How I Fix A Bicondylar Fracture

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Disclosures

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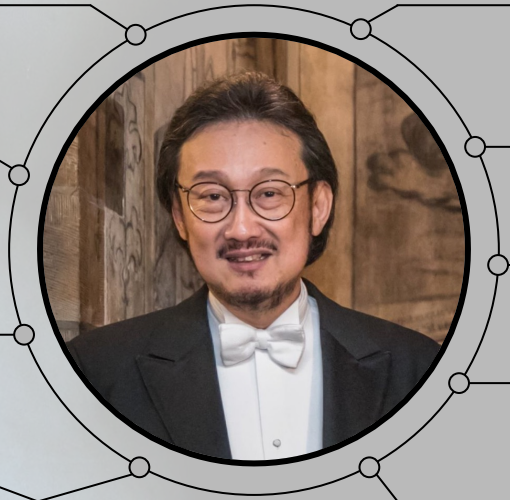
J Arthroplasty, AJSM, OJSM, VJSM, KSSTA,
JISAKOS, Knee, JOS, KSRR



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Arthroplasty Society in Asia (ASIA)

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Asia Pacific Knee Society (APKS)

President | 2020 - 2022
Asia Pacific Arthroplasty Society (APAS)

Introduction

Tibial plateau fractures are **complex** and despite timely and excellent reduction, they **may result in sub-optimal results**

This may due to the inability to detect and correct sagittal malalignment resulting from **a reversal of the posterior tibial slope**

Schatzker type VI constitute nearly **one-fifth (20%)** of tibial plateau fractures and are the **most challenging fracture patterns**

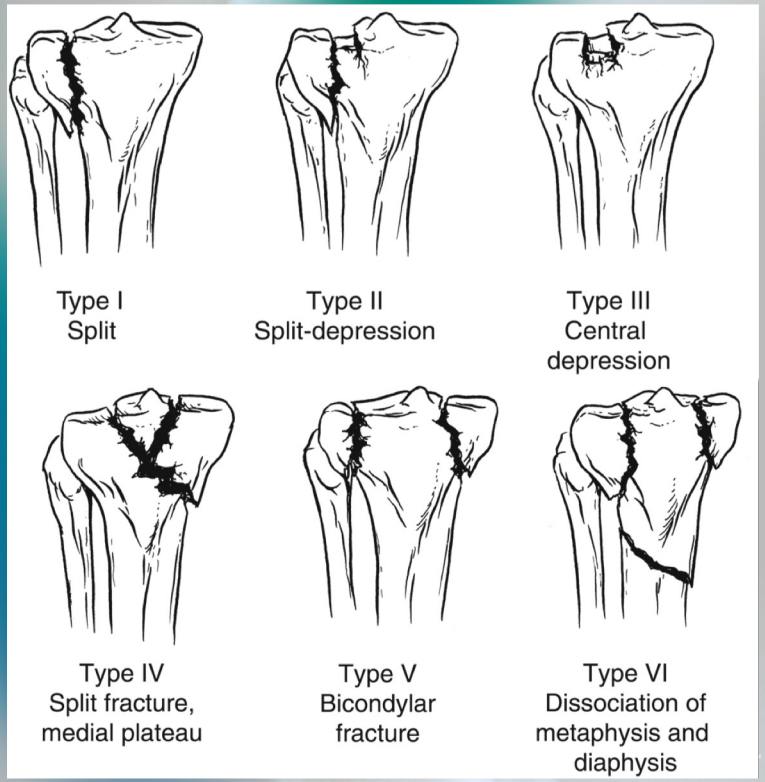
AO Principles of
Bicondylar Fracture Treatment

- **Functional reduction**
- **Stable fixation**
- Preservation of **blood supply**
- Early **active** movements

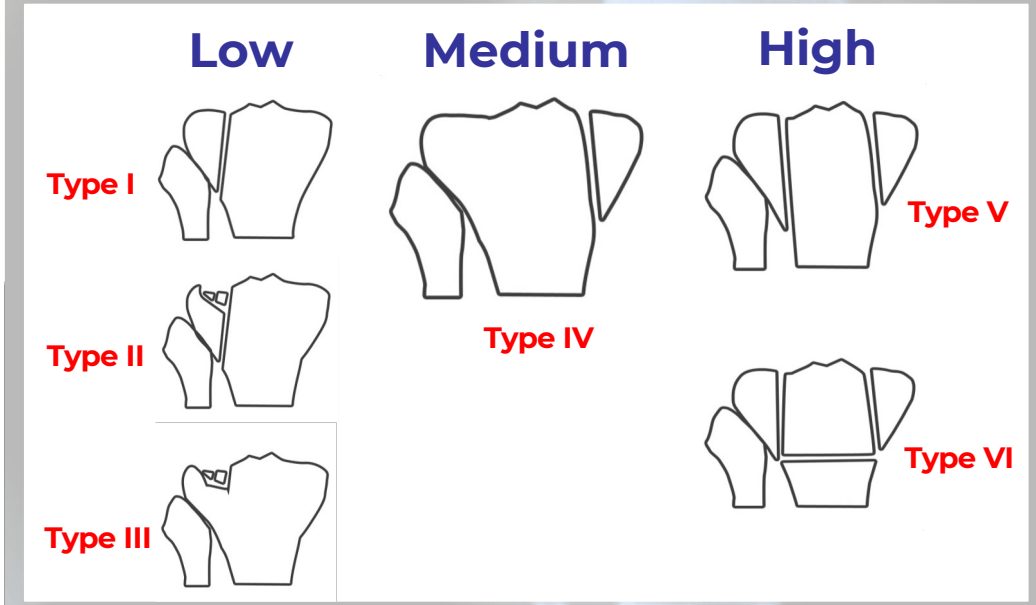
Treatment Options

- Conservative with casts
- Skeletal Tractions
- Cannulated screws
- External fixation / JESS
- Ilizarov Ring Fixators
- DCP – Buttress plates
- ORIF (MIS) with LCP

Classification



Degree of **Violence**



Schatzker

Timing of Surgery

- High energy fractures have massive swelling and soft tissue injury
- Incisions should only be made after the soft tissue envelope has recovered
- The skin should be soft; blisters should have epithelized; and skin wrinkles should be present
- **Never be afraid, or ‘lazy’ to span the joint & wait**

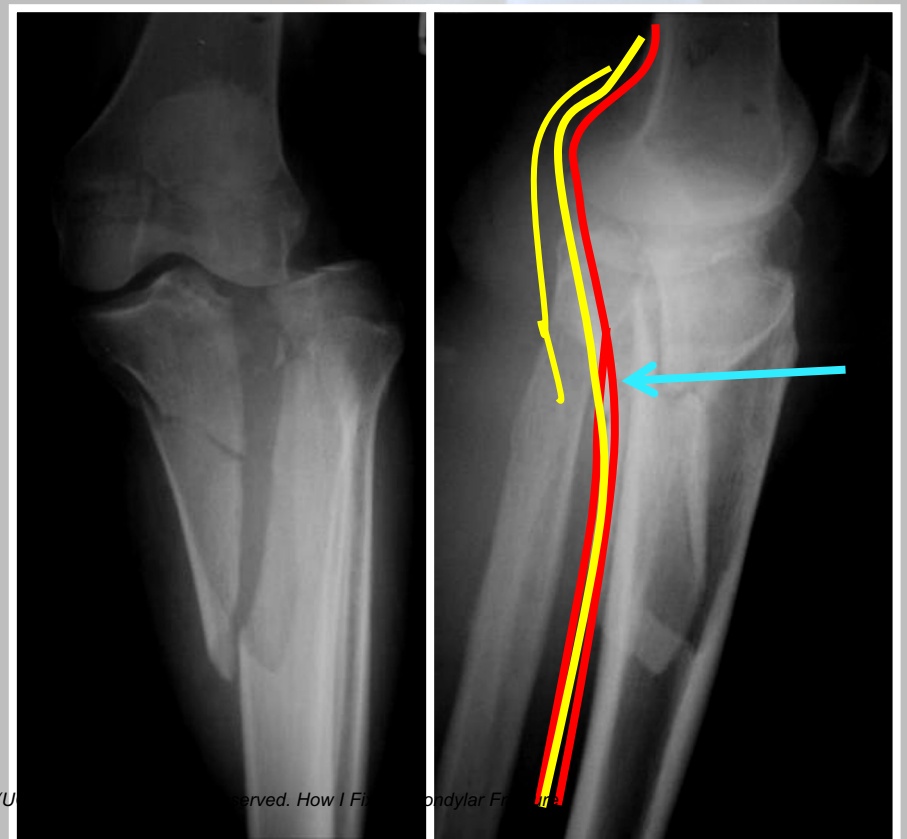
What is The First Rule ?

1 **Check for limb threatening conditions !!!**

1. Neuro-Vascular

N V are at risk

Fx dislocation:
lesion of the popliteal artery
up to 37%



Neuro-Vascular

Angiography

If there is a doubt

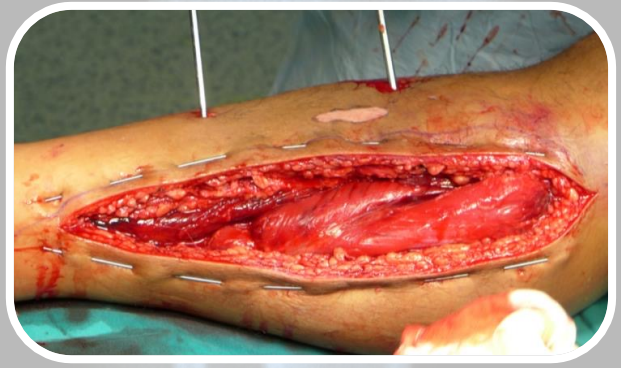
2. Compartment Syndrome ?

Diagnosis

- History
- Physical examination:
  - Serial assessment
  - Early Detect compartmental syndrome

Do not assume that it will not happen

If in doubt :
Fasciotomy
as soon as possible



3. We Must Differentiate Between

Low Energy

High Energy

soft tissue condition

Whatever The Conditions ?

NV compromise ?

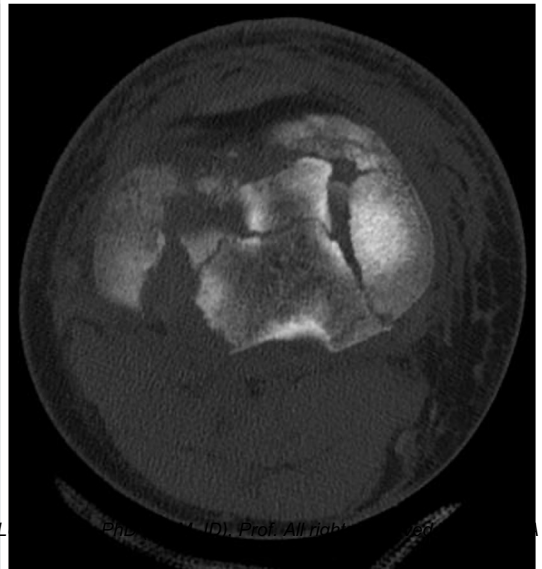
Compartmental Syndrome ?

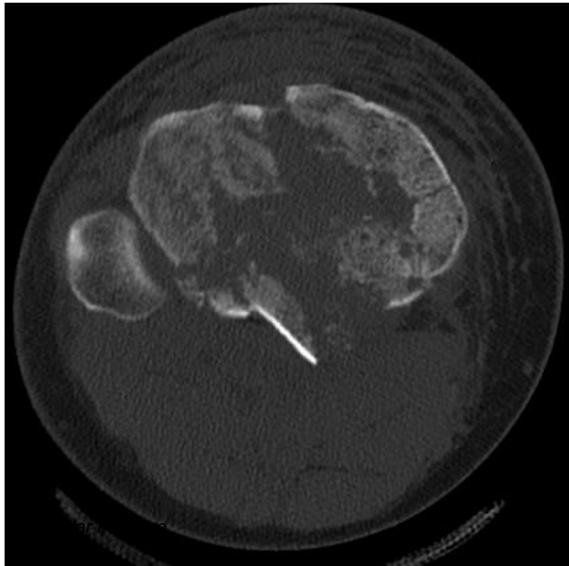
Poor skin and soft tissue ?

1 **SPAN**

Then you have time to think and classify

2 **SCAN**



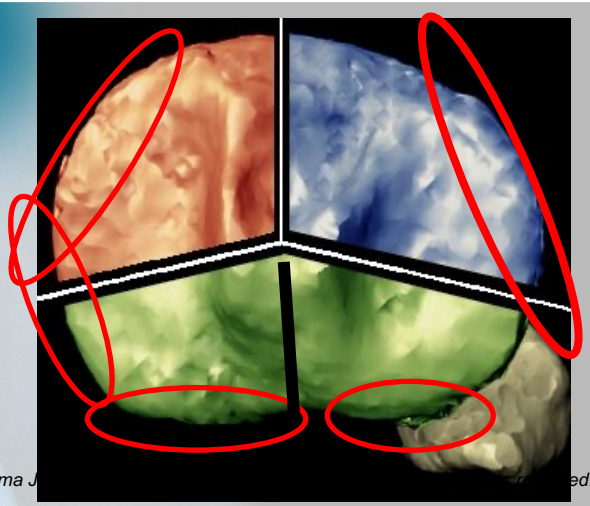


Where are the fragments?
What is the direction of displacement?

Three-Column Fixation for Complex Tibial Plateau Fractures

Cong-Feng Luo, MD, PhD, Hui Sun, MD, Bo Zhang, MD, and Bing-Fang Zeng, MD

JOT, 2010



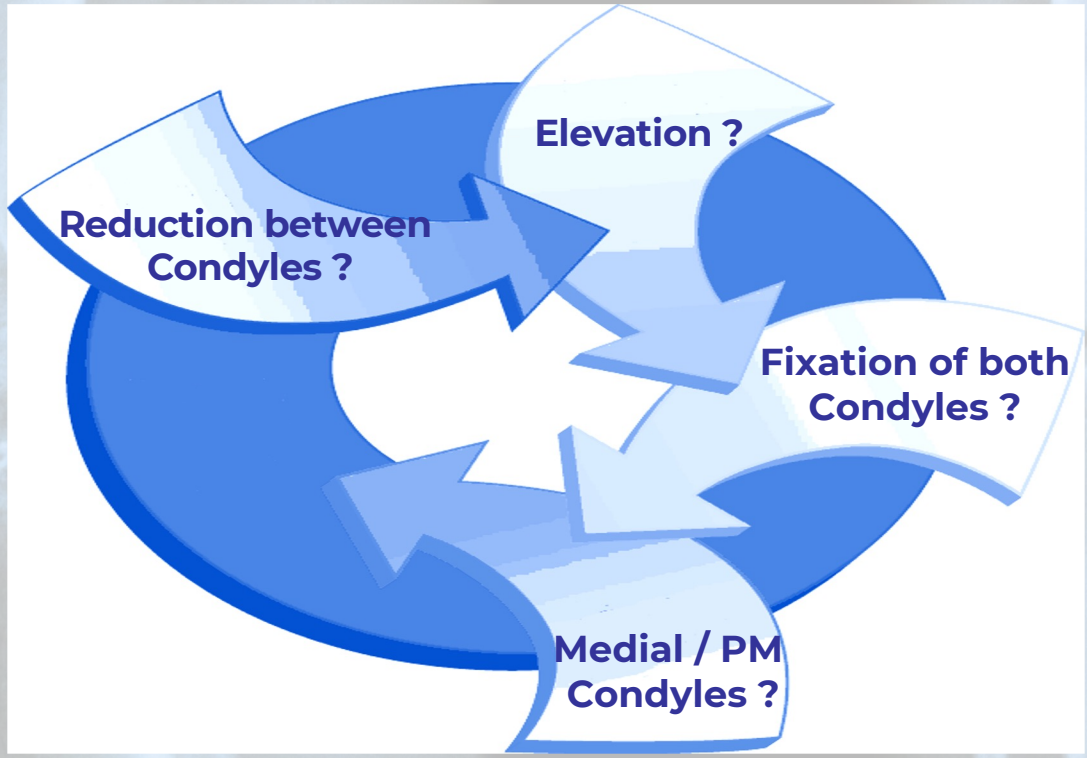
3 PLAN

Planning after obtaining more fracture details from CT Scan

Planning how to

- Approach
- Reduce
- Fix

Surgical Planning



Principles of Fixation of The Plateau

1. **Articular fractures**
   - **Rim integrity**
     Rim requires “ Cortical Containment”
   - **Depressed or not ?**
2. **Metaphyseal fractures**
3. **All need stability**

Joseph Schatzker

1. **Articular fractures**
   - **Rim integrity**
     - Rim requires “ Cortical Containment”
     - Split wedge requires “Buttressing”
   - **Depressed or not ?**
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Joseph Schatzker

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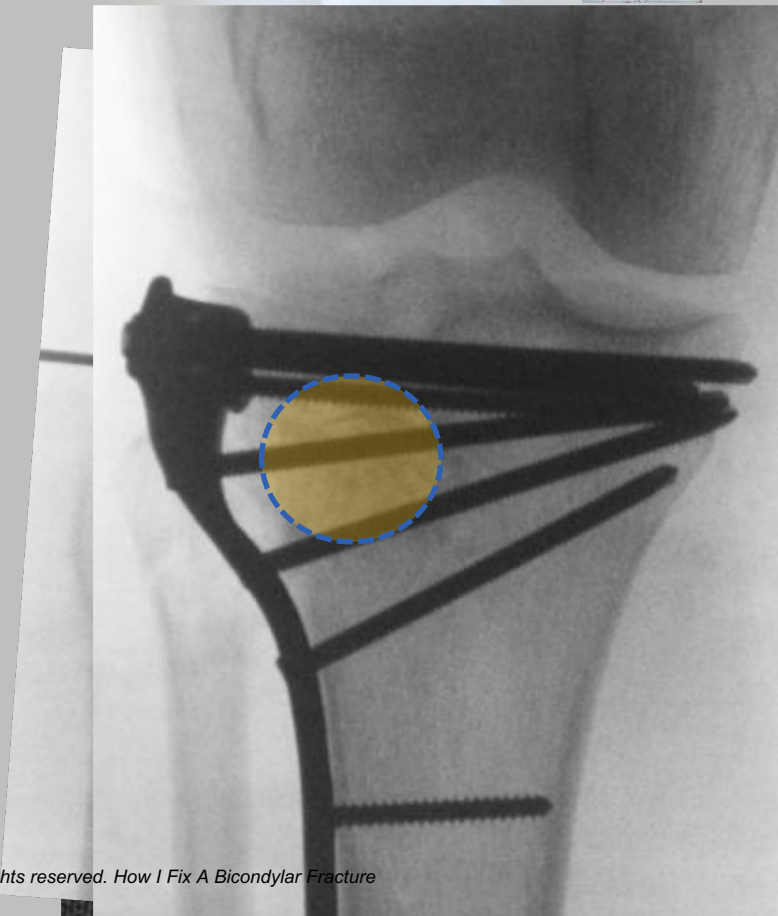
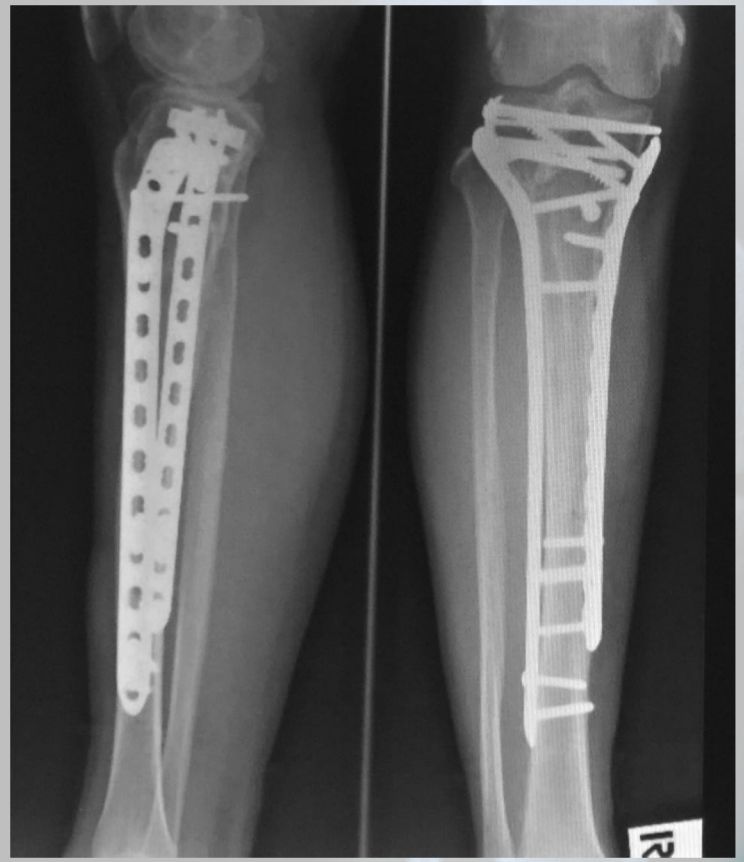


Joseph Schatzker

1. **Articular fractures**
   - **Rim integrity**
     - Rim requires “Cortical Containment”
     - Split wedge requires “Buttressing”
   - **Depressed or not ?**
     - Requires elevation + support
2. **Metaphyseal fractures**
   - **Axial alignment**
3. **All need stability**



Joseph Schatzker

Surgical Indications

- Articular step of > 3mm
- Condylar widening > 5mm
- Varus / Valgus instability
- All medial plateau fractures
- All Bicondylar Fractures

Protocol for Bicondylar Fracture

Assess medial fracture for stability against varus collapse

Reduction of lateral # leads to stable medial fracture

Lateral LCP

Medial buttress can not be established even after temp lateral reduction

Open reduction of medial fragment

Buttress medial fragment with medial plate

Controversies :

What Sizes of Gaps and Step-offs can be Accepted ?

Clin Orthop Relat Res (2022) 480:2288-2295
DOI 10.1097/CORR.0000000000002266

Clinical Orthopaedics and Related Research®
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Clinical Research

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Functional Outcome After Nonoperative Management of Tibial Plateau Fractures in Skeletally Mature Patients: What Sizes of Gaps and Stepoffs Can be Accepted?

Thijs P. Vaartjes BSc[1], Nick Assink MSc[1], Robert J. Nijveldt MD, PhD[2], Svenhjalmar H. van Helden MD, PhD[2], Eelke Bosma MD, PhD[3], Mostafa El Moumni MD, PhD[1], Kaj ten Duis MD[1], Mike Hogervorst MD[1], Job N. Doornberg MD, PhD[1], Jean-Paul P. M. de Vries MD, PhD[4], Harm Hoekstra MD, PhD[5], Frank F. A. IJpma MD, PhD[1]

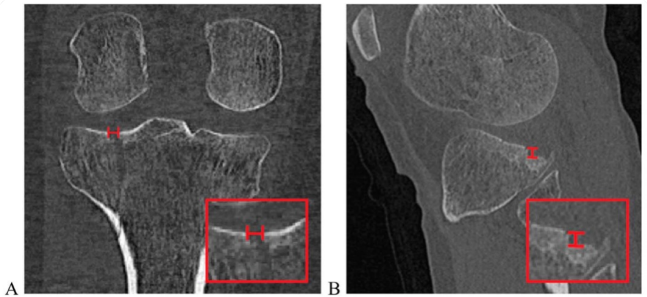
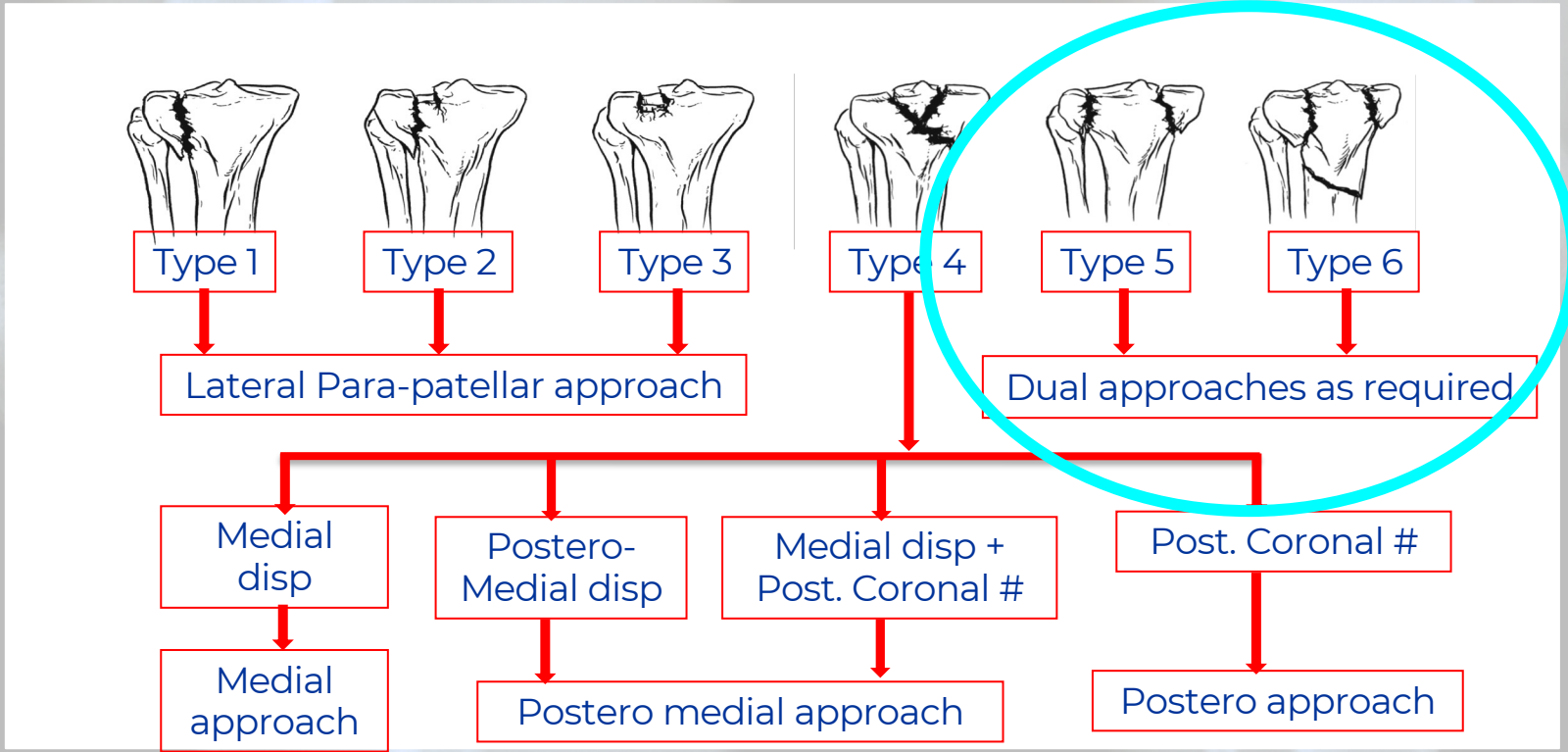


Fig. 1 A-B The measurements of the fracture displacement are displayed in the (**A**) coronal (gap 3.7 mm) and (**B**) sagittal (stepoff 3.8 mm) views.

- **Gaps or step-offs up to 4 mm on CT could result in good functional outcome with nonoperative treatment**
- The arbitrary 2-mm limit of gaps and step-offs for tibial plateau fractures could be revisited
- The survivorship of the native knee **free from conversion to a total knee prosthesis was high (97%)**

Approach

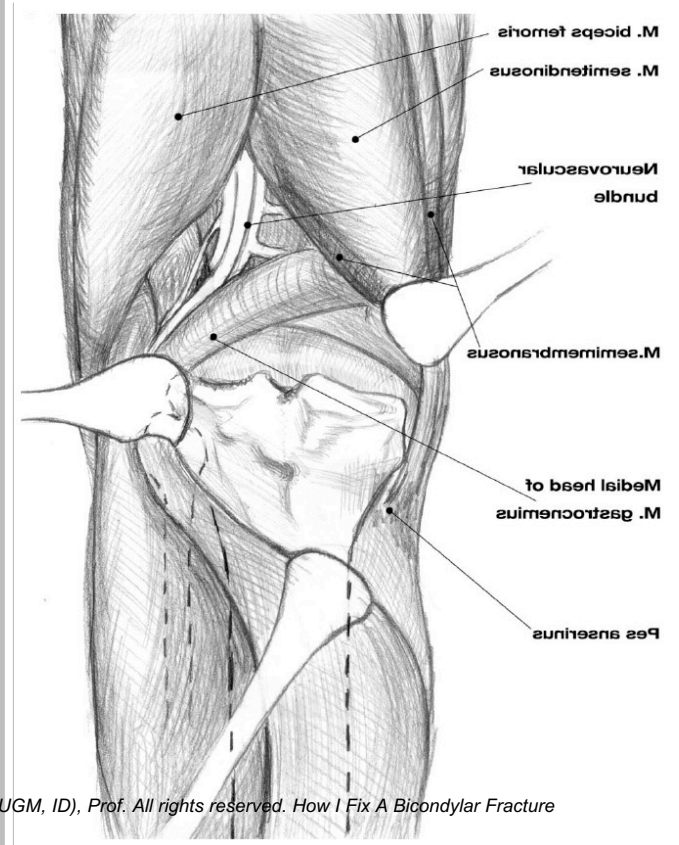


Surgical Approaches :

Do we accept one “Midline Incision” ?

This is “Outdated” Choice of Incision

Posterior Approach



Surgical Approach in Bicondylar Fracture

Trauma Case Reports 25 (2020) 100256

Contents lists available at ScienceDirect

Trauma Case Reports

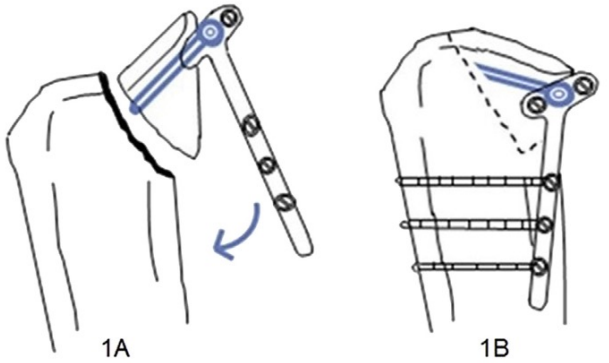
journal homepage: www.elsevier.com/locate/tcr

Case Report

Complex bicondylar tibial plateau fractures with reversed tibial slope - Our experience with a fracture-specific correction strategy

Devendra Kumar Chouhan[a], Uttam Chand Saini[a,*], Rajesh Kumar Rajnish[a], Mahesh Prakash[b]

[a] Department of Orthopaedics, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India
[b] Department of Radio-diagnosis and Imaging, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India

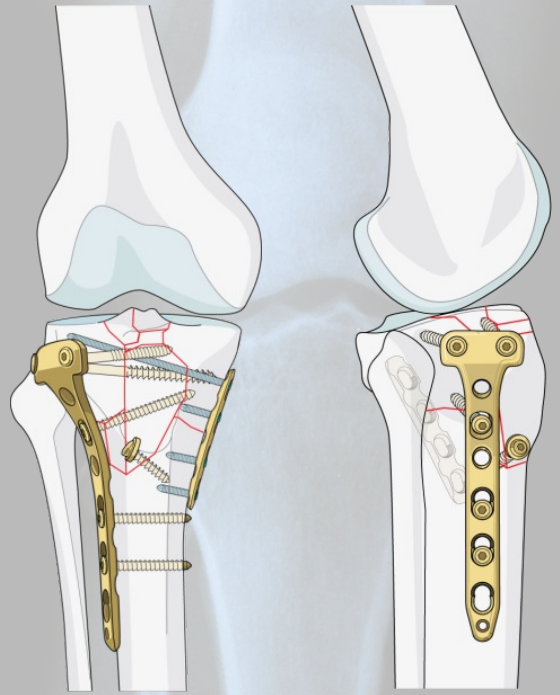


The fracture was accessed via a posterior approach

Gives direct access to the fracture apex, which eases fracture reduction and fixation to correct the sagittal malalignment

Dual Plating - Indications

- **Coronal fractures with a postero-medial fragment needs to be buttressed**
- **Medial articular involvement**
- **Displacement of medial column / separation of medial plateau**



Staged Treatment
in Bicondylar Fracture

> Eur J Trauma Emerg Surg. 2024 Jun;50(3):1033-1041. doi: 10.1007/s00068-023-02411-9. Epub 2023 Dec 18.

Staged treatment of bicondylar tibial plateau fractures: influence of frame configuration and quality of reduction on outcomes

Rafael Oleo-Taltavull [1], Sebastián Corró [2], Jordi Tomàs-Hernández [1 3], Jordi Teixidor-Serra [1 3], Jordi Selga-Marsà [1 3], Juan Antonio Porcel-Vázquez [2], Carlos Alberto Piedra-Calle [1 3], Yaiza García-Sánchez [3], Ernesto Melchor Guerra-Farfán [1 3], José Vicente Andrés-Peiró [4 5]

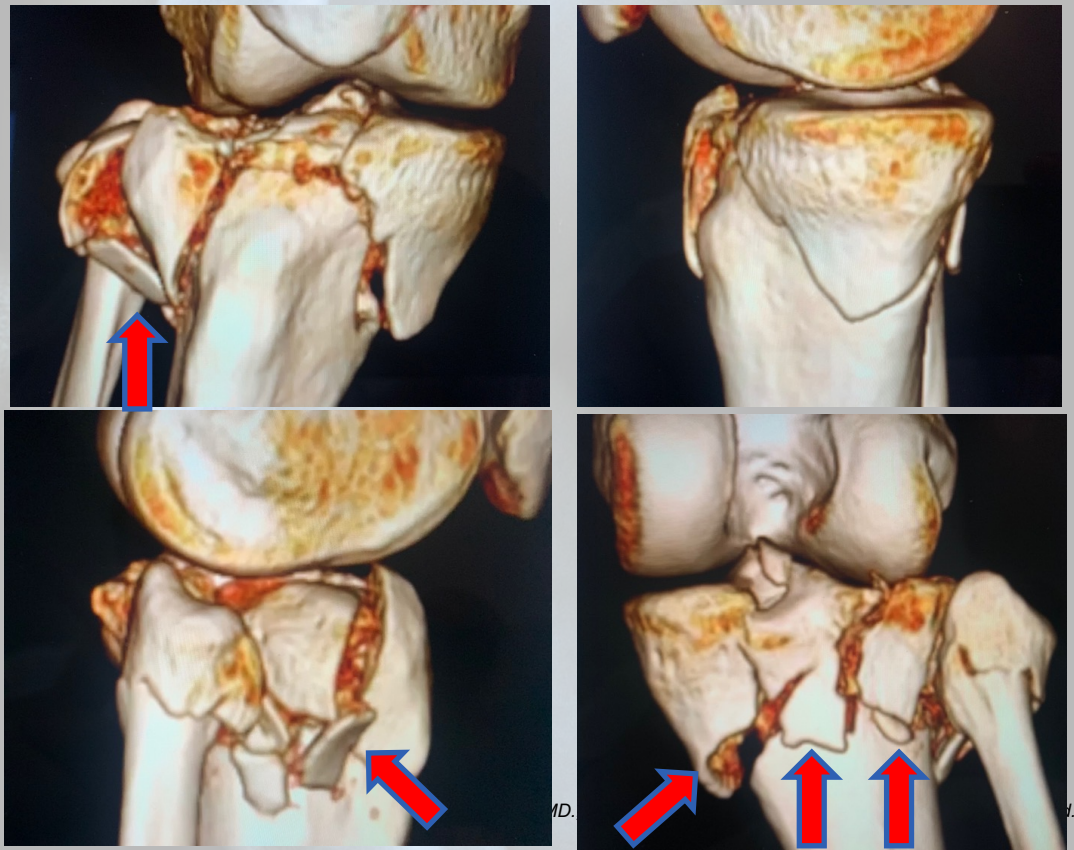
Conclusion

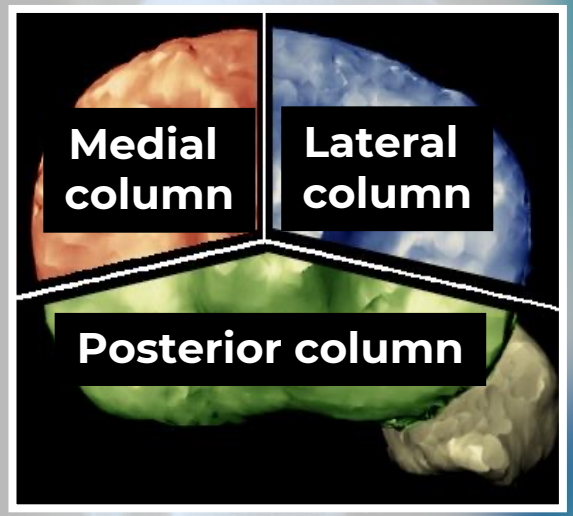
- **High-energy TPF management is challenging and prone to complications**
- **Staged treatment protocols may improve outcomes**
- 27.9% of patients had postoperative complications (infection and stiffness)

CASE

30-years-old woman MCA

CASE

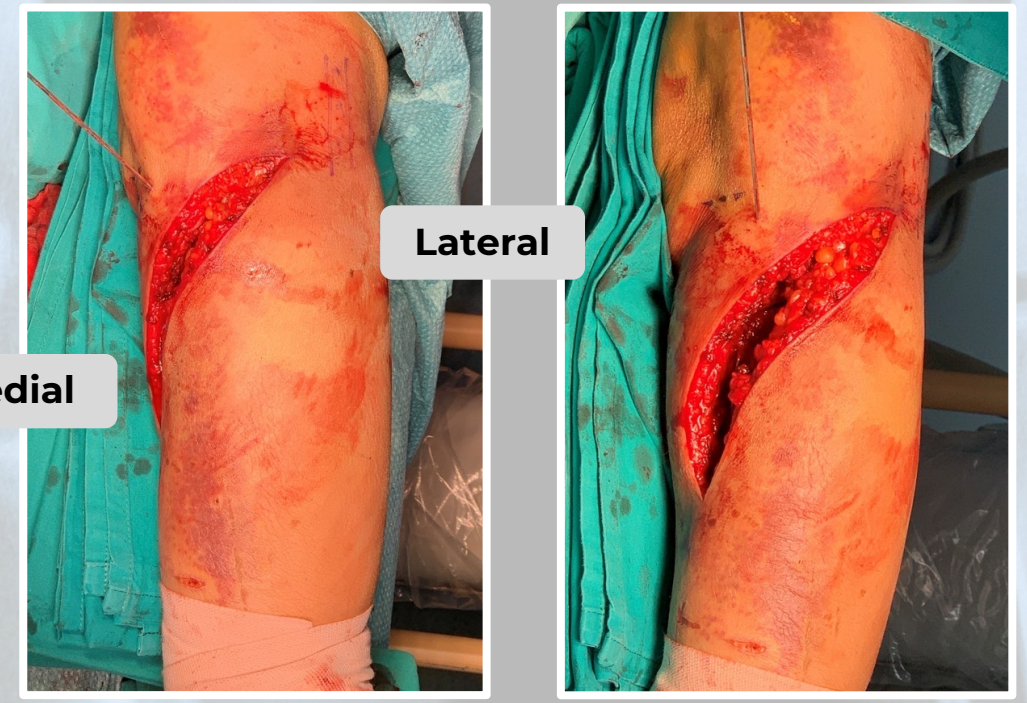




CASE

Day 10 after external fixator before operation

CASE



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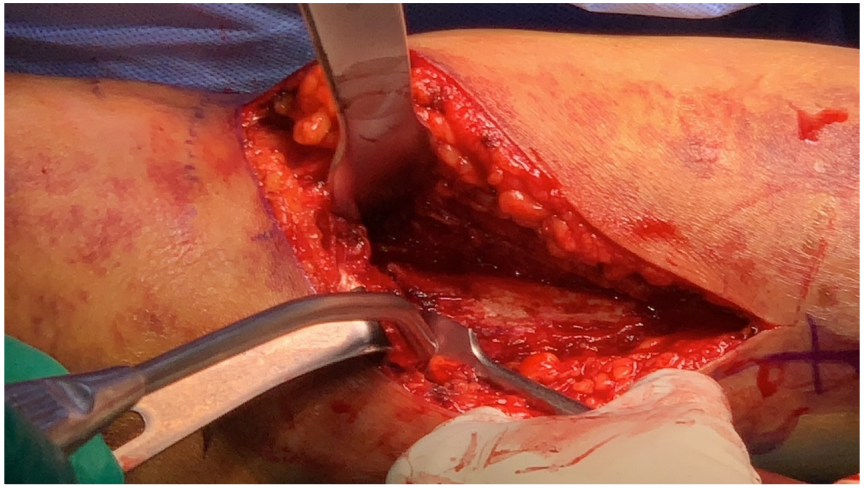
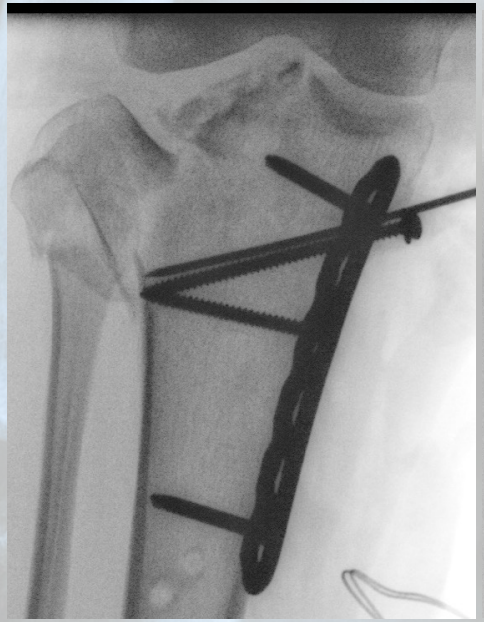
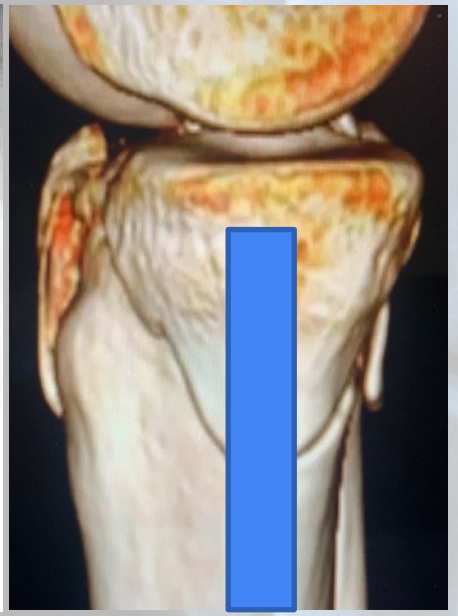


The medial head of the gastrocnemius muscle is retracted laterally to expose the posterior column

To avoid neurovascular injury in the popliteal fossa, all dissection from medial to lateral should be performed beneath the muscle in the proximal part

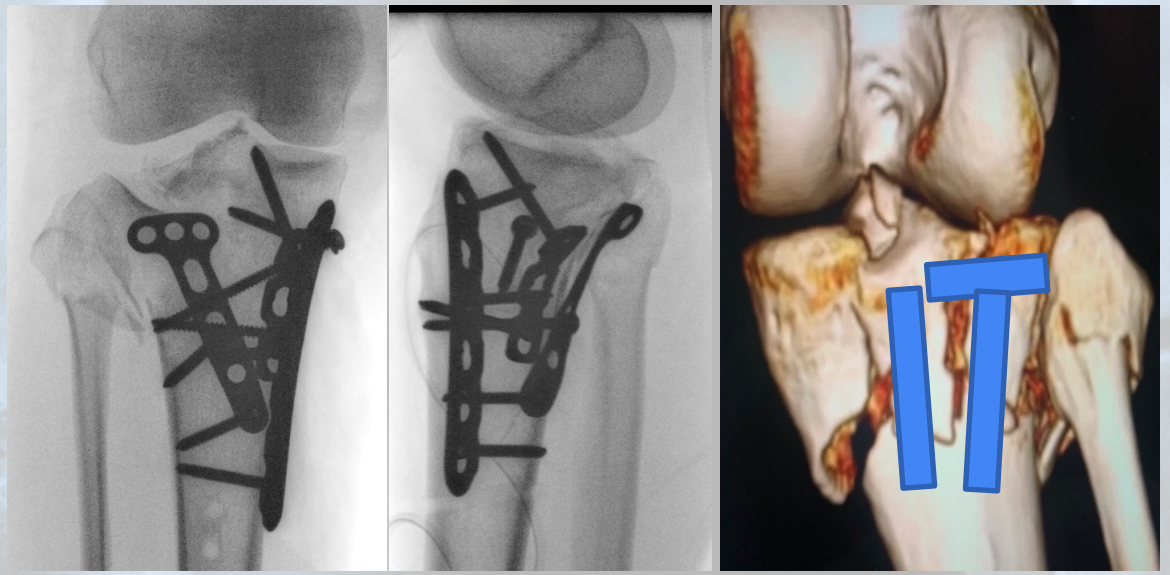
CASE





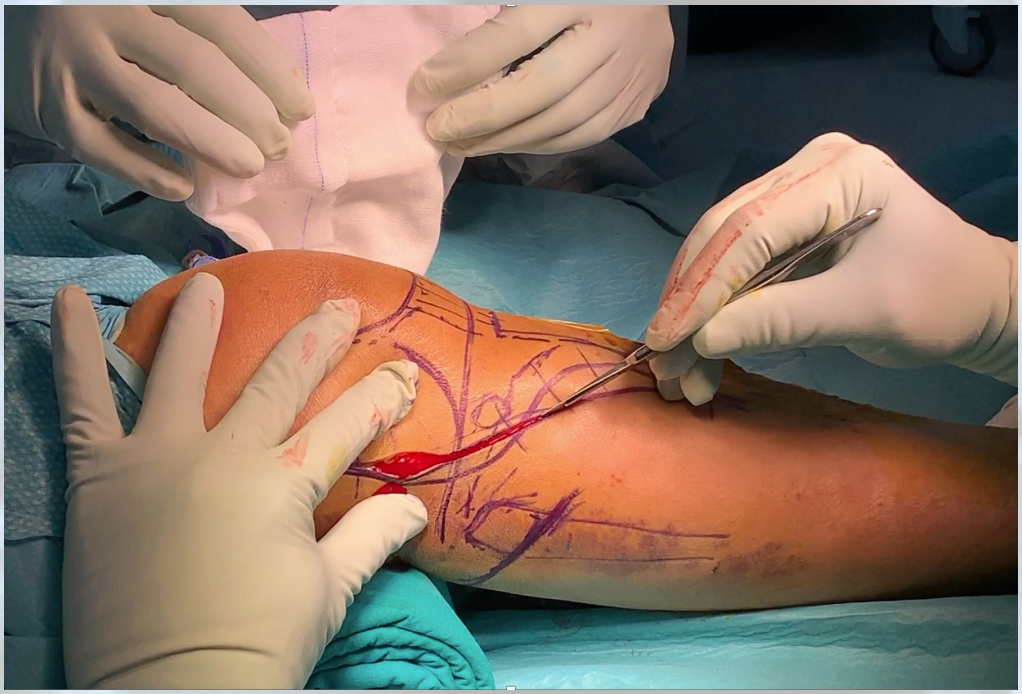
With this approach, a small LCP was applied to the posteromedial of tibia with one screw

CASE



With the same approach, a small T-plate was applied at the posterolateral of tibia

CASE

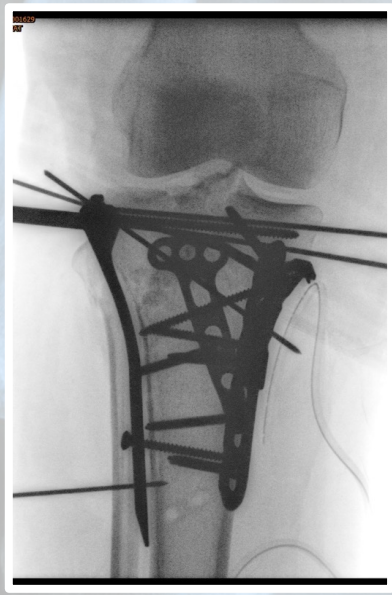


Continue with anterolateral approach

CASE

Direct reduction of the lateral tibial plateau, check X-ray & temporary fixation with K -wire

CASE

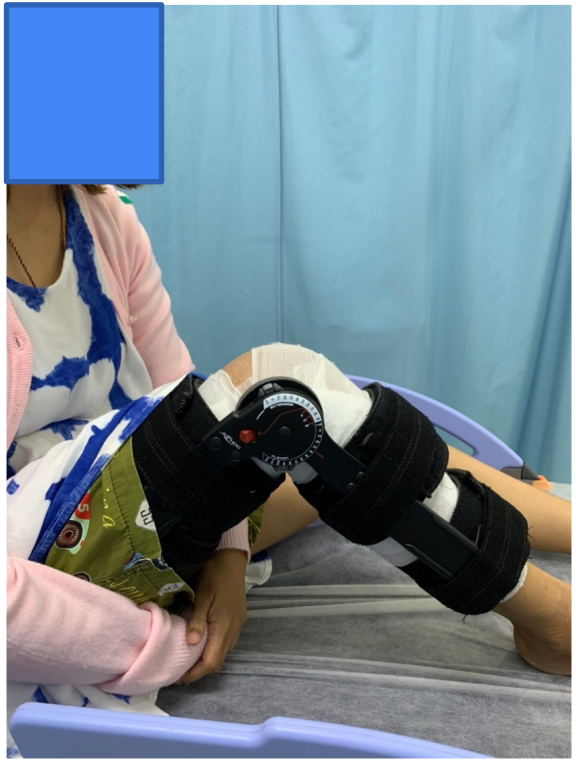


Check the plate position in both AP & lateral and the direction of the screw

CASE

Pre-Op	Post-Op	Pre-Op	Post-Op
			

CASE



Rehabilitation

- Early mobilization and ROM exercises
- When internal fixation is stable, ROM can begin on the 2nd post op day

NWB = 6 weeks

PWB = 9 - 10 weeks

FWB = 12 – 18 weeks

Joint reduction

Typically, we reduce it from the anterior

Wall fragment (may not go posterior if)

- Small
- Not pushing mechanism
- Depression fragment is big and adequate with rafting
- Or if belt plate is fine

Take Home Messages

- Learn how to expose posterior column
- Evaluate the fractures, then you have no limitation to select the approaches
- Position : select the most convenient but not create a problem of reduction complex fractures

Thank You For Your Attention