APOA Foot & Ankle Council Presents..

Case of the Month

January 2024

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Presented by:

Dr. Wong Chung-Hei, Leo

Department of Orthopaedics and Traumatology
Princess Margaret Hospital, Hong Kong SAR

Title:

Surgical Management of a Case of Ankle Nonunion

Learning Points:

- It is important to identify the underlying cause of non-union
- For the treatment of hypertrophic non-union, restoration of mechanical stability is essential to achieve bone healing

Upcoming Case of the Month
February ***2024***

Presented by:

Andri Primadhi, MD, PhD

Department of Orthopaedics and Traumatology
Universitas Padjadjaran Medical School / Hasan Sadikin Hospital
Bandung, Indonesia

Title:

Interpositional Arthroplasty for Hallux Rigidus

Want to present a case? Write to...

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Surgical Management of a Case of Ankle Nonunion

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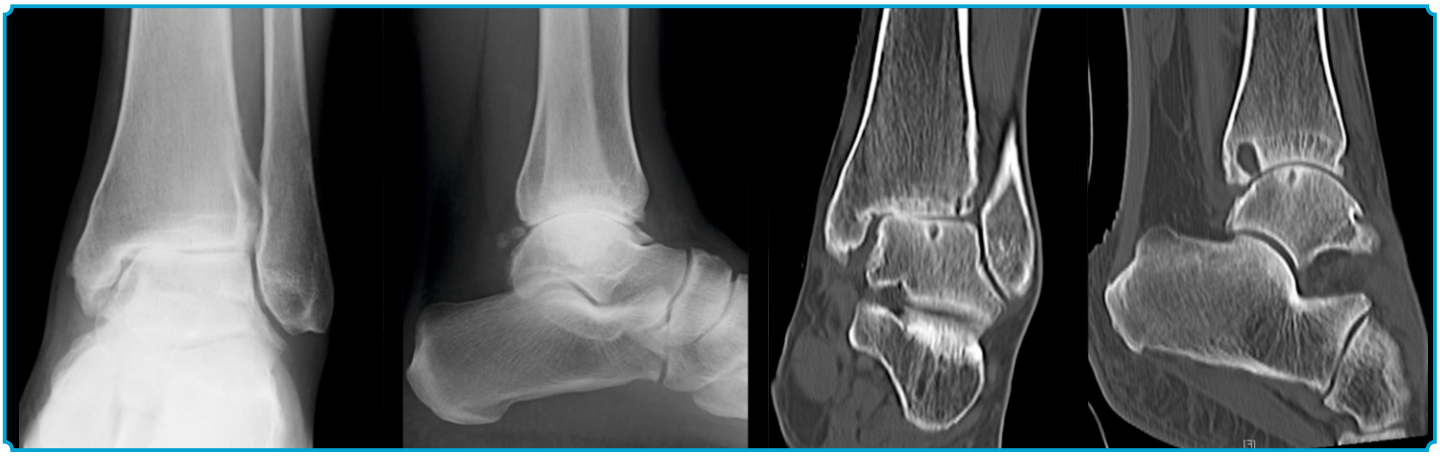
This is a case of a 43-year-old lady presented with advanced left ankle osteoarthritis who underwent open ankle fusion but required multiple revision surgeries due to non-union.

She suffered from a left ankle fracture in a road traffic accident in 1997. She was a chronic smoker with a psychiatric history of depressive disorder. Otherwise, she had good past health and walked unaided. She complained of left ankle pain after the road traffic accident. There was increase in ankle pain for a few years. On physical examination, there was tenderness at the left ankle. The range of ankle dorsiflexion was 5 degrees and plantarflexion was also 5 degrees. XR and CT scan of the left ankle showed advanced degenerative changes with tibiotalar sclerosis and subchondral cyst (***Fig.1).*** The diagnosis was osteoarthritis of the left ankle



(Fig. 1)
Pre-operative X-rays and CT scan demonstrated advanced degenerative changes of the ankle joint with subchondral cyst formation

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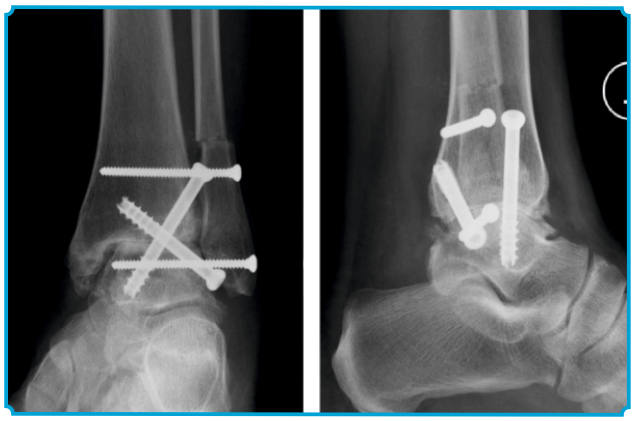
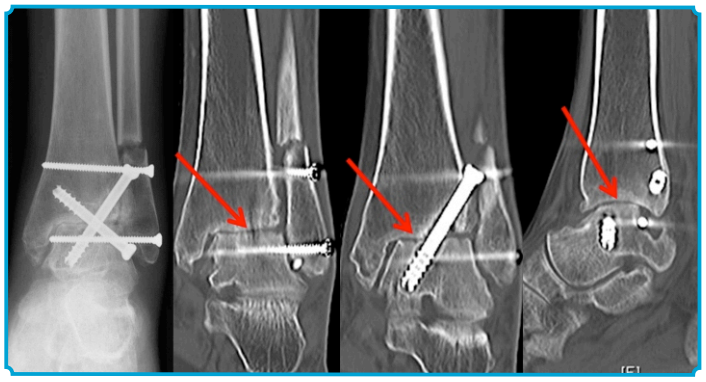
She had failed conservative management such as analgesics, ankle-foot orthosis and local injection. Thus, open ankle fusion with screws and osteotomy of the distal fibula was performed in a hospital in 2014 ***(Fig. 2).***

Upon post-op 2 months, the patient noted increasing pain over the left ankle upon weight-bearing.

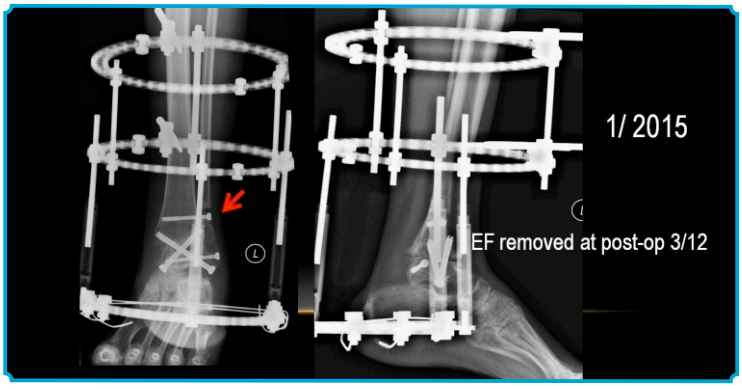


(Fig. 2)
Early post-op X-rays of the ankle

X-rays and CT scan at post-op 7 months showed non-union at the ankle ***(Fig. 3).*** Thus, revision of left ankle fusion with external ring fixator and bone graft obtained from the excised medial malleolus was performed in Jan 2015 (7 months after the index operation) ***(Fig. 4).***



(Fig. 3)
X-rays and CT at post-op 7 months showed non-union at the tibiotalar joint



(Fig. 4)
X-rays demonstrating the revision left ankle fusion with external ring fixator and bone graft obtained from the excised medial malleolus 7 months after the index operation.

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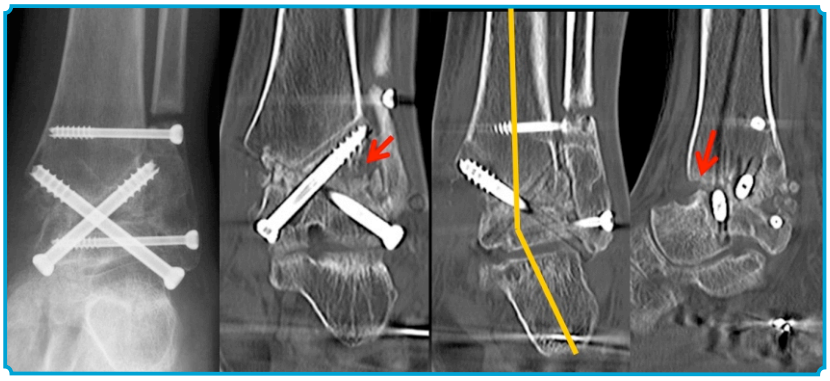
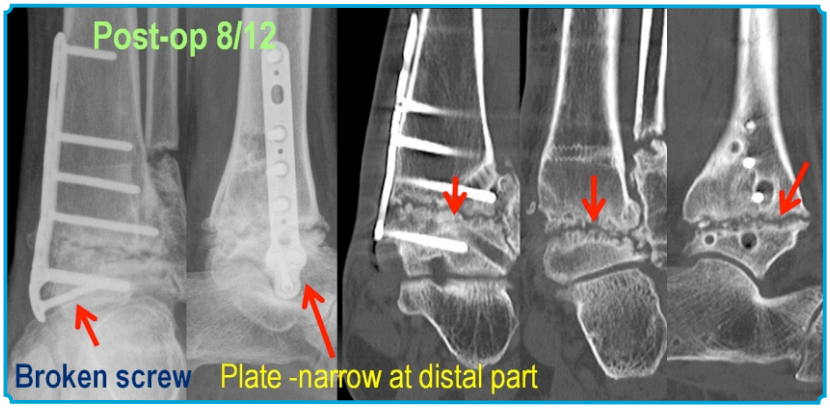
However, the patient still suffered from persistent pain after the revision surgery. X-rays and CT at post-revision surgery 1 year still showed a tibiotalar joint non-union and interval valgus heel deformity ***(Fig.5)*.**



(Fig. 5)

X-rays and CT at post revision surgery 1 year showed a tibiotalar joint non-union and valgus heel deformity

Afterwards, she attended another hospital. The 3rd surgery of revision fusion with a locking plate was performed in Dec 2015. Post-operatively patient barely tolerated walking with the frame due to ankle pain. As a result, this lady was homebound for almost 2 years consecutively. Unfortunately, upon follow-up 8 months after the 3rd operation, it was noted the most distal screw was broken and non-union was showed on subsequent CT scan ***(Fig. 6)***



(Fig. 6)

X-ray and CT scan revealed non-union and a broken screw at post 8 months after the 3rd operation.

The patient was later referred to my hospital, a tertiary orthopaedics hospital in 2016 due to her complicated post-op non-union despite multiple revision surgeries. Upon physical examination, there was apparent valgus hindfoot deformity seen over the left ankle with localized bony tenderness over the site of non-union. The subtalar joint was uninvolved at the juncture. The vascular condition was satisfactory with robust distal pulses. Her inflammatory markers were normal. The risk factor of bone non-union was reviewed with the patient, yet she was unsuccessful with smoking cessation.

There was a loss of both the medial and lateral buttress of the ankle joint after the previous surgery. The shortening of the fibula contributed to the valgus deformity. The surgery of excision of the medial malleolus might jeopardize the vascularity. In Aug 2016, the last revision surgery was performed in my hospital with plating on both distal tibia and fibula. The fibular length was restored with an autologous structural iliac

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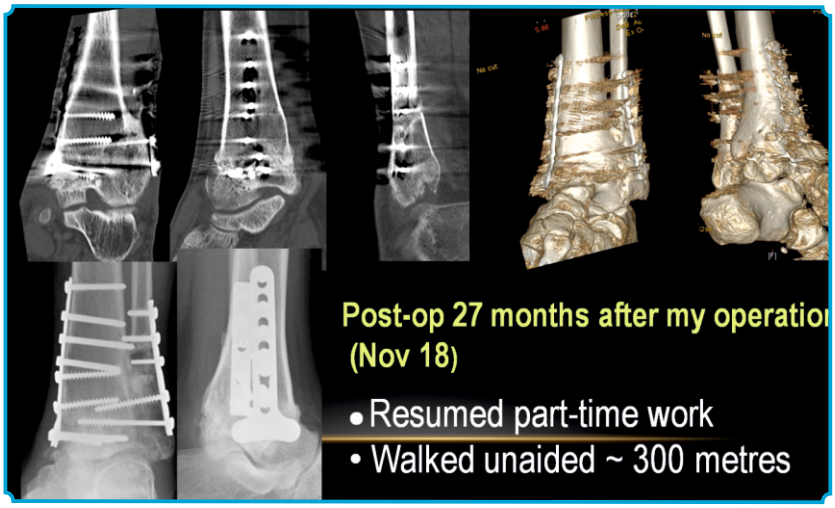
bone graft. A satisfactory stable fixation was achieved through the medial locking plate on the tibia and another lateral plate on the fibula. Bone healing was promoted by autologous iliac graft and bone marrow aspirate as well as demineralized bone matrix (allograft). A short-leg dynacast was applied. The patient was instructed not to bear weight with her left ankle for 10 weeks. Post-op CT at 14 months reviewed bony union ***(Fig 7).*** Clinically, the patient had gradually regained mobility to walk unaided and was able to resume part-time work.



(Fig. 7)

Post-op CT at 14 months revealed bony union and post-op X-rays at 27 months demonstrated good alignment.

Discussion

This case has illustrated the failure of ankle fusion surgery. In this case, mechanical instability is likely to be a significant factor for the ankle nonunion. The patient suffered from a hypertrophic non-union as evidenced on the XR films. Revisiting the tedious clinical journey of this lady, we are reminded of the approaches when tackling cases of foot and ankle non-union. Same with non-union over other parts of the body, infection as a cause must be ruled out. Subsequently, systemic (i.e. smoking) and localized risk factors (i.e. mechanical instability) should be reviewed and addressed. The pearl of this case is to share the importance of identifying the underlying cause(s) of non-union and its subsequent management. Regarding our case, the hypertrophic non-union was attributed to its mechanical instability. In other scenarios such as atrophic non-union, stimulation of biological healing with autograft bone graft is deemed more important in its management.

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