



Bifocal fractures... Around the knee

Nicolas Pujol

Centre Hospitalier de Versailles

France

npujol@ght78sud.fr



Nightmares/Histories for life

- Bifocal femoral shaft fractures
- Bifocal tibial shaft fractures
- Floating knee
- ...



Bifocal femoral shaft fractures

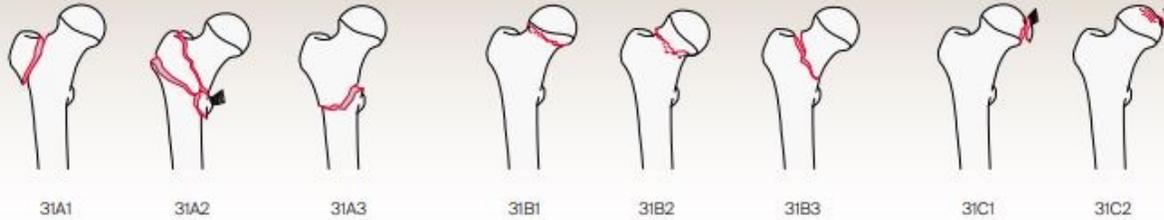
- 1% femoral fractures
- High energy trauma



AO classification

AO/OTA Fracture and Dislocation Classification

Introduction to the classification of long-bone fractures



Femur

31 Proximal end segment

31A Trochanteric region

- 31A1 Simple pertrochanteric
- 31A2 Multifragmentary pertrochanteric, lateral wall incompetent ($\leq 20^\circ$)
- 31A3 Intertrochanteric (reverse obliquity)

31B Femoral neck

- 31B1 Subcapital
- 31B2 Transcervical
- 31B3 Basicervical

31C Femoral head

- 31C1 Split
- 31C2 Depression

32 Diaphyseal segment

32A Simple

- 32A1* Spiral
- 32A2* Oblique ($\geq 30^\circ$)
- 32A3* Transverse ($< 30^\circ$)

32B Wedge

- 32B2* Intact wedge
- 32B3* Fragmentary wedge

32C Multifragmentary

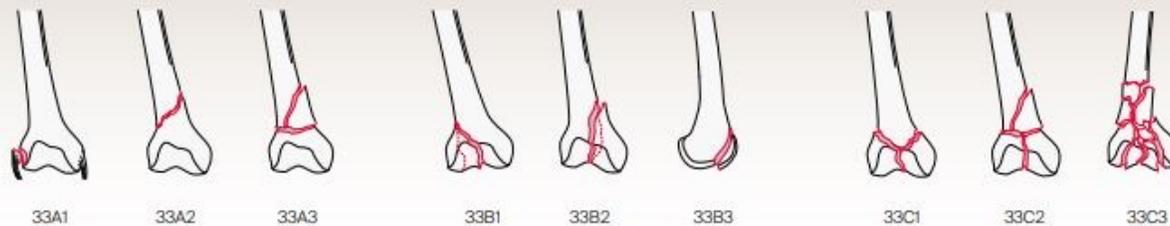
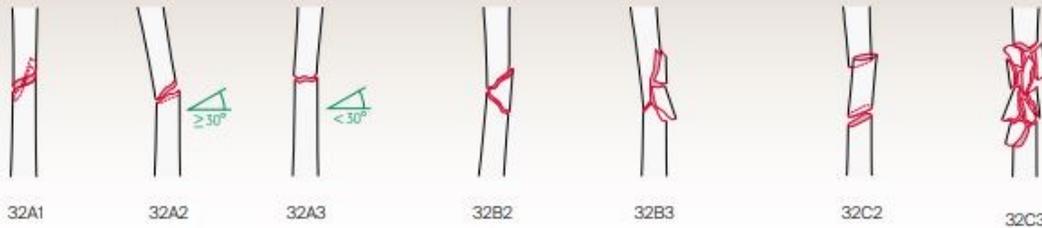
- 32C2* Intact segmental
- 32C3* Fragmentary segmental

* Qualifications:

32A and 32B: a Proximal 1/3, b Middle 1/3, c Distal 1/3

32C: i Proximal diaphyseal-metaphyseal, j Pure diaphyseal,

k Distal diaphyseal-metaphyseal



33 Distal end segment

33A Extraarticular

- 33A1 Avulsion
- 33A2 Simple
- 33A3 Wedge or multifragmentary

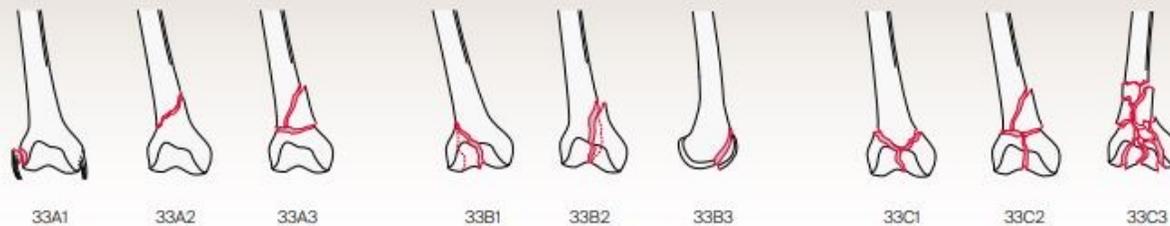
33B Partial articular

- 33B1 Lateral condyle, sagittal
- 33B2 Medial condyle, sagittal
- 33B3 Frontal/coronal

33C Complete articular

- 33C1 Simple articular, simple metaphyseal
- 33C2 Simple articular, wedge or multifragmentary metaphyseal
- 33C3 Multifragmentary articular, simple, wedge or multifragmentary metaphyseal

AO classification



Femur

31 Proximal end segment

31A Trochanteric region

- 31A1 Simple pertrochanteric
- 31A2 Multifragmentary pertrochanteric, lateral wall incompetent ($\leq 2^\circ$)
- 31A3 Intertrochanteric (reverse obliquity)

31B Femoral neck

- 31B1 Subcapital
- 31B2 Transcervical
- 31B3 Basicervical

31C Femoral head

- 31C1 Split
- 31C2 Depression

32 Diaphyseal segment

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Diagnosis

- Full radiographs
- Hip
- Knee

- AP and lateral

- CT scan (Body scan) often necessary



Diagnosis

- 9% femoral neck
- When femoral shaft fracture



Ipsilateral Femoral Neck and Shaft Fractures: Current Diagnostic and Treatment Strategies

David J. Hak, MD, MBA; Cyril Mauffrey, MD, FACS, FRCS; Mark Hake, MD; E. Mark Hammerberg, MD;
Philip F. Stahel, MD



Surgical management of bifocal femoral fractures: a systematic review and pooled analysis of treatment with a single implant versus double implants

J. D. Cossen¹ · Esther M. M. Van Lieshout¹ · Michael H. J. Verhofstad¹

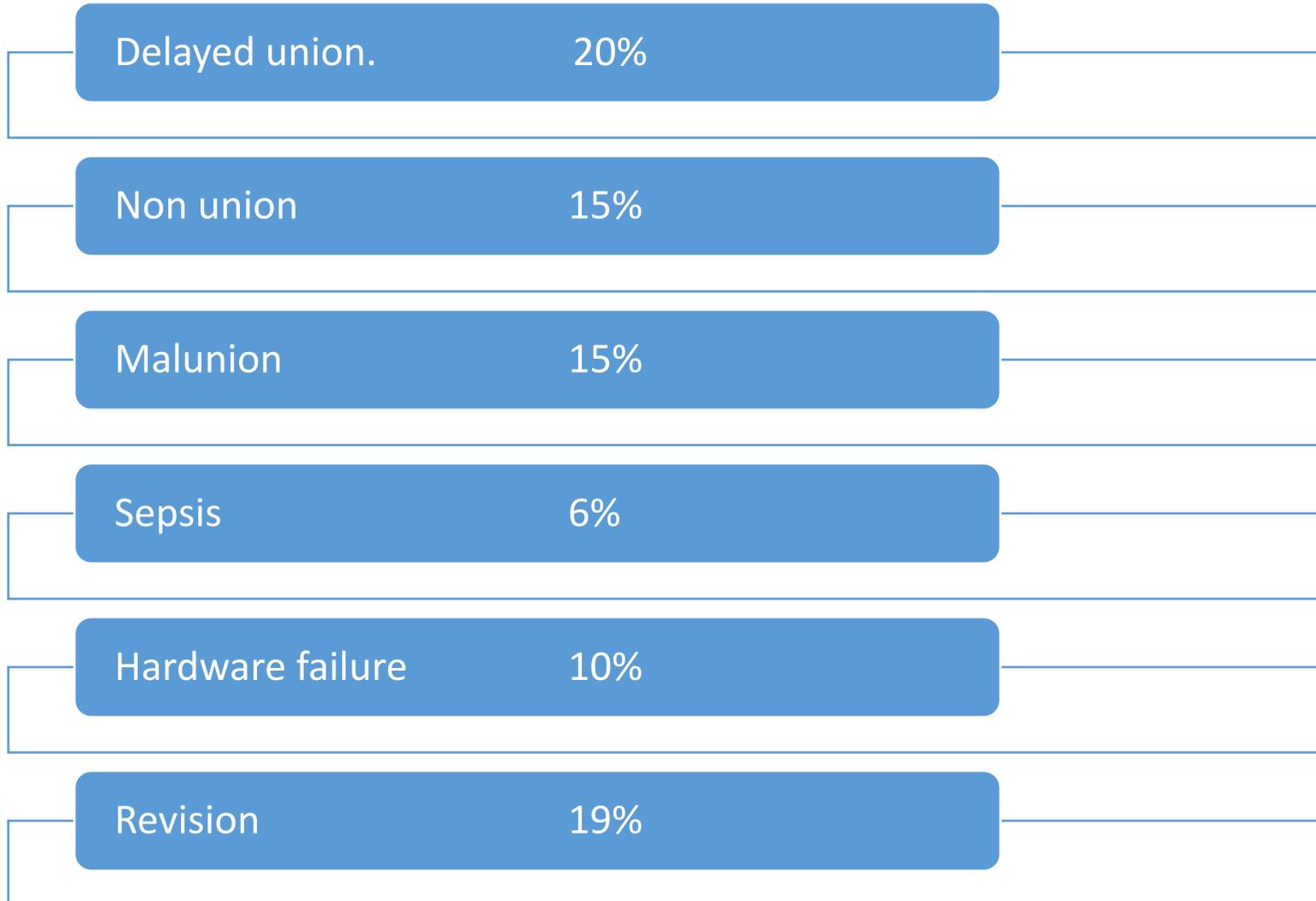
Received: 24 December 2022 / Accepted: 13 June 2023 / Published online: 5 July 2023
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Treatments

- Single or double fixation?
- No difference at all (complications, functional result, healing...)



Complications



Complications



Bifocal fractures of the tibia



AO classification

AO/OTA Fracture and Dislocation Classification

Introduction to the classification of long-bone fractures

Tibia

41 Proximal end segment

41A Extraarticular

- 41A1 Avulsion
- 41A2 Simple
- 41A3 Wedge or multifragmentary

41B Partial articular

- 41B1 Split
- 41B2 Depression
- 41B3 Split depression

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- 41C3 Fragmentary or multifragmentary metaphyseal

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43 Distal end segment

43A Extraarticular

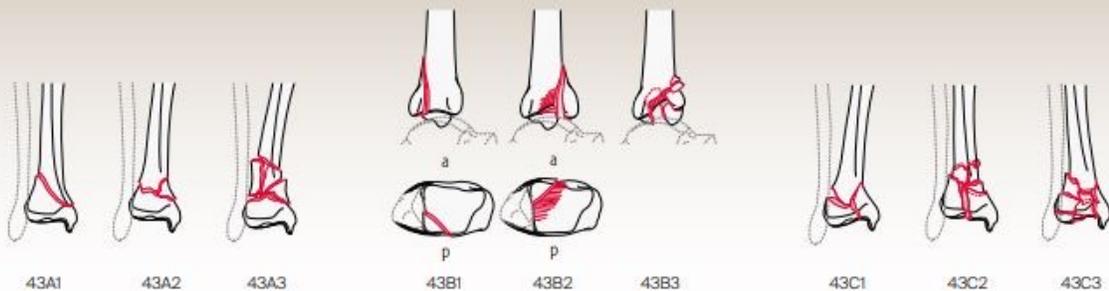
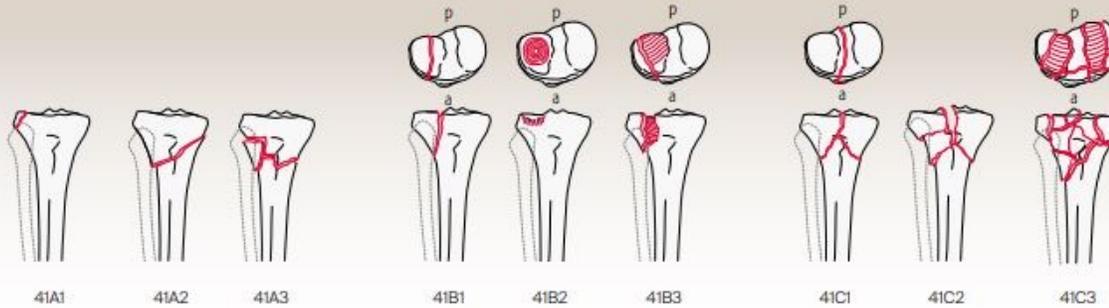
- 43A1 Simple
- 43A2 Wedge
- 43A3 Multifragmentary

43B Partial articular

- 43B1 Split
- 43B2 Split depression
- 43B3 Depression

43C Complete articular

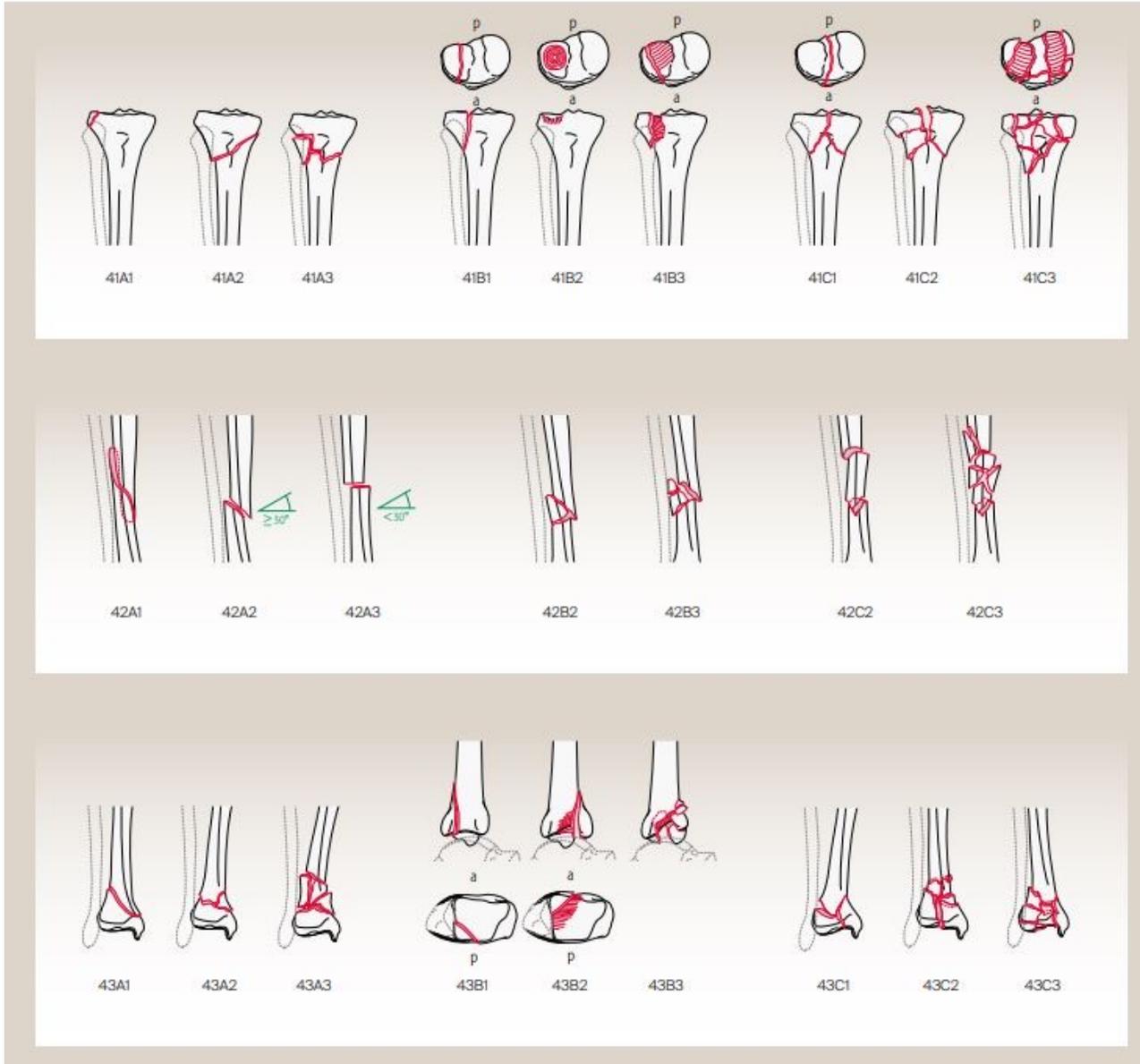
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Diagnosis

- Radiographs
- CT scan
- ...

Treatment options, some examples:

Mr V, 61 y, bicycle vs truck



Schatzker 6

+

Tibial shaft

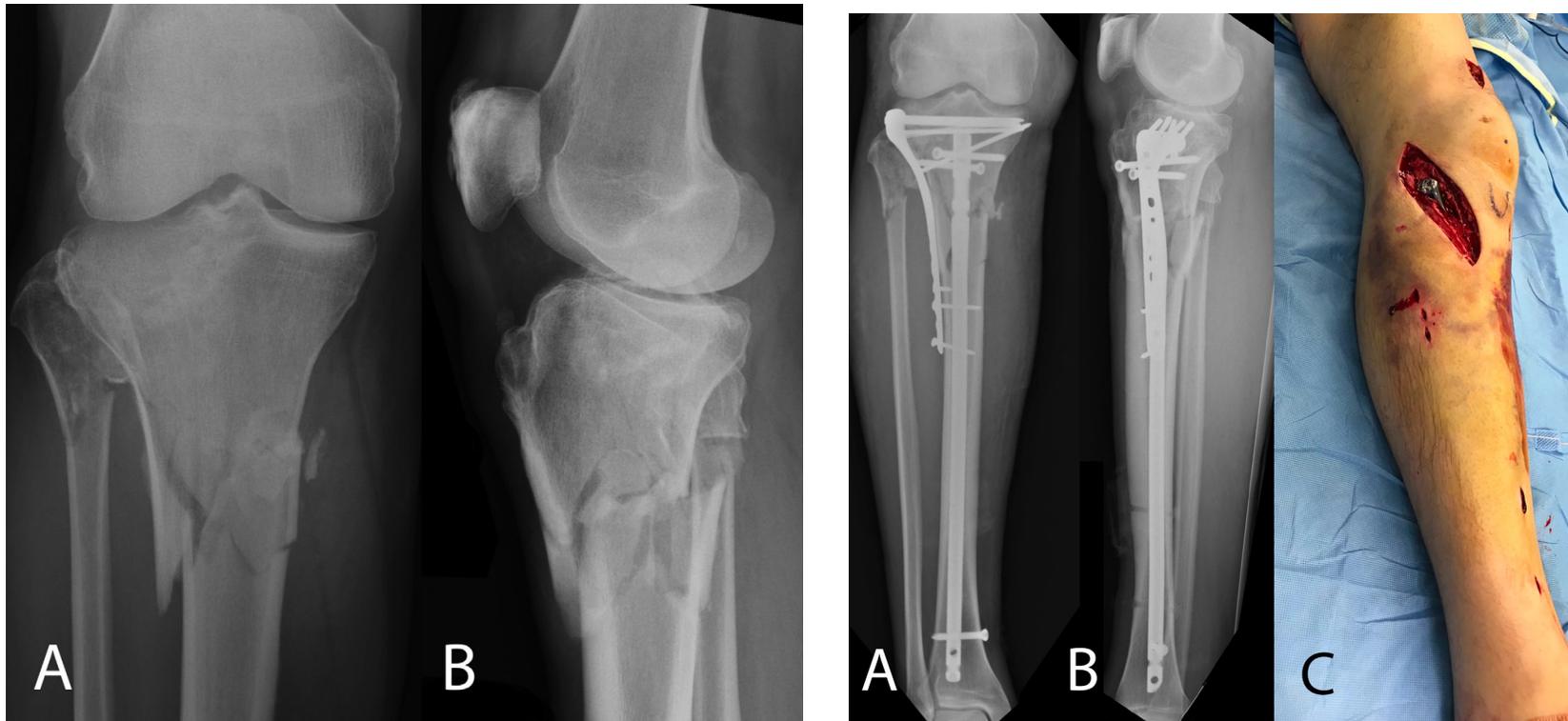
Mr V, 61y, Bicycle injury



Treatment

- Combined plate and nails

In some cases



Treatment

- Combined plate and nails
In some cases



Complications

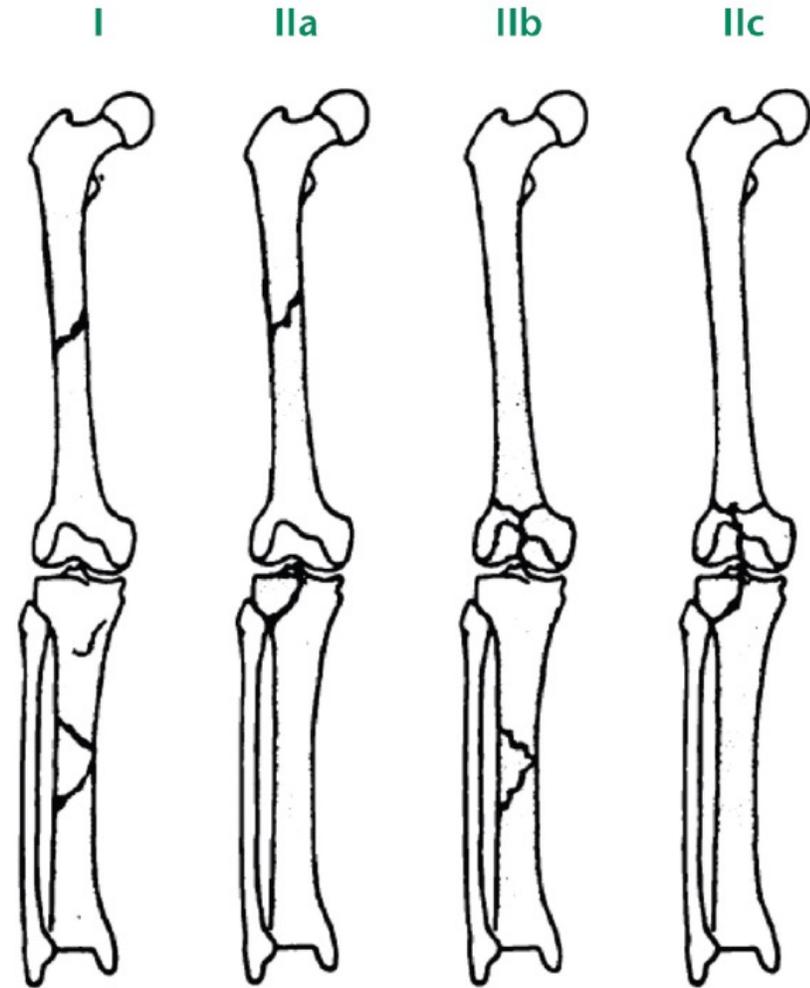
Compartment syndrome	up to 40%
Non union	10%
Malunion	15%
Sepsis	10%



Floating knee



Classification



Fraser 1978



Diagnosis/ Associated lesions

- Open fractures: 69% !!!
- Popliteal artery: 7%
- Other fractures: 44%
- Multiligament knee injuries: 19%



Strategy (1): Damage control

Management of the Floating Knee in Polytrauma Patients

M.L. Bertrand*, P. Andrés-Cano and F.J. Pascual-López

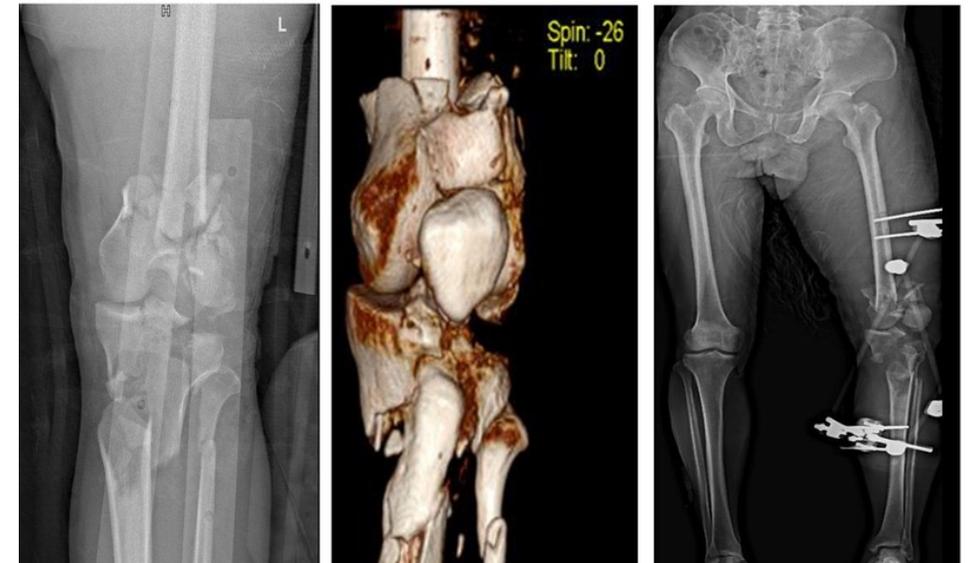
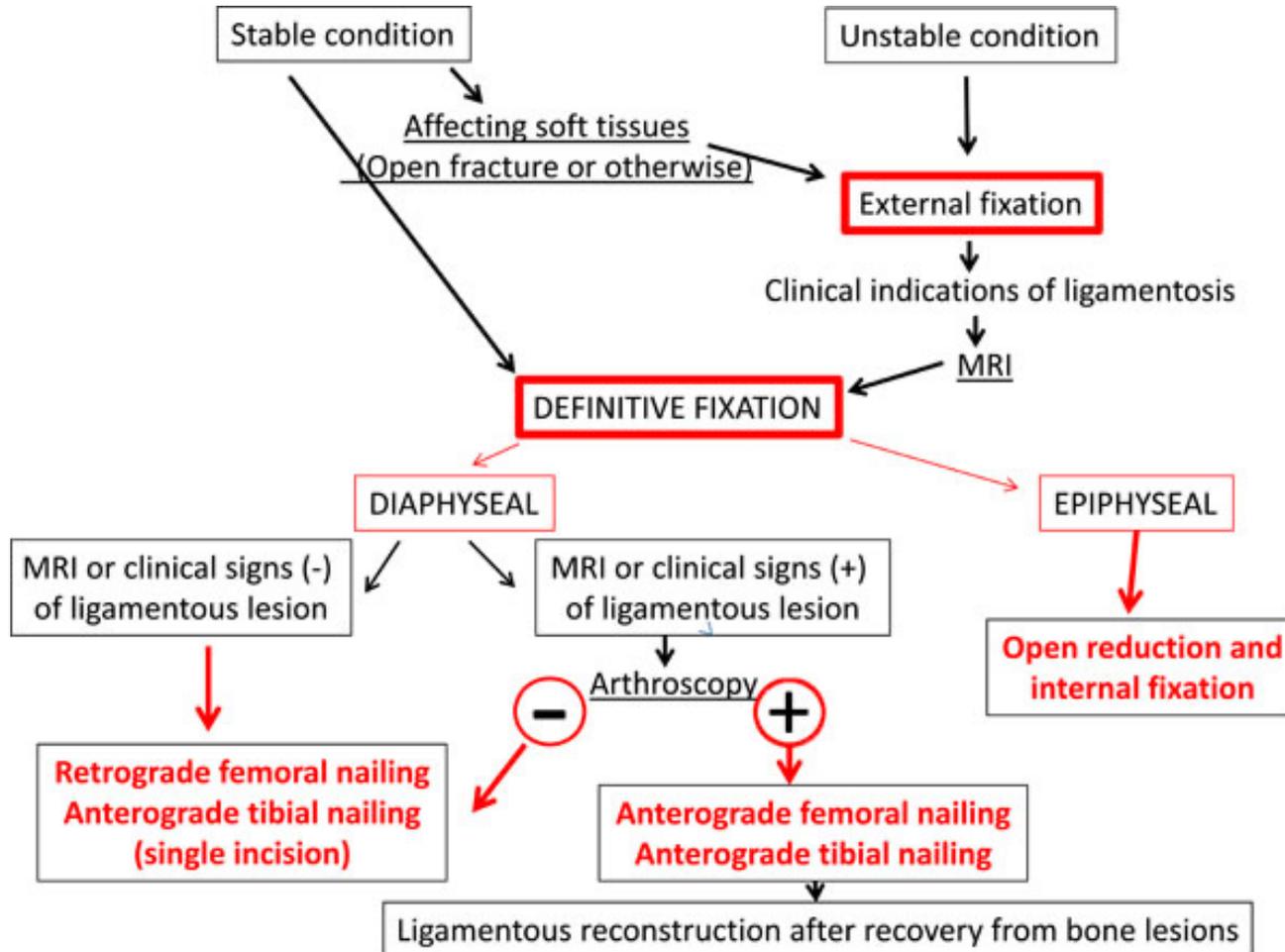
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EDITED BY
Longpo Zheng,
Tongji University, China

REVIEWED BY
Daniel Robert Schlatterer,
WellStar Health System, United States
Yimin Chen

The current issues and challenges in the management of floating knee injury: a retrospective study

Guy Romeo Kenmegne¹, Chang Zou¹, Yixiang Lin, Yijie Yin, Shengbo Huang and Yue Fang*

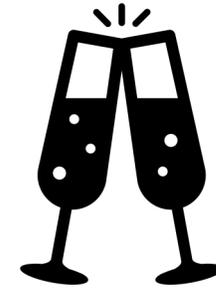


Strategy

- Each fracture is unique
- Best treatment , one stage better , almost never possible
- One or multiple fixation devices
- Combination of implants



Mr M. 60 y Scooter injury



Treatment



Treatment



Double floating knee

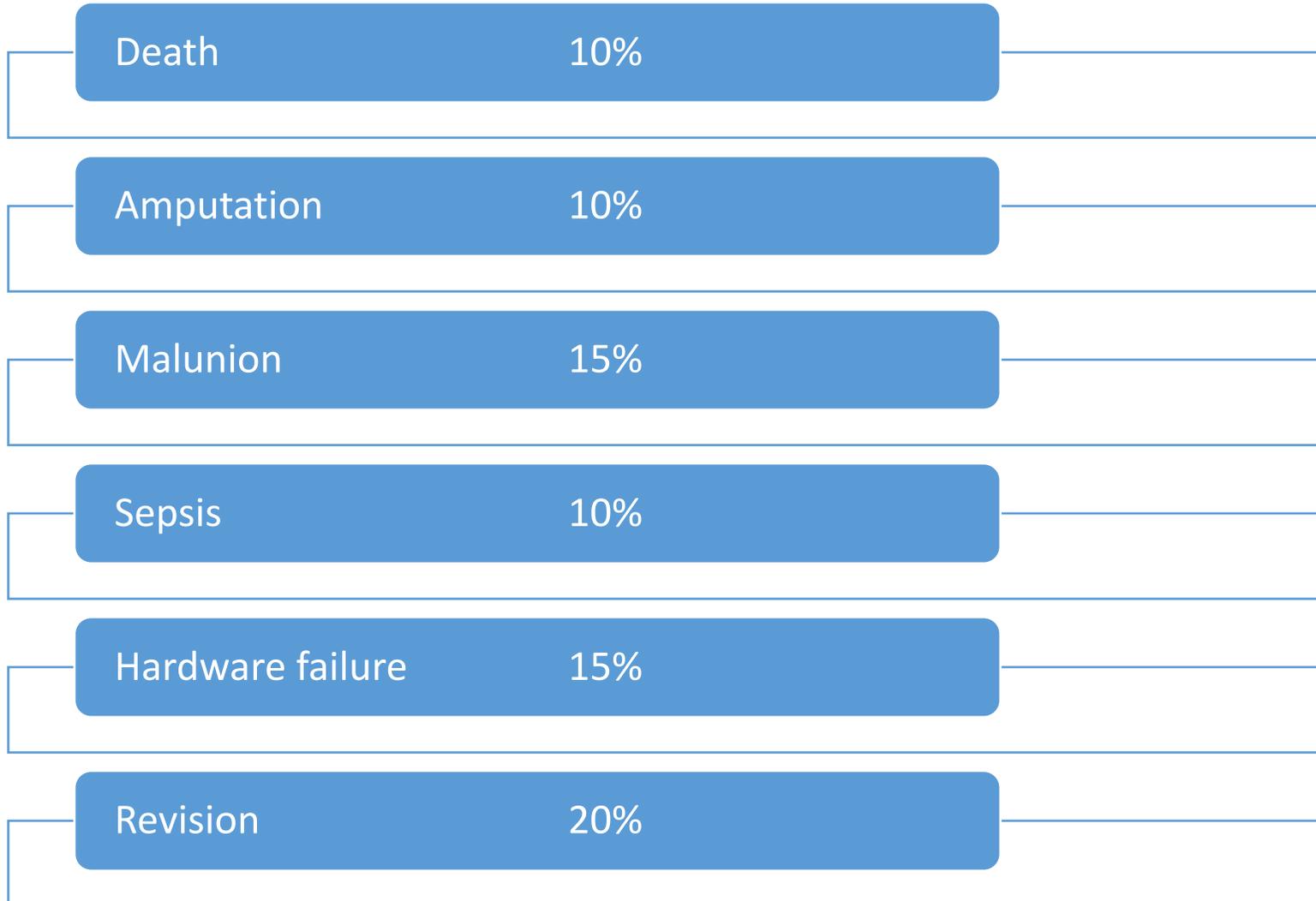
- Stage 1: damage control
Temporary fixation (6w)

Stage 2: Removal Ex fix (2w)

Stage 3: ORIF



Complications



Conclusions:

- Difficult fractures ! !
- Lot of complications
- Need of well-structured emergency units/OR/Ward, trained teams...
- Exhaustive/different devices available (Plates, Ex fix, Nails etc)

