patient after TAR.



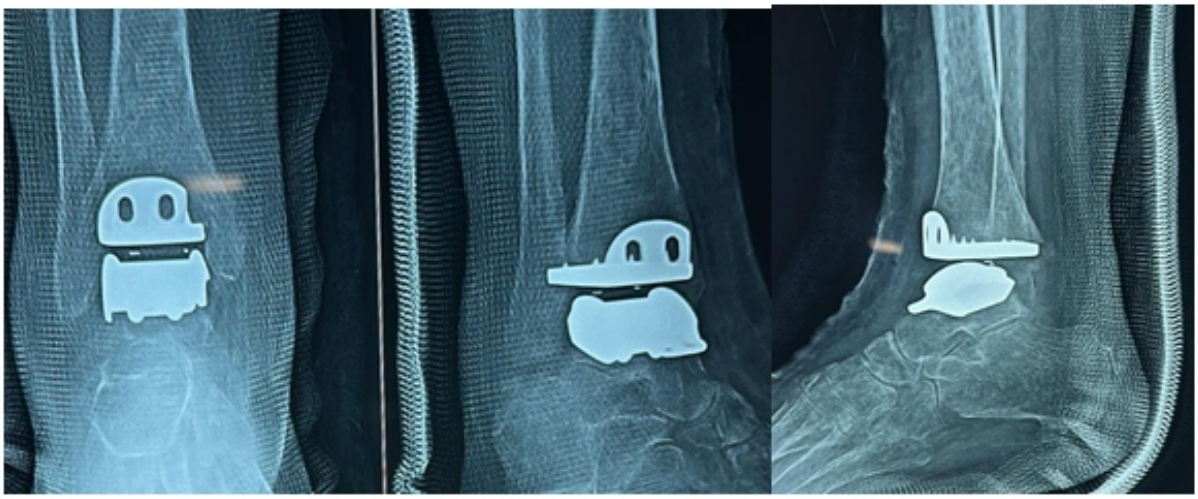
Video 2: Postoperative gait of the same patient after TAR.

Similarly, a 30-year-old female with gouty ankle arthritis underwent TAR to retain ankle motion. Because of extensive destruction to the ankle, she was hardly able to stand or walk with the support of relatives! The patient was well counselled about the prosthesis's survivorship and the probable need for revision surgery in the coming decade (either fusion or revision TAR). Her bargain of painless mobility for a decade was more precious than a permanent, painless, stiff ankle (Figures 6 and 7).

Figure 6: Preoperative images and clinical picture of a disabled patient with gouty ankle arthritis.



Figure 7: Postoperative radiographs of the same patient as in Figure 5 with well-implanted ankle replacement.



Future of total ankle replacement: A ray of hope!

- TAR techniques are advancing to include AVN talus, wherein the surgeon can perform a total talus replacement with a tibial component on top of the replaced total talus prosthesis. This is called Total ankle total talus replacement (TATR). The same can be planned in cases where talar erosions and subsidence cause late failure of TAR.

- Similarly, in cases with multiple hindfoot arthritis, expert surgeons now perform single stages subtalar or talonavicular fusions with ankle replacement.

- In the early years, the acceptability of deformity was very stringent, and any deformed ankle beyond this narrow range of ten degrees in a coronal plane was contraindicated for TAR. Limits are rapidly widening, and the role of TAR is expanding into arthritic deformed ankles with multiplanar deformities.

- Instead of fusion, Revision implants are now available for continued mobility after a failed TAR. Stemmed revision TAR implants offer longevity of five to seven years.

- Even take-down fusion to convert cases into replacements has also had a reasonable success rate.

MISMANAGED CASE OF ANKLE FRACTURE



Dr Mahesh Soni
Dr Diwakar Mishra

Dr Mahesh Soni is a practising Orthopaedic surgeon at Ankleshwer with a special interest in foot and ankle trauma and orthopaedics. Dr Soni has been a faculty at various international and national foot and ankle meetings.

Case description: A 26-year-old female patient presented with complaints of pain, swelling and deformity over her left ankle. There was a history of trauma over her left ankle ten months back. The fractures were treated surgically and fixed with Tension Band + K wires. The patient continued to have pain, swelling and deformity after the surgical intervention.

On examination, there was swelling and deformity over the left ankle. The ankle joint line was tender. The ankle had a range of motion from 10 degrees of dorsiflexion to 30 degrees of plantarflexion.Radiographic examination (Fig.1) revealed an old Trimalleolar fracture (SER -4), which had been fixed with tension band wire assembly for medial and lateral malleoli. There was a widening of medial clear space, lateral talar shift and shortening of the lateral malleolus (dime sign was broken). The tibiotalar joint space was decreased, and the mortise appeared widened. Radiographs of the contralateral ankle were obtained for comparison (Fig.2).

Figure 1: Radiograph at presentation.



Figure 2: The comparative radiograph of the opposite ankle.



A computerised tomographic scan of the ankle was obtained, which revealed decreased tibiotalar space, irregularity of distal tibial articular surface, shortened distal fibula, increased medial clear space, lateral talar shift, talar tilt, and posterior malleolus fracture (fig. 2a, 2b). The distal tibiofibularsyndesmosis was normal.

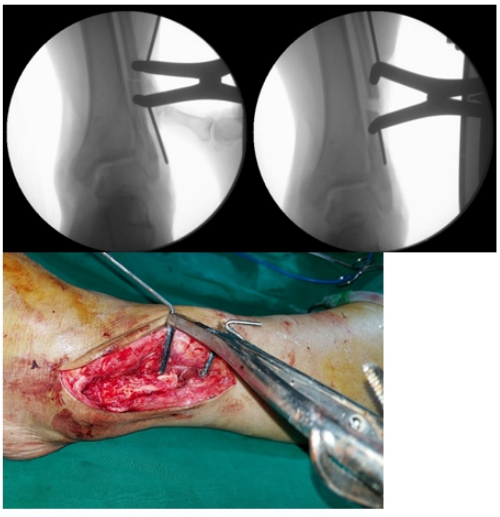
Figures 2a and 2b: Figures demonstrate features of malunion at the ankle.



After a detailed discussion with the patient, a plan was made to restore the fibular length, ankle mortise and talar position.

The surgery was done in a supine position under a tourniquet. Medial and lateral incisions were made, and pre-existing implants were removed. No further intervention was done on the medial side. On the lateral side, fibula osteotomy was done about 3 cm proximal to the ankle joint line. Kirschner wires were placed in proximal and distal fragments, and a Hintermann Distractor was applied to restore the fibular length. The tricortical graft was harvested from the iliac crest and sandwiched between the fibular fragments (Figures 3a, 3b and 3c).The reductionwas compared with the contralateral ankle for fibula length, Talocrural angle and medial joint space.

Figures 3a, 3b and 3c: Sequential pictures of restoration of fibular length.



Fixation was done with a distal lateral fibular anatomical plate, which appeared inadequate. The fixation was supplemented with a second plate placed on the posterior aspect. A tri-cortical syndesmotic screw was placed (Figure 4). The posterior splint was applied, which was kept for 15 days.

Figure 5: Immediate post-operative radiographs.



Ankle mobilisation exercises were started. Radiographs at two months showed good fracture union, and weight bearing was initiated (Figure 5).

Figure 5: Two months postoperative radiographs showing sound fracture consolidation.



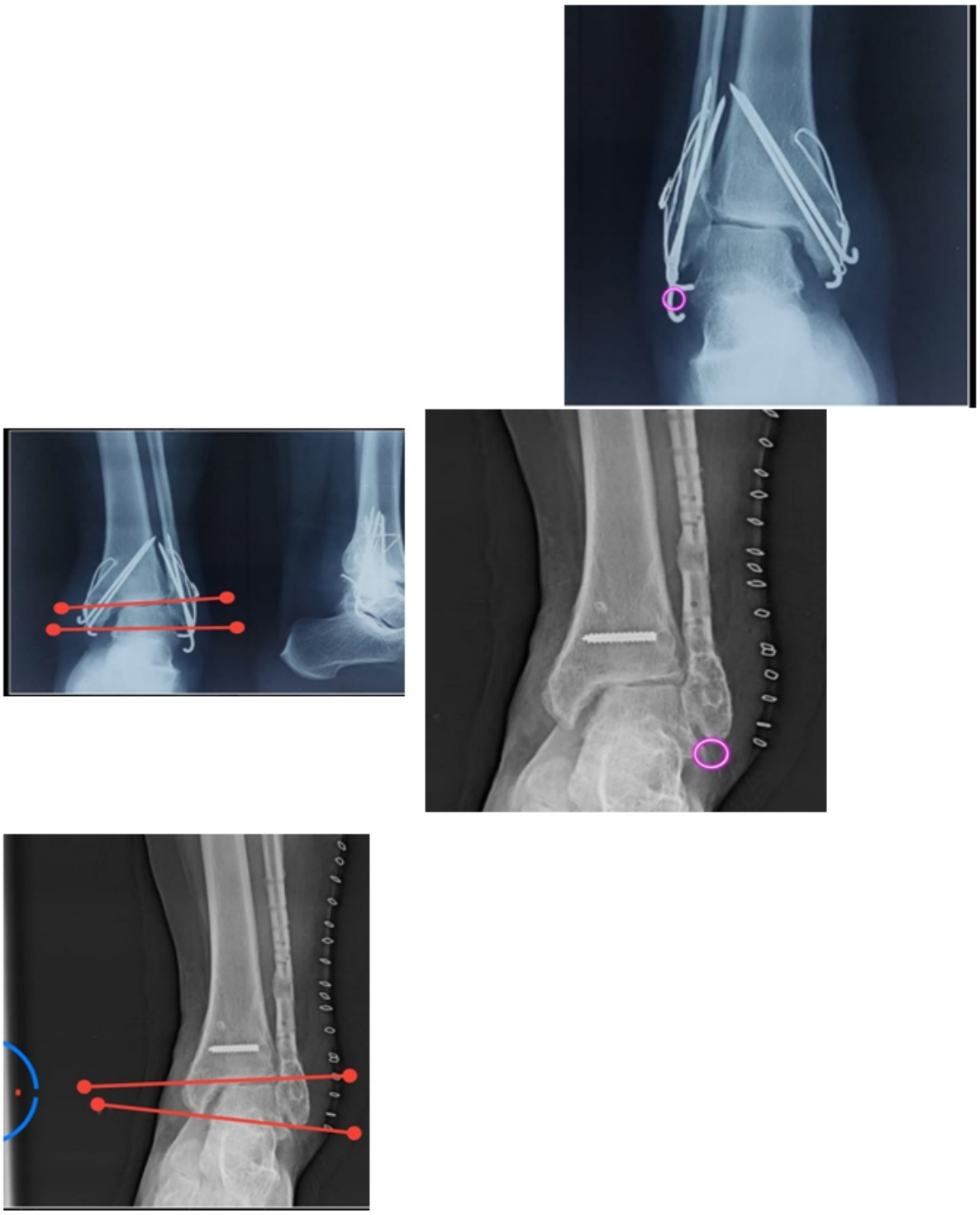
At the final follow-up at one year, radiographs showeda broken syndesmotic screw with well consolidated graft (Figures 6a and 6b). All hardware except the broken intratibial part of the syndesmotic screw were removed.

Figures 6a and 6b: One year post-operative radiograph and post-implant removal radiograph showing sound consolidation.



At the last follow-up, the patient could walk comfortably with full weight bearing. The ankle range of movement was from 20 degrees of dorsiflexion to 45 degrees of plantarflexion. There was occasional pain, and the patient was satisfied with the revision surgery. Figures 7a and 7b demonstrate comparative radiographs restoring the dime sign and the talocrural angle.

Figures 7a and 7b: Comparative radiographs demonstrating restoration of dime sign and talocrural angles.



Pearls of wisdom

· Distal fibula has a vital role in ankle biomechanics.

· Talus follows the lateral malleolus faithfully. So, any fibular shortening or rotation alters the position of the talus in ankle mortise. Minor changes in talar position cause significant alterations in stress-bearing areas of the ankle, leading to early degeneration. (1mm of Talar shift leads to the tibio talar surface contact area decline by 42%. Lateral talar shift is closely associated with an increase in medial clear space)

· A CT scan should always be obtained in intraarticular fractures to assess the posterior malleolus/ syndesmosis instability/comminution.

· All attempts should be made to restore the fibular length and rotation during the primary surgery.

· Preserving the joint is always better than joint fusion, so surgeons should try to preserve the joint, especially in young patients. The results are satisfying.

CASE OF TRIMALLEOLAR ANKLE FRACTURE



Dr Sanjay Sarvaiya

Dr Sanjay Sarvaiya has been a trauma and orthopaedic surgeon in the city of Bhavnagar for 28 years. He has a keen interest in the management of complex peri- and intra-articular trauma.

Case description: 45-year-old male, farmer by occupation, had a fall while coming down the stairs. He presented within 6 hours of the injury. He had a closed fracture of the ankle with swelling, tenderness, and Inability to walk with the normal distal neurovascular deficit. X-ray showed fracture-dislocation of the ankle (Figure 1).

Figure 1: Fracture- dislocation of ankle.



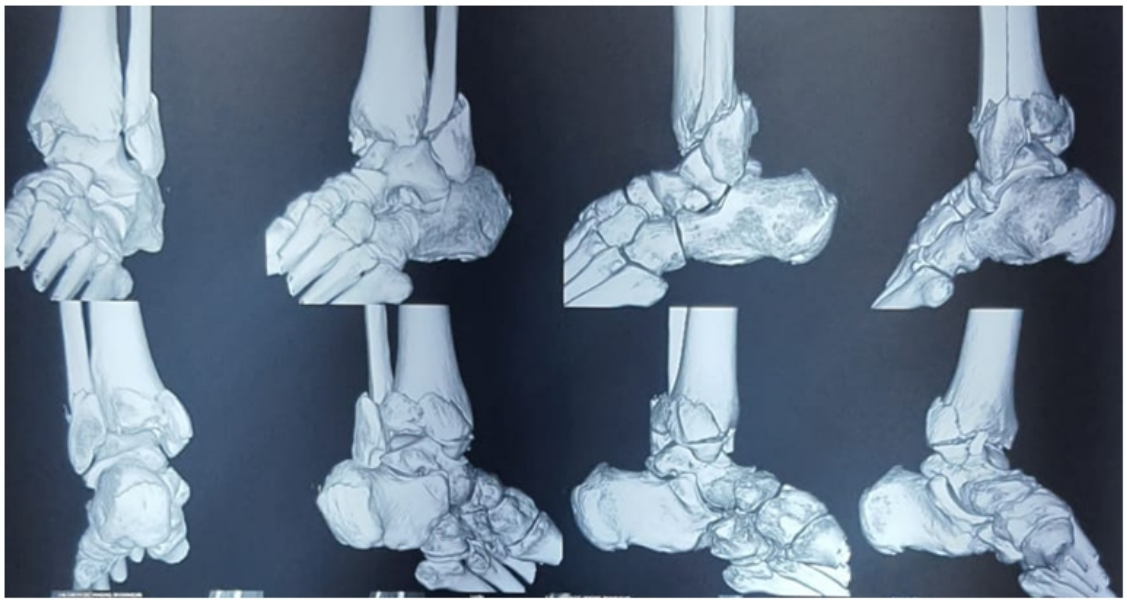
The dislocation was reduced in an emergency, and a plaster slab was applied (Figure 2).

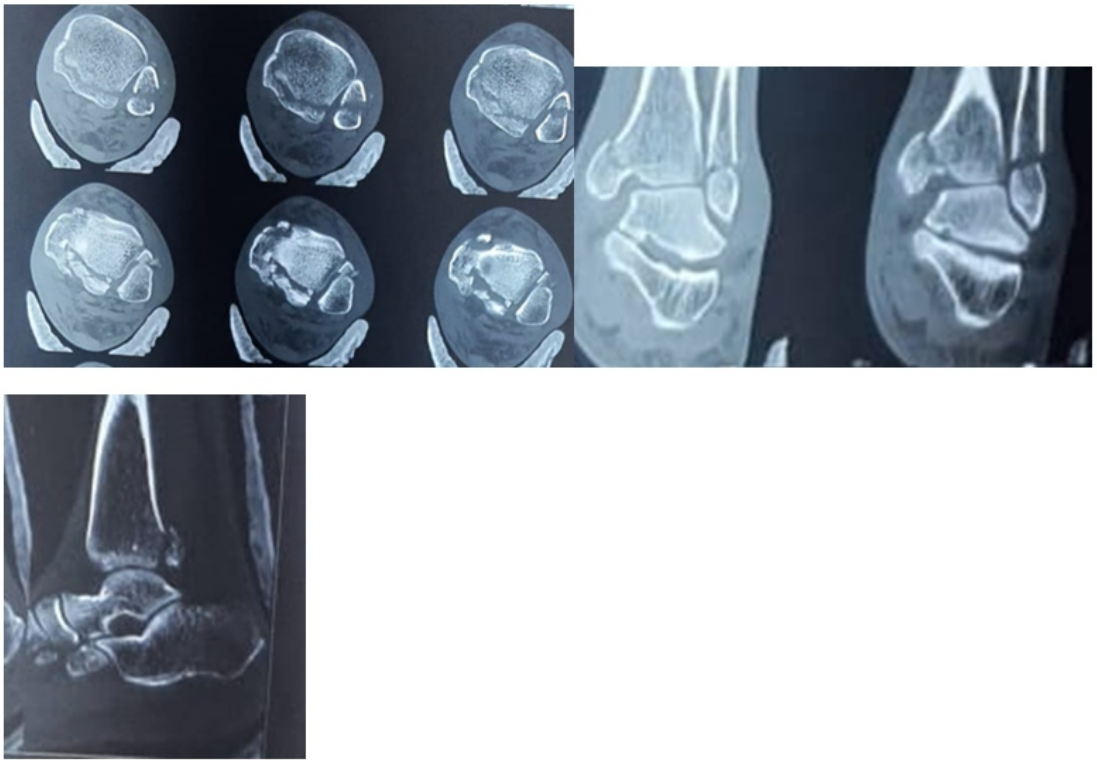
Figure 2: Post-reduction x-ray of the ankle.



A CT scan was procured, which demonstrated a posterior malleolus fracture with fractures of the medial and lateral malleolus (Figures 3a, 3b, and 3c). A small anterior rim fragment was also noticed.

Figures 3a, 3b, 3c and 3d show lateral malleolar fracture, medial malleolar fracture and posterolateral variety of posterior malleolar fractures.





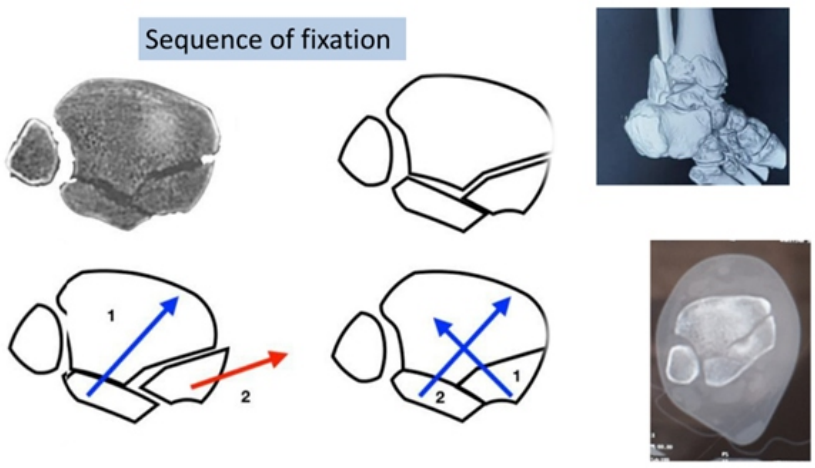
The decision to proceed with surgery was taken. The posterolateralapproach was utilised in a prone position with a simultaneous posteromedial approach. A little anterior extension of the medial approach was done. The Medial approach to address a small anteromedial rim fracture was carried out in a supine position (Figures 4a, 4b, 4c, and 4d).

Figures 4a, 4b, 4c, and 4d: The posterolateral approach (a and b). The posteromedial approach © and medial approach (d).



he sequence of fixation followed was reduction and reconstruction plate fixation of the fibula followed by the fixation of the posteromedial fragment with a 3.9mm locking screw using it as a compression screw and the use of a small T buttress plate for the posterolateral fragment. For medial malleolus, a screw plus a k-wire were used. The screw was used for anterior rim fragment fixation. Figure 5 demonstrates a sequence of fixation.

Figure 5: Fixation sequence.



Immediate postoperative x-rays showed perfect reduction and well-aligned ankle mortise (Figure 6).

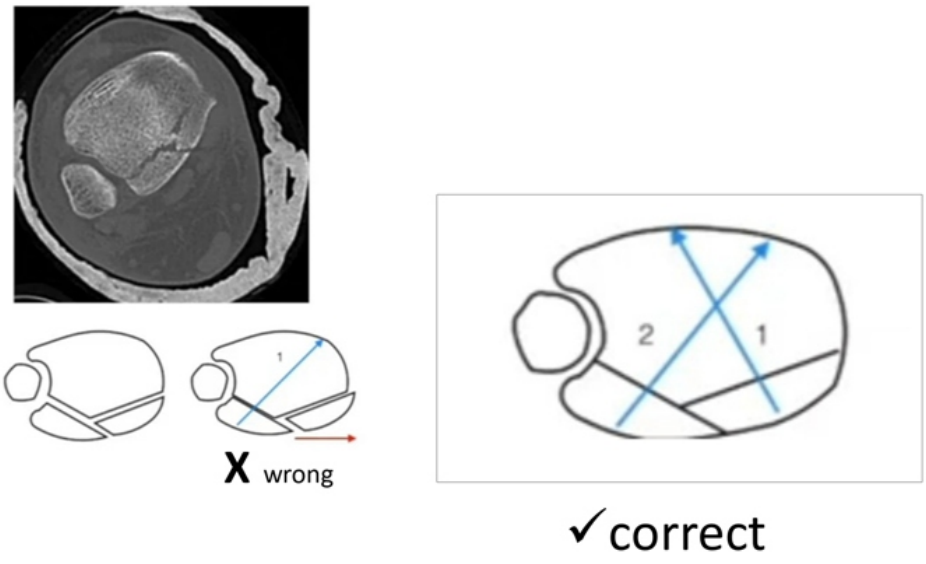
Figure 6. Postoperative radiograph showing well-reduced fractures.



At three months, the patient had a sound union and went on to carry out all activities of daily living by four months.

Pearls of wisdom:

- Posterior malleolus fractures need to be classified according to HARAGUCHI CLASSIFICATION to plan approaches and sequence of fixation.
- Reduce the posteromedial fragment first and then move to the posterolateral fragment.



- Address the anterior rim fragment with a medial approach.

MULTILIGAMENT INJURY OF ANKLE JOINT: A CASE REPORT

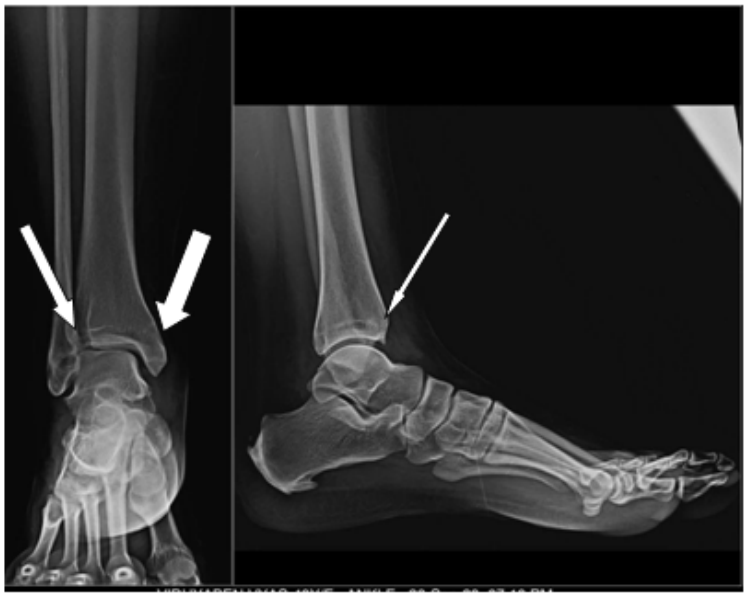


Dr Jagdish Sakhiya

Dr.Jagdish Sakhiya is a practising Orthopaedic Foot & Ankle Surgeon at Rajkot. He had his fellowships from Spain, UK, Chennai and Vadodara. His area of interest is complex deformity correction.

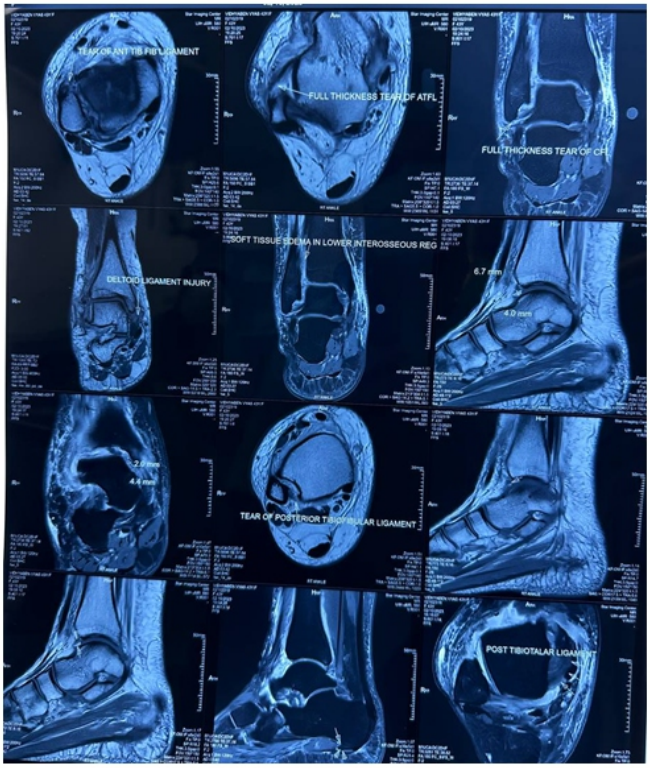
Case presentation: A 43-year-old female patient, a housewife with no known past medical history, presented to our emergency department after suffering an injury to her right ankle due to a fall from stairs. She had a painful and swollen ankle and was unable to bear weight.Bimalleolar swelling and tenderness over both medial and lateral gutters were noted during the examination. The neurovascular examination showed no impairment, and compartment syndrome was excluded.Non-weight-bearing ankle radiographs revealed a small avulsion fracture of the tip of the medial malleolus with increased medial clear space and the widening of syndesmotic space(Figure 1).

Figure 1: Radiographs demonstrating a small avulsion fracture of the tip of the medial malleolus(fleck sign) with increased medial clear space and the widening of syndesmotic space.



A below knee plaster slab was applied, and MRI was ordered. MRI showed afull-thickness tear of the anterior talofibular ligament (ATFL), a Tear of the calcaneofibular ligament (CFL) with a tear of the anterior inferior tibiofibular (AITFL) and posterior inferior tibiofibular ligaments (PITFL).MRI also demonstrated oedema of the interosseous membrane with deltoid injury with a 6.7 mm by 4 mm sized bony fragment at the medial gutter (Figure 2).

Figure 2: MRI showing tear of ATFL, CFL, deltoid, AITFL and PITFL. MRI also shows a bony fragment in the medial ankle gutter.



The patient was posted for surgery after four days of injury.We started in a supine position, followed by prepping both lower limbs. We first checked the stress views of the ankle joint under the C-arm and confirmed the diagnosis. We first approached the ankle medially to remove a bony fragment from the medial gutter and clear it (Figure 3).

Figure 3: Bony fragment removed from the medial gutter.



The lateral extensile approach for syndesmotic and lateral collateral ligament was taken from the lateral border of the fibula. It was curved at the lateral malleolus tip towards the fourth metatarsal(Figure 4).

Figure 4: Lateral approach at the ankle.



Open reduction of the syndesmotic joint was performed with gentle thumb pressure applied to the distal fibula. At the same time, the foot was slightly supinated and medialised. Syndesmosis was fixed primarily with 2 mm k wire with counterpressure applied to the medial tibia. The mortise was held reduced, and one more 2 mm K- the wire was fixed anterior to the fibula to avoid anterior translation of the fibula. Syndesmosis was reduced and fixed withtwo 3.5 mm cortical screwscatching three cortices.Appropriate alignment was confirmed using fluoroscopy, and stabilisation was proceeded.

After syndesmotic fixation, we repaired the deltoid ligament with two 2.8 titanium anchors in neutral dorsiflexion and neutral inversion-eversion because the lateral collateral ligament was completely torn. One anchor was inserted 5mm proximal to the tip of the medial malleolus and a second at the anterior colliculi. The elevated proximal periosteal flap of the medial malleolus was also sutured.

At last, ATFL and CFL were repaired using the Brostrom gould technique with two suture anchors in the neutral position of the ankle(Figure 5). The appropriate alignment was confirmed using fluoroscopy with stress tests for all ligaments like cotton hook test, external rotation of fibula and anteroposterior translation of fibula,external rotation and eversion and valgus stress test for deltoid,anterior drawer test for ATFL and varus stress test in dorsiflexion for CFL.

Figure 5: Immediate post-operative x-ray.



Postoperative radiographs confirmed the anatomical alignment and parameters of the ankle mortise. On the 1st postoperative day, the patient was mobilisednon-weight bearing using a walker. Below knee splint was applied following the surgery for four weeks, and active range of motion (ROM) exercises were initiated to prevent prolonged stiffness. The suture was removed in the 2nd week after confirming that the wounds were healed and there were no signs of infection. Partial weight bearing was initiated eight weeks after the surgery and continued with full weight bearing ten weeks after.

Regular X-ray was examined every month. At the four-month follow-up, full recovery was achieved, clinically and radiologically confirmed. We observed no ROM limitation, instability, swelling, or sensory deficit, with the American Foot and Ankle Society (AOFAS) ankle hindfoot score at the final follow-up being 87. A normal alignment of the tibiotalar joint, without any signs of degenerative changes, was seen on a comparative final X-ray with the contralateral side (Figures 6a, 6b and 6c).

Figure 6a: Comparative anteroposterior x-rays of both sides demonstrate precise ankle mortise restoration.

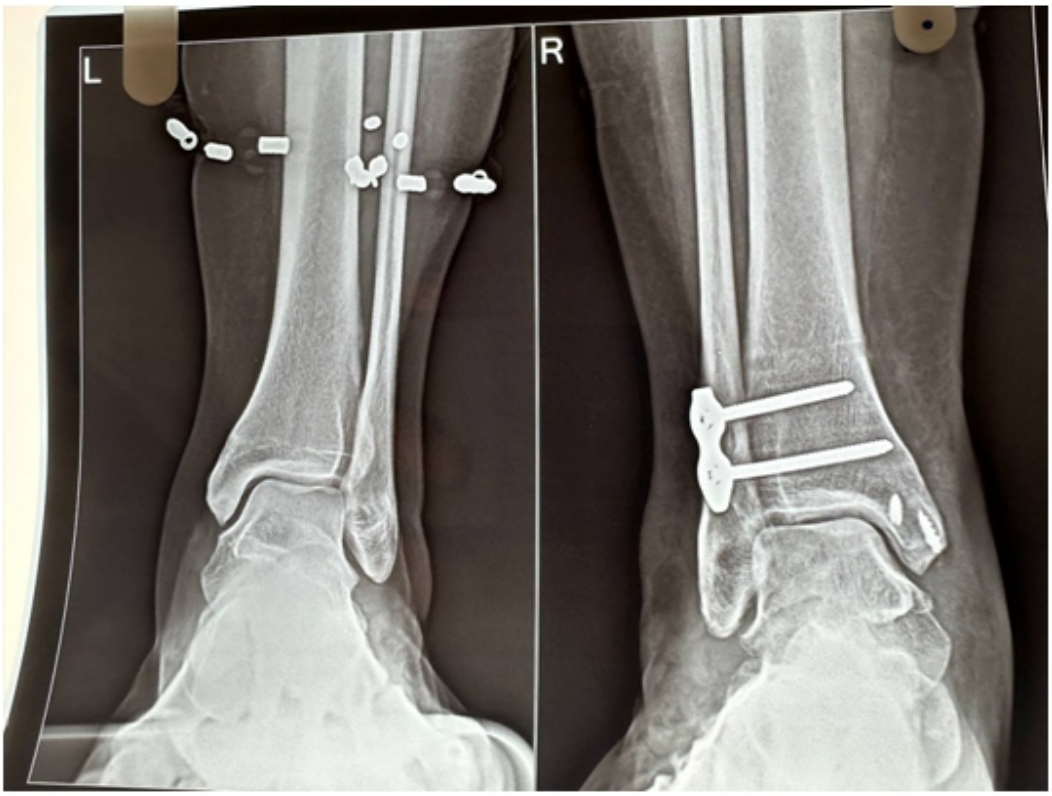


Figure 6b: Comparative mortise views of both sides demonstrating precise restoration of the ankle mortise.



Figure 6c: Comparative lateral radiographs of both sides demonstrating precise restoration of the ankle mortise.



Pearls of wisdom:

· Multi-ligamentous injuries of the ankle, particularly those involving the syndesmotic, deltoid, and lateral collateral ligaments, represent a complex and often underdiagnosed condition that can have profound long-term consequences if not properly managed. Recent studies underscore the importance of timely recognition and comprehensive surgical repair to prevent chronic instability, early-onset arthritis, and long-term disability.

· Syndesmotic injuries are missed in 20% to 30% of cases, resulting in altered load distribution across the joint and a heightened risk of post-traumatic osteoarthritis.

· Deltoid injuries are underdiagnosed in 30% to 40% of cases, especially when combined with lateral ligament injuries. Failure to recognise and repair this ligament can result in chronic medial instability, leading to valgus deformity and accelerated degeneration, particularly in the subtalar joint.

· Up to 20% of lateral ligament injuries are missed, especially in the presence of concurrent syndesmotic or deltoid ligament damage. Chronic lateral instability, if untreated, predisposes the patient to recurrent sprains and progressive joint degeneration.

· A structured surgical approach is critical to restoring ankle stability and function. A syndesmosis is repaired first becausesyndesmosis is the cornerstone of ankle stability. Restoring its integrity is fundamental to re-aligning the tibiofibular joint and ensuring proper load transmission through the ankle.

· The Deltoid is repaired next because if the medial side remains unstable after syndesmotic fixation. Medial stability is essential for overall ankle function.

· The last repair is of the lateral ligament. Once the syndesmosis and deltoid ligaments are stabilised, the lateral collateral ligaments are addressed to correct any remaining instability.

· Early rehabilitation is crucial after ligament repair. Early mobilisation leads to better functional outcomes by promoting ligament healing, reducing stiffness, and preserving joint range of motion. It also enhances circulation, aids in healing, and minimises muscle atrophy, leading to a quicker return to activity.

CASE OF TRAUMATIC PERONEUS BREVIS RUPTURE ALONG WITH SUPERIOR PERONEAL RETINACULUM RUPTURE



Dr Yogdeepsingh Jadeja

Dr Yogdeepsinh Jadeja is a fellowship trained foot and ankle surgeon practising at Rajkot.

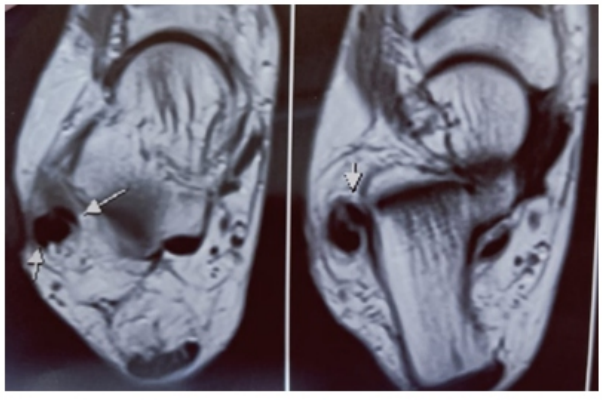
Case description: A 60-year-old female presented with a history of twisting injury of the right anklewhile walking two months back. She took conservative treatment in the form of a below knee slab for one month. But the pain did not subside. She presented with severe pain inthe outer aspect of her ankle while walking and complained of occasional snapping sounds.

On clinical examination, there was severe tenderness along the posterior aspect of the distal fibula along the trajectory of the peroneal tendons until the sinus tarsi. Snapping of the peroneal tendons was present in the ankle range of movement, and inversion of the foot was painful. There was no gross swelling around the ankle, and ankle movements were normal.

Aprovisional diagnosis of peroneal tendon rupture and peroneal retinaculum rupture was considered. MRI was advised to confirm the same.

MRI showed a Micky Mouse sign (Figure 1) and a prominent peroneal tubercle (Figure 2).

Figure 1: A Micky Mouse sign showing a peroneus brevis tear with peroneus longus interposed in the brevis tendon.



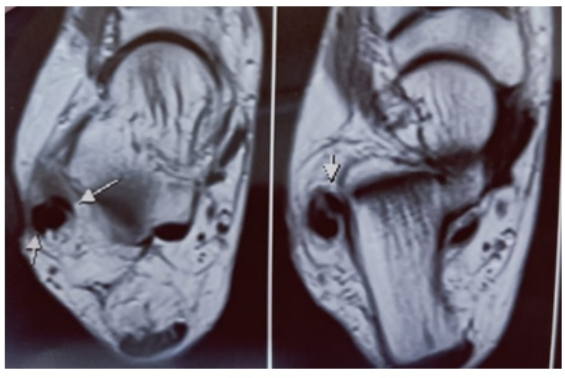


Figure 2: Prominent peroneal tubercle.



The final diagnosis was traumatic peroneus brevis rupture withsubluxated peroneus longus. The surgical plan was to carry out tendon debridementand repair peroneus brevis and peroneal retinaculum repair plus or minus peroneal groove deepening.

Operative procedure:

The patient was positioned in a supine position with a bump under the ipsilateral hip. A posterolateral incision over the posterior aspect of the fibula along the peroneal tendons identified both tendons. Around 3 cm of the longitudinal split was found within the peroneus brevis, while the peroneus longus was normal (Figures 1a and 1b).

Figure 1a and 1b: Split tear of peroneus brevis with normal peroneus longus.





A small portion of the peroneus brevis was excised, and the remaining tendon tubularisation was done with 2-0 Ethibond sutures (Figure 2).

Figure 2: Tubularization of peroneus brevis.



The peroneal groove was deep enough to accommodate both peroneal tendons, so groove deepening was unnecessary.Two 2.8mm single-loaded suture anchors are placed in the fibula. The superior peroneal retinaculum was repaired with no 2 fibre wires of suture anchors. The peroneal tendon's normal excursion was assessed by moving the ankle in a full range of motion (Figures 3a and 3b).

Figure 3a and 3b): Final repair of the superior peroneal retinaculum. A post-operative radiograph with anchors in situ.



The wound was closed in layers, and a below-knee slab was applied. The slab was kept for two weeks, followed by suture removal and a non-weight-bearing below-knee cast for another four weeks. The ankle range-of-motion exercises started at six weeks, and after six weeks, full weight bearing was allowed at eight weeks. At the final follow-up, the patient had normal function with normal movements (Figures 4a and 4b).

Figures 4a and 4b: Post-operative movements.



Pearls of wisdom:

· Patient with a history of inversion ankle injury with normal ankle x-rays; clinical evaluation of peroneal tendons is necessary.

· MRI is an investigation of choice.

· If suture anchors are unavailable, the surgeon can manage peroneal retinaculum repair with osseous tunnels in the fibula.

· Sometimes peroneal groove is too shallow to accommodate peroneal tendons; in such cases, the surgeon needs to do deepening of the groove with the help of a small burr or small osteotome.

CASE OF PERONEAL TENDON DISLOCATION



Dr Ankit Kamothi

Dr Ankit Kamothi is a fellowship-trained foot and ankle surgeon practising in Ahmedabad.

Case history: A 26-year-old male,a police officer by occupation, presented with a twisting injury to his left ankle during training six months ago. He was initially treated for an ankle sprain and immobilised with an ankle orthosis for thirty days. He observes continued pain and peroneal tendon dislocation at the ankle. The patient learned to self-reduce tendon dislocation multiple times. He also observed a popping sound while the tendon was dislocated.On examination, we found tenderness around the lateral malleoli. The apprehension test was positive at active dorsiflexion and eversion against resistance. At active circumduction, the peroneal tendon also got subluxated (Figure 1).

Figure 1: Demonstration of peroneal tendon dislocation at active dorsiflexion



The ankle series X-rays were normal. The diagnosis was confirmed with dynamic ultrasound evaluation. MRI helps diagnose any peroneal tendon pathology and peroneal groove morphology. MRI, being a static imaging modality, is not very helpful in pure subluxation or dislocation cases. In our case, no peroneal tendon injury was found. Our diagnosis was traumatic peroneal tendon subluxation without any tear.

Operative procedure:We planned to perform superior peroneal retinaculum repair with groove deepening(grooveplasty). The patient was supine with the affected leg elevated and externally rotated to allow optimal access to the lateral ankle.A curvilinear or longitudinal incision was made over the lateral aspect of the ankle, just behind the fibula, to expose the peroneal tendons(Figure 2).

Figure 2: Marking of curvilinear incision.

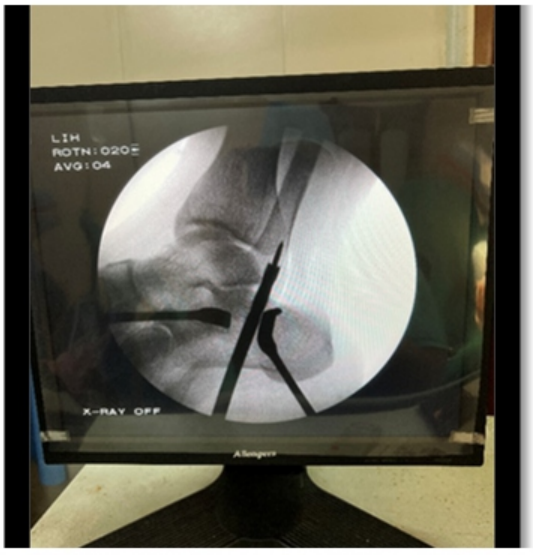


On exploration, peroneal tendons were normal without any tears.

The superior peroneal retinaculum (SPR) was lax and torn. The fibular groove was also found to be slightly shallow.

We did groove deepening using a small drill bit from the fibular tip through the subcortical bone groove and posterolateral wall under image guidance.Curettes of various sizes removed the cancellous bone behind a posterolateral wall of the fibula. A smooth bone tamp was used to punch the fibula and deepen the fibular groove (Figures 3a and 3b).

Figures 3a and 3b: Drill bit in fibula (3a) followed by hammering a tamp to create fibular groove deepening (3b).



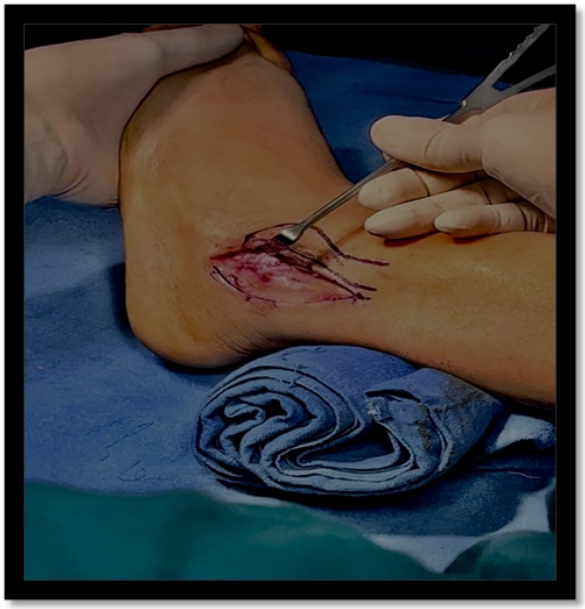


The anterolateral border of lateral malleoli was roughened, and one 2.8mm suture anchor was placed over it (Figure 4). The SPR was repaired using the pant-over-waist technique, maintaining the ankle in dorsiflexion and eversion. The strength of the repair was checked by moving the ankle through a full range of motion (Figure 5). The wound was thoroughly washed and closed, and a below-knee slab was given.

Figure 4: Anchor placement in fibula.



Figure 5: Post-repair check with ankle movements.



Post-operative protocol:A below-knee slab was kept for ten days, followed by early passive ROM at two weeks and suture removal at two weeks. After two weeks, partial weight bearing was allowed with an air walker boot. Full weight bearing was allowed at four weeks. At around eight weeks, active ROM exercises, proprioception, balancing, and gait training were allowed.

Pearls of wisdom:

· All ankle twisting injuries are not lateral ankle sprain.

· Peroneal dislocation is a more clinical diagnosis, but imaging modalities are necessary to rule out other pathologies.

· Dynamic ultrasound is beneficial in diagnosis.

· There are five aspects of surgical repair, namely

- Anatomic reattachment of the retinaculum.
- Reinforcement of the superior peroneal retinaculum with local tissue transfers.
- Rerouting the tendons behind the calaneofibularligament.
- Bone block procedures.
- Groove deepening procedure.

· The surgeon must advise longer immobilisation if peroneal tendon pathology or tear is treated with dislocation.

· SPR repair with groove deepening gives the best outcome for every individual.

A CASE OF PLANTER PLATE RUPTURE OF 1ST MTP JOINT (TURF TOE)



Dr Vihal Patel

Dr Vihal Patel is a fellowship trained foot and ankle surgeon practising at Surat.

Patient History:

A 22-year-old young girl came with pain and swelling over the planter aspect of the 1st MTP joint and difficulty with weight bearing for two and half months. She had a history of trauma while she was travelling in a sleeper coach bus, which met with an accident with another heavy vehicletwo and a half months back. The patient had a proximal tibia fracture, which was managed with surgery elsewhere. The patient also had pain and swelling on the plantar aspect of the 1st MTP joint, which was treated as simple blunt trauma with a plaster slab.

At presentation, she showedsevere tenderness on the planter aspect ofthe 1st MTP joint without any collateral laxity. However, her Lachman test, showing dorsoplantar instability with proximally shifted sesamoids, was positive. We made a diagnosis of plantar plate injury.

Investigations:

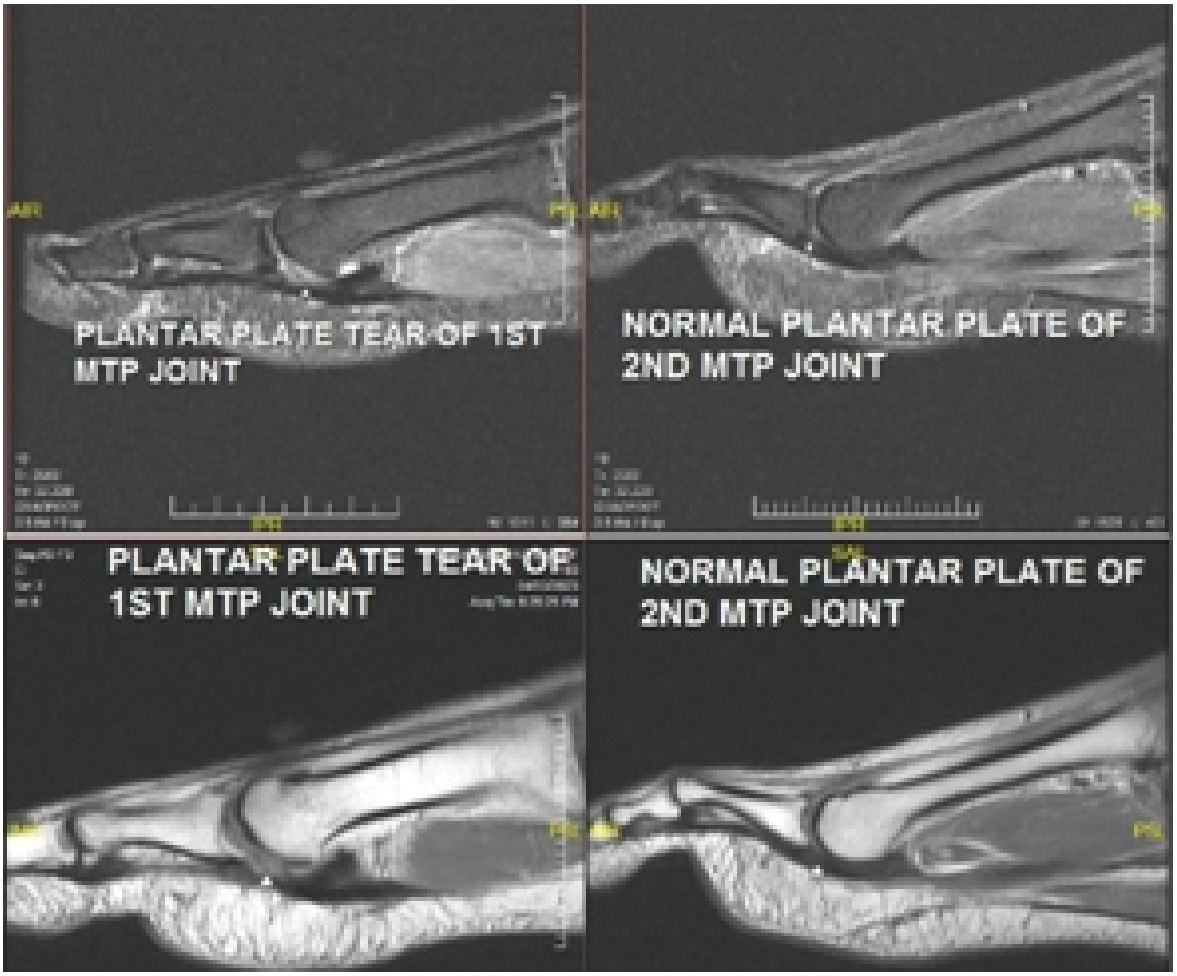
Aweight-bearing AP view of both feet (compared with a normal foot) demonstrated a proximal shift of sesamoids (Figure 1).

Figure 1: Proximal shifting of sesamoids on left side compared to right side suggestive of high-grade plantar plate rupture.



We taped her 1st toe in planer flexion and advised her to do an MRI to confirm the planter plate injury (Figure 2).

Figure 2: The planter plate ruptured from the base of the proximal phalanx of the first toe. Here, the radiologist gives us a comparative image with the Normal Planter plate of the second MTP joint.



Treatment:

This being a grade 3 injury, surgery was the option.

The patient was posted for surgery under spinal anaesthesia and in a supine position.Painting and draping of the normal limb weredone for intraoperativecomparison of the sesamoid position. A plantar-medial J-shaped incision was taken (Figure 3).

Fig 3: Medial incision taken as seen in the image to reach planter plate of 1st MTP joint.



The medial plantar nerve and tendon of flexor hallucis longus were identified and isolated (Figure 4).

Figure 4: Isolated tendon of long toe flexor and medial plantar nerve.



The medial plantar nerve and flexor hallucis longus tendon were isolated and retracted to identify a plantar plate tear. Two 2 x 1.8mm suture anchorswere placed in the base of the proximal phalanx, one medially and one laterally. The torn planter plate was tightly tied to anchors while 1st toe was held in plantar flexion (Figure 5). The toe was in plantar flexion at the end of the procedure (Figure 6). A forefoot slab with a toe sleeve was applied.

Figure 5: Two suture anchors, one medial and one lateral, in the proximal phalanx base for tying the plantar plate with the toe in plantarflexion.



Figure 6: Final position of the toe at the end of surgery.



Post op protocol

A forefoot slab was given for one month, and the patient was mobilised with heel weight bearing with a walker for one month. After one month, active mobilisation and partial weight bearing on the 1st MTP joint started, and after one and a half months. Full weight bearing was started once she wascomfortable with passive stretching of the 1st MTP joint.

At the final follow-up, at eight months, the sesamoids were in a precise position with a good range of motion (Figures 7, 8a, and 8b). The scar healed well, and the patient was able to stand on tip toe (Figure 9).

Fig 7: Weight-bearingX-ray at eightmonths. As we can see here, both sesamoids are at the same level.

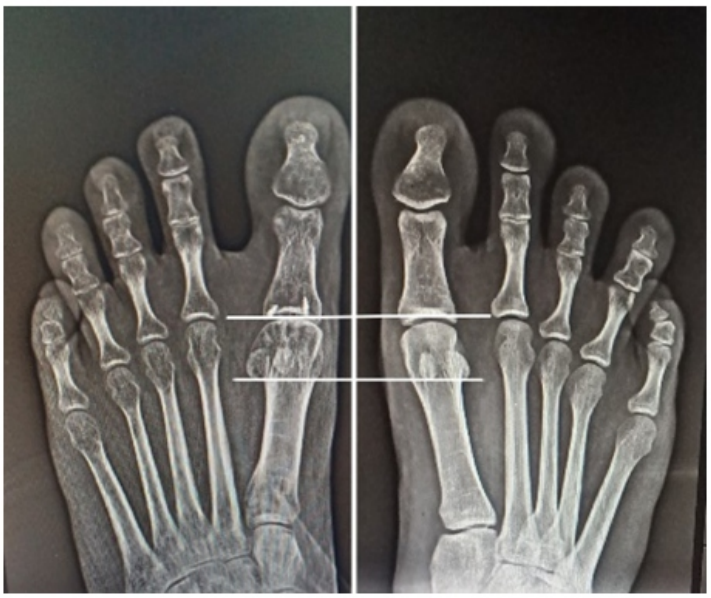


Fig 8a and 8b: Planter flexion and dorsi flexion of 1st toe.



Fig 9: The scar has healed well, and the patient was able to stand on her toes at eight months.



Words of wisdom:

· A high index of suspicion is a must.

· Proper history-taking is crucial to understanding the mechanism of injury. In this case,the patient's sudden overstretching of the 1st MTP joint due to collision led to the rupture of the planter plate from the base of the proximal phalanx.

· Proper investigations, such as a weight-bearing foot AP view to identify the proximal shifting of the sesamoid bone and an MRI to confirm the diagnosis and determine the severity of the injury, are crucial.

· If we don't repair the planter plate, the proximal phalanx will slowly go into dorsi flexion, resulting in claw toe deformity, and painful callosity will develop, as the planter plate is a static component of the flexor compartment of the 1st MTP joint.

· Proper postoperative care and physiotherapy is a must for better outcomes.

A CASE OF MISSED AVULSION OF ANTERIOR INFERIOR TIBIOFIBULAR LIGAMENT



Dr Varun Sahetia

Dr Varun Sahetia is a Foot and Ankle Orthopedic Specialist at Surat. He has a special interest in sports Injuries and diabetic foot management and has been trained in Arthroscopic and MIS surgeries.

Case description: A male, 38 years old, met with a road traffic accident six months ago. The patient sustained an ankle fracture, which was diagnosed as a Bimalleolar Potts Ankle fracture with syndesmotic injury (Figures 1a and 1b). Only X-rays were carried out before surgery.

Figure 1a and 1b: Injury x-rays, anteroposterior (a) and lateral (b) of the patient showing a bimalleolar fracture.



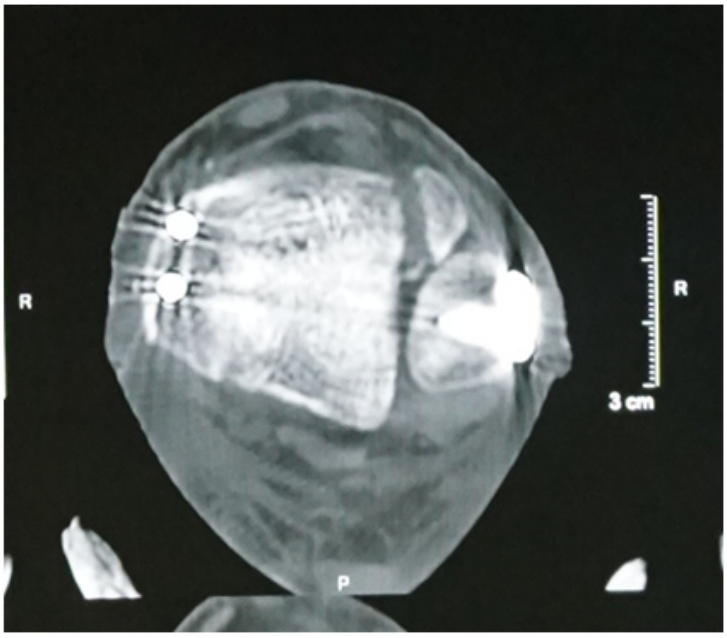
The patient was treated with open reduction and internal fixation of malleolar fractures, and syndesmosis was also fixed with a syndesmotic screw (Figures 2a and 2b).

Figures 2a and 2b: Post-operative anteroposterior (a) and lateral (b) images of the same patient.



At presentation to us, the patient had persistent pain on walking even after six months of surgery.A CT scan was advised. CT scan demonstrated avulsion fractures of the anterior inferior tibiofibular ligament (AITFL) (Figure 3).

Figure 3: Axial CT scan showing avulsed fragment from AITFL.



An open reduction was performed, and the avulsed fragment was fixed with a reconstruction plate. The fracture then healed well (Figure 4).

Figure 4: Final post-operative x-ray.



Pearls of wisdom:

- A CT scan is mandatory for all ankle fractures.
- Always stress your ankle after fixation to look for instability/ ligamentous involvement.
- Always have X-rays of one joint above to rule out proximal fibula fracture
- Opposite-side X-rays are beneficial.

In case of fibular comminution, Fix the medial malleolus first

REVISION ANKLE FRACTURE FIXATION



Dr Dhimant Patel

Dr. Dhimant Patel is a practising Orthopaedic Foot & Ankle Surgeon at Ahmedabad. He received his fellowships from the UK, Chennai, and Vadodara. His area of interest is complex deformity correction.

Case presentation: A 53-year-old male patient, a professional driver, presented to us with complaints of a deformed ankle, swelling, and pain during activities on the right side.He also gave a history of ankle surgery for trauma seven months ago. Detailed history revealed that the patient had a compound ankle injury operated elsewhere with primary wound debridement, internal fixation, and closure (Figures 1a and 1b). At four weeks, the patient was asked to follow physiotherapy sessions. It was severe pain and deformity that led the patient to opt for a second opinion.

Figure 1a and 1b: A compound bone injury of the right ankle following a road traffic accident.



A transverse scar was present over both sides of the ankle, and swelling and visible varus deformity were present. Tenderness was present over the medial and lateral malleolus over the scar without neurovascular impairment (Figures 2a and 2b).

Figures 2a and 2b: Lateral (2a) and medial (2b) aspects of the affected ankle demonstrating scars.



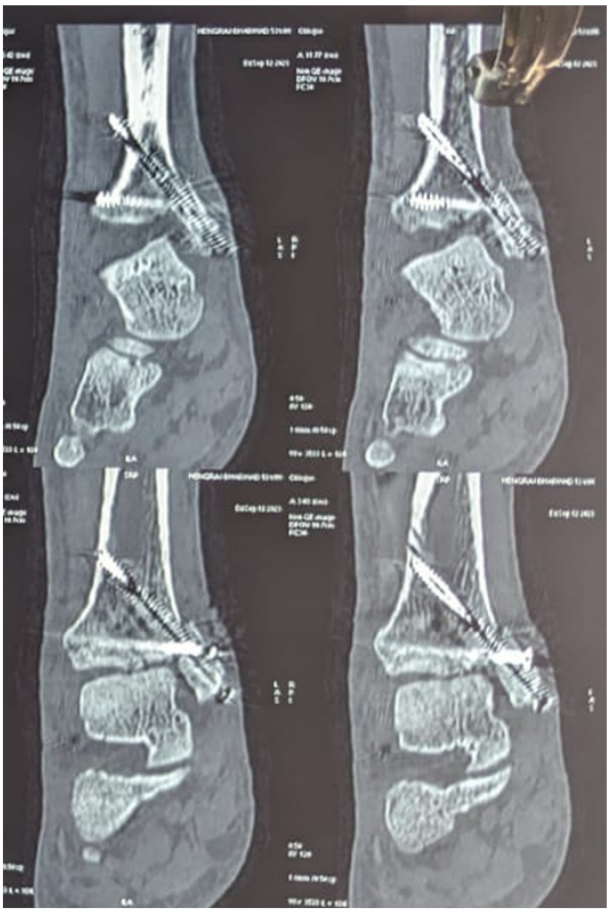
Ankle x-rays at presentation showed varus malalignment of bimalleolar ankle fracture where fibula was fixed with two k-wires and medial malleolus with two screws. (Figure 3).

Figure 3: Fixation Lauge-Hansen Supination adduction type injury with varus mal-alignment.



A CT scan was advised, and it demonstrated a depressed articular fragment at the tibial surface with medial angulation (Figure 4).

Figure 4: CT scan showing depressed medial tibial articular fragment.



The decisionto have revision surgery was made. The patient was positioned supine, and scar-sparing incisions were made on both sides (Figure 5). The fibular fracture site was explored, and implants were removed. There was a visible gap(Figure 6). The fracture site was prepared.

Figure 5: Sar sparing incision.



Figure 6: Visible gap at fibular fracture.



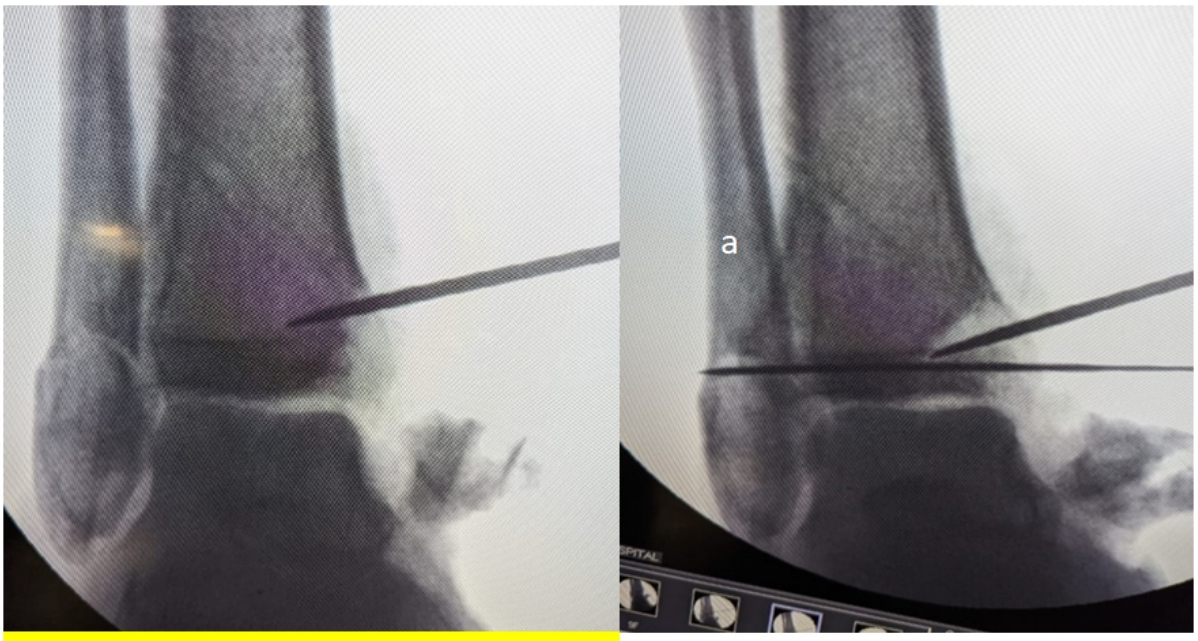
The medial side implant removal was done. The medial malleolus was lifted from its fracture to expose the depressed joint fragment. The fragment was elevated with the help of osteotome taking some subchondral bone stock (Figure7).

Figure 7: Osteotome elevation of fragment.



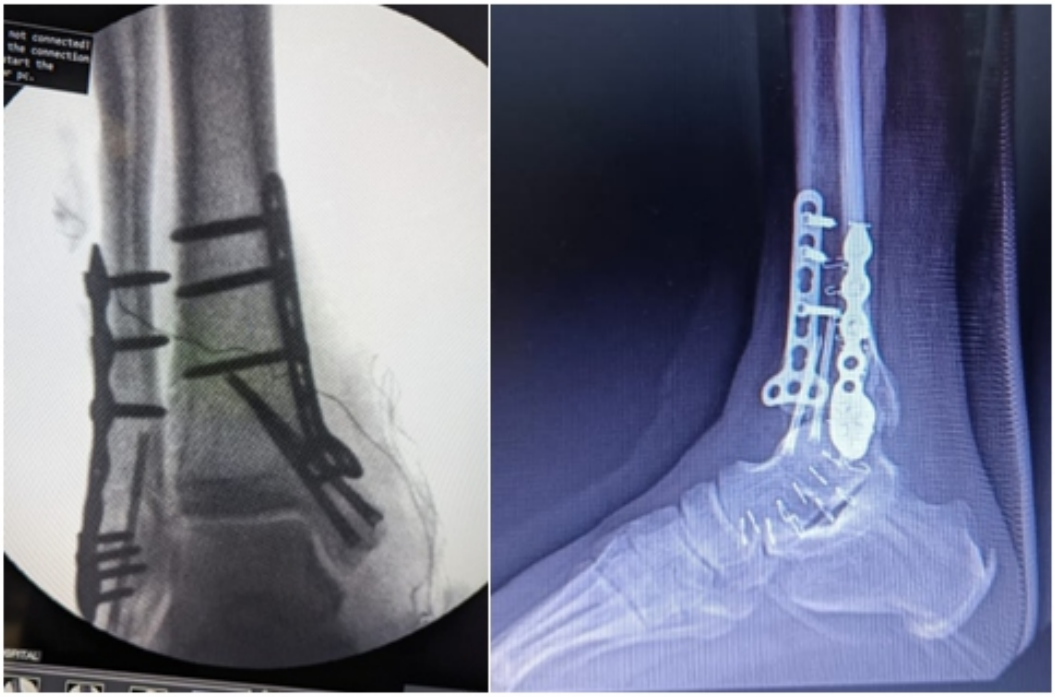
A bone graft was taken from the same site and placed under the fragment for support. Temporary fixation with a k-wire helped maintain the reduction. Alignment was checked under the image (Figure 8). Medial malleolus fixation was done using a 3.5mm antiglide plate and two 3.5mm full-threaded compression screws.The fibula was fixed with a plate and a compression screw to close the bone gap. The closure was done in layers.

Figure 8: Image demonstrating precise reduction of the medial malleolus.



Postoperative radiographs confirmed the anatomical alignment and complete restoration of parameters of the ankle mortise (Figure 9).

Figure 9: Immediate postoperative radiograph showing precise restoration of the ankle mortise.



On the first postoperative day, the patient was mobilised non weight-bearing using a walker. Following the surgery, a below-knee splint was applied for four weeks, and active range of motion (ROM) exercises were initiated to prevent prolonged stiffness. The sutures were removed in the second week. Partial weight bearing was initiated eight weeks after the surgery and continued with full weight bearing ten weeks after.At the 3-month follow-up, full recovery was achieved without any ROM limitation, instability, swelling, or sensory deficit; a normal alignment of the tibiotalar joint, without any signs of degenerative changes, was seen (Figures 10a, 10b, 10c, and 11).

Figures 10a, 10b, and 10c: Three months follow up with weight bearing x-rays (a, b), x-rays in full planterflexion and dorsiflexion(c).

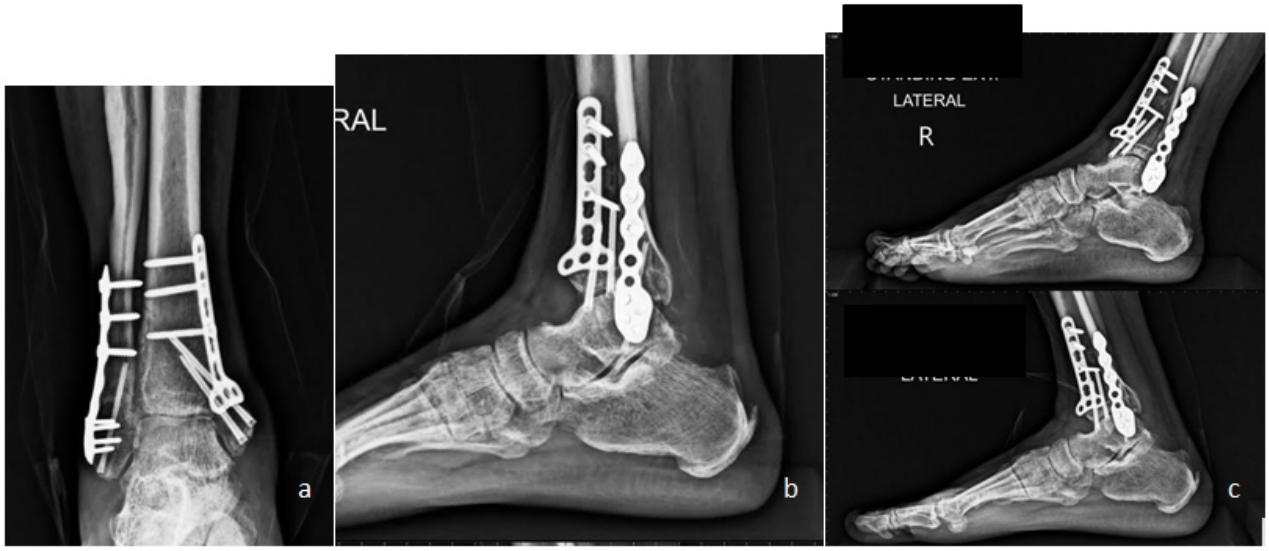


Figure 11: The patient was able to perform squatting at three months.



Pearls of wisdom:

· Revision ankle fracture fixation is challenging, but joint movement was a priority considering the patient's age and profession.

· Supination-adduction type of ankle injury has a high chance of intra-articular depression (73%), and 23% have radiographic arthrosis.

· Anatomical reduction and stable fixation of articular impaction appear to mitigate the risk of post-traumatic arthritis.

· Assessment of local condition and site of previous wounds is critical to plan the incision.

· Perform a preoperative CT scan of all ankle fracture patients, assess it, and plan accordingly.

· Post-operative aggressive physiotherapy is a must.

A CASE REPORT OF TIBIO-CALCANEO-NAVICULAR ARTHRODESIS FORPOST-TRAUMATIC TALUS FRACTURE WITH ANKLE ARTHRITIS



Dr Nrutik Patel

Dr Nrutik Patel is a fellowship-trained foot and ankle surgeon who practices in Ahmedabad. His special interest is diabetic foot.

Case description:

A 22-year-old male patient met with a road traffic accident seven months ago. The patient had a type 3C talus fracture treated with provisional fixation with vascular plus plastic reconstruction.The wound was healed with sequential dressing. At presentation, the patient had ankle pain and swelling and could not ambulate. On examination, ankle movements were restricted to five degrees with pain. There was no distal neurovascular deficit with good flap coverage (Figure 1). We ruled out infection with haematological investigations.

Figure 1: Clinical picture showing clean skin condition with taken-up graft at the lateral ankle.



Ankle series X-rays demonstrated ankle arthritis with the destruction of the talar body (Figure 2). CT scan also confirmed the diagnosis (Figure 3).

Figure 2: X-ray demonstrated ankle arthritis with the destruction of the talar body.

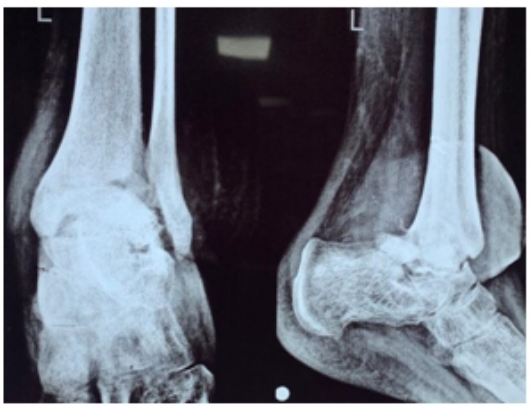
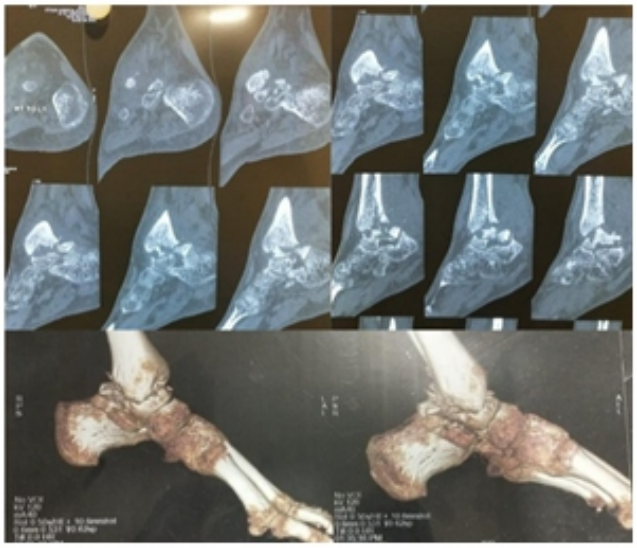


Figure 3: CT scan confirmed ankle arthritis with distal tibial and talus surface destruction.



Surgical management was contemplated. The plan was to carry out tibio-calcaneal-navicular arthrodesis.Wechoose the direct anterior approach. The lateral approach was avoided, considering the skin flap on the lateral side. An anterior approach was taken. Talus was removed in a piecemeal pattern (Figure 4).

Figure 4: Anterior approach with talectomy.

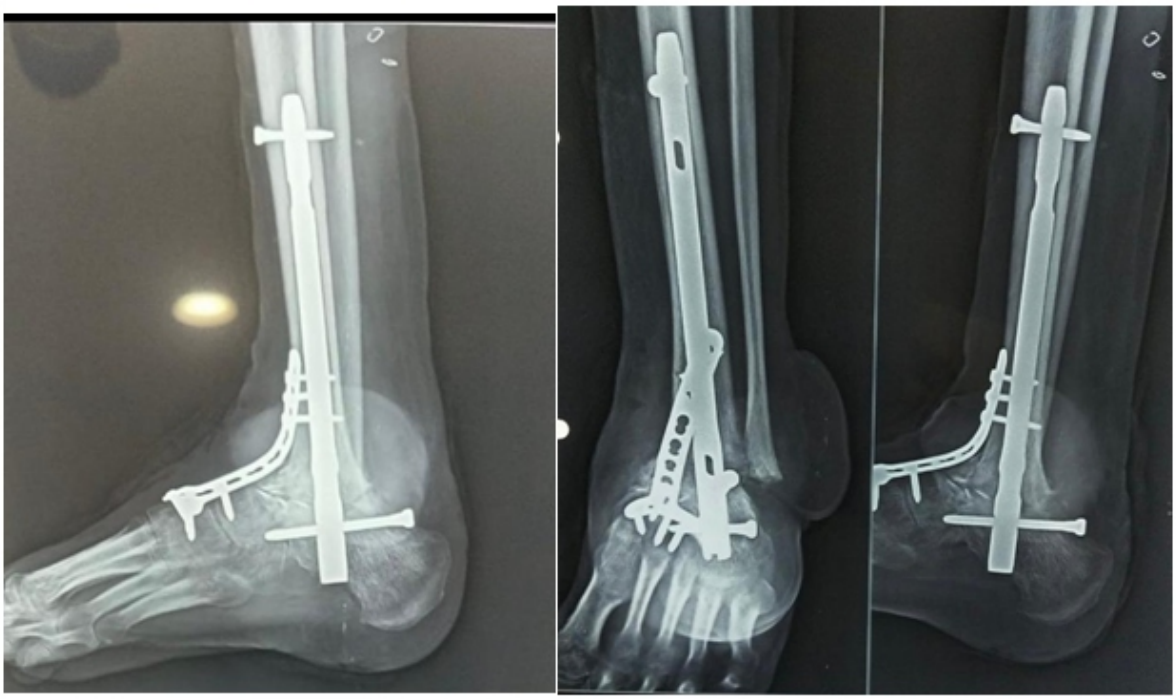


Both the joint surfaces of the tibia and calcaneum were debrided. The proximal surface of the navicular bone was also decorticated, and drilling was done.A bone graft was put in, and the hindfoot nail was inserted from the calcaneus. Still, there was dissociation of the tibia to the navicular.So,the anterior plate with the same approach was inserted and fixed with locking screws. This was followed by a layered closure (Figure 5). Post-operative radiographs showed satisfactory fixation (Figures 6a and 6b).

Figure 5: Wound closure.

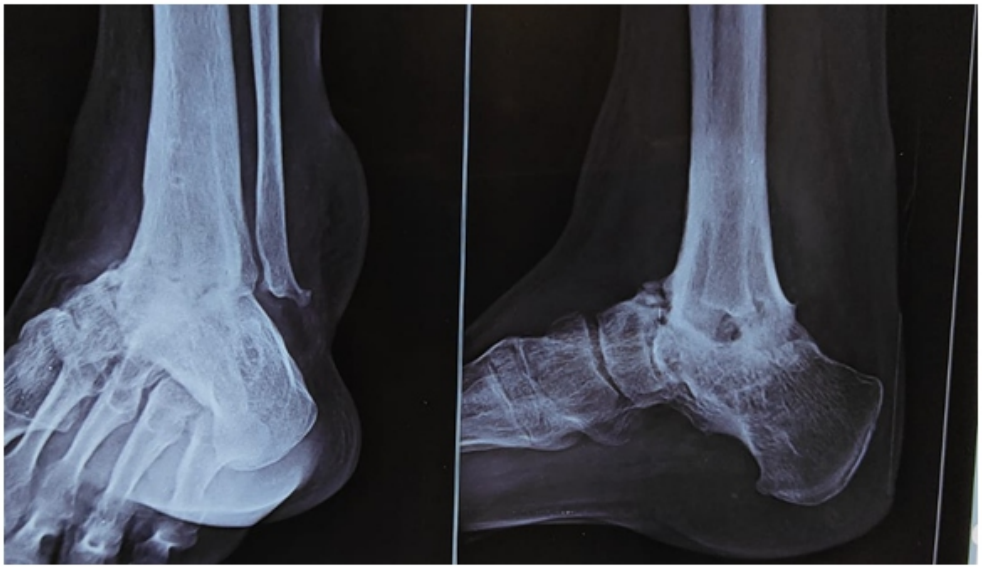


Figures 6a and 6b: Immediate post-operative radiograph showing stable fixation with TTC nail and anterior plate.



At two weeks, stitches were removed, and the leg was plastered for six weeks. After the plaster removal, the patient was allowed to put on partial weight for one month and full weight afterwards. Implants were removed nine months after surgery (Figure 7). The patient is walking pain-free with the plantigrade foot, with a limited range of motion.

Figure 7: Follow-upx-ray after nine months showing implant removal and union over fusion site.



Pearls of Wisdom

· Identifying morphology in radiographs and CT scans will help the surgeon plan surgery and fixation methodology.
· There are several methods and fixation devices for ankle fusion. It would be best if the surgeon chooses implants according tothe case and local condition.
· Plantigrade, braceable foot is the goal in suchcases.
· Meticulous debridement of joint surface, bone grafting, and adequate fixation are the keys to success.
· Out of multiple options to manage this case, fusion was selected over revision fixation, ankle replacement, or total talar replacement. The presence of ankle arthritis, multi-fragmented talus, and lack of adequate bone stock were the factors that prioritise arthrodesis over other options.

A SIMPLE FIXATION METHOD IN A COMPLEX INRA-ARTICULAR CALCANEUM FRACTURE



Dr Harsh Vyas

Dr Harsh is a fellowship-trained foot and ankle surgeon practising in Ahmedabad.

Case description:

40 A 40-year-old male patient presented to our hospital with a history of fall from height. He was unable to put weight on his right limb. On examination, the heel was quite broad compared to the other side, and tenderness was present all around the heel. He was a known case of DM taking oral hypoglycaemic drugs. Before the surgery, the patient was temporarily immobilised with a below-knee slab, underwent routine investigations, and obtained pre-operative workup clearance.

The calcaneum was radiologically evaluated using plain radiographs (Figure 1) and CT scans (Figures 2a and 2b).

Figure 1: Injury X-rays demonstrating fracture calcaneus.



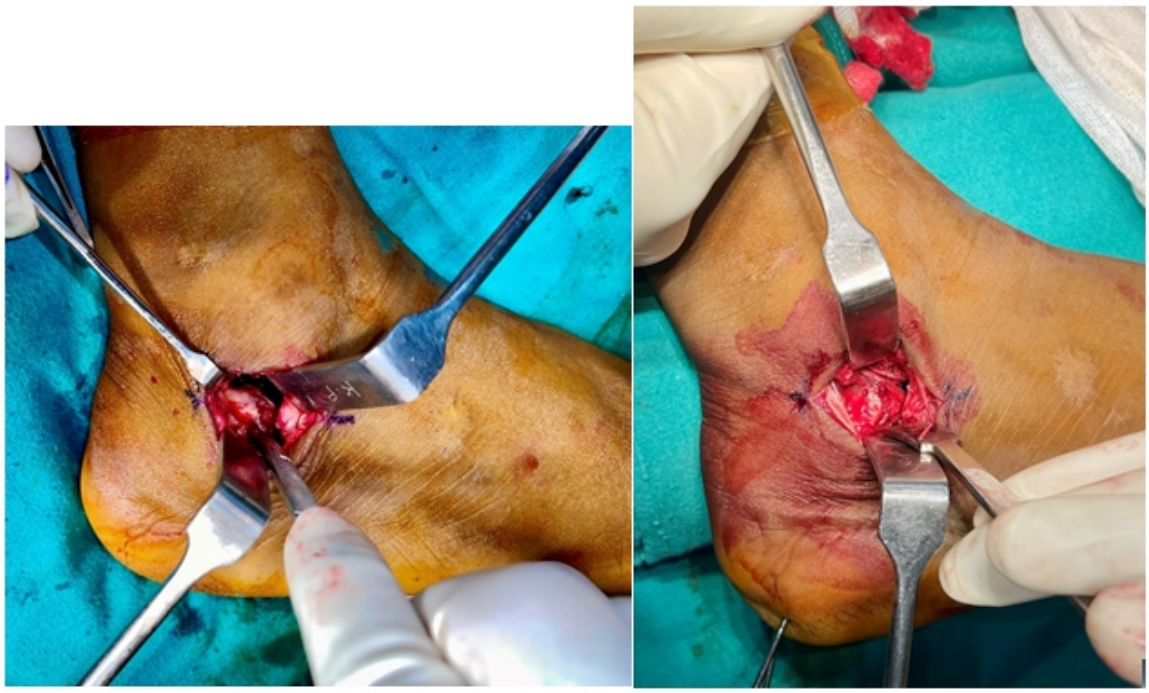
Figures 2a and 2b: Coronal (a) and sagittal (b) CT scan images of the same patient confirming the diagnosis





The surgery was planned in closed reduction and fixation with a sinus tarsi approach.
An approach was taken from the tip of the lateral malleolus towards the base of the 4th metatarsal, exposing the posterior facet. A Steinmann pin was inserted for axial traction to correct the axial alignment and height of the calcaneum. The most important step was to elevate the depressed posterior facet using Hohmann's retractor (Figures 3a and 3b).

Figures 3a and 3b: Posterior facet depression visualised through the sinus tarsi approach was corrected with a Holmann retractor.



The reduced posterior facet was fixed with a 1.8mm K wire. The tuberosity was fixed to the talus through the constant fragment with the help of K wire. A thalamic (sustentacular) screw was passed from lateral to medial and cephalad to caudal direction, aiming towards sustentaculum tali to compress the fragments. A 1.8 mm K wire was passed through the plantar aspect of the calcaneus through the posterior facet into the talus. Bend the K wires and project them out through the plantar skin. (Figure 4).

Figure 4: Final closure and K wires projecting out of the plantar skin.



Figure 5 demonstrates a well-reduced fracture.Trans-articular K wires were removed at six weeks, partial weight bearing was started at eight weeks, and full weight bearing at three months.

Figure 5: Postoperative radiographs showing well aligned fracture.



Pearls of Wisdom

· This is a simple technique that is soft tissue friendly, economical, and effective in difficult situations of displaced intraarticular calcaneal fractures.

· Sinus tarsi approach is a soft tissue preserving approach, and trans articular K wires with or without sustentacular screw after anatomic reduction of posterior facet help to avoid post-operative subsidence of facet and maintain axial alignment, length and width of the calcaneum.

· K wires projecting out from plantar skin also help compliance, keeping patients non-weight-bearing for at least 6-8 weeks.

· This technique can be safely utilised in people with diabetes, smokers, children and patients with compromised soft tissue.

· We have published our study of 226 patients with displaced intra-articular calcaneum fractures treated with trans articular K wires with or without sustentacular screw through the Sinus tarsi approach, and we had 81.41% (p-value 0.4.) good to excellent results compared to other studies of displaced intra-articular calcaneum fractures through MIS technique.