

3d advanced course on knee surgery
Val d'Isère 2010


Clinical examination in proximal articular tibia fractures.




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Fracture-dislocations




Dislocation at accident:
High-energy trauma; rotation & shear forces

Highly unstable

High incidence of neurovascular and associated ligamentous injuries

TM Moore, CORR 1981

Clinical examination



- Medical history:
High vs. low-energy trauma
- Vascular status
- Neurological status
Peroneal nerve
- Soft-tissue status
Open
Closed
Compartment syndrome
- Ligament status
After fracture stabilization ?

Medical history

Co-morbidity:
Impaired vascularity:
Diabetes; smokers; chronic vascular disease


Cardiac or pulmonar problems

Psychiatric problems

Emergency operation

- Compartment syndrome
- Vascular / neurologic injury
- Open fracture
- Major instability


Vascular status



- Palpation
- Doppler Ultrasound
- Angiography

Whiteside TE J Am Acad Orthop Surg 1996

Vascular status



- Coolness
- Pallor
- Cyanosis
- Delayed capillary refill
- Poor pulses
- Reduced ABI

Vascular status

The Journal of TRAUMA® Injury, Infection, and Critical Care

The Value of the Ankle-Brachial Index for Diagnosing Arterial Injury After Knee Dislocation: A Prospective Study

William J. Mills, MD, David P. Borei, MD, FRCSC, and Patrick McNair, MD

Background: The risk of arterial injury with knee dislocation is well known. The most effective method for rapidly and accurately diagnosing arterial injury in this setting remains a topic of debate. Both physical examination and arteriography have been advocated, although each of these methods has its critics. The authors propose that the ankle-brachial index (ABI) can accurately predict whether patients with knee dislocations have sustained vascular injury.

Methods: A prospective study enrolled 38 patients with knee dislocation to evaluate for potential arterial injury using clinical pulse examination and ABI. Patients with an ABI lower than 0.90 underwent arteriography. Those with an ABI of 0.90 or higher were immobilized and admitted for serial examination and delayed arterial duplex evaluation.

Results: Of the 38 patients, 11 (29%) had an ABI lower than 0.90. All 11 had arterial injury requiring surgical treatment. The remaining 27 patients had an ABI of 0.90 or higher. None had vascular injury detectable by serial clinical examination or duplex ultrasonography. The sensitivity, specificity, and positive predictive value of an ABI lower than 0.90 were 100%. The negative predictive value of an ABI that reached 0.90 or higher was 100%.

Conclusions: The ABI is a rapid, reliable, noninvasive tool for diagnosing vascular injury associated with knee dislocation. Routine arteriography for all patients with knee dislocation is not supported.

Key Words: Ankle-brachial index, ABI, Knee dislocation, Vascular injury, Arteriography.

J Trauma. 2004;55:1261-1265.

ABI > 0,90: no vascular injury
ABI < 0,90: Possible vascular injury

Vascular status

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The Role of Arteriography in Assessing Popliteal Artery Injury in Knee Dislocations

Eric G. Kluweberg, MS, Brian M. Criss, MD, William R. Fines, MD, Jason D. Archibald, MD, and Claude T. Mowbray III, MD

Background: This study aimed to review the need for arteriography among patients with traumatic knee dislocations, and to evaluate any adverse consequences associated with the clinical decision to pursue or defer arteriography.

Methods: A retrospective analysis was performed for 55 patients (37 knees) with traumatic knee dislocations during a 3-year period. The presence or absence of arterial injury was assessed. The physical examination, the detection of presence of foot pulses and ankle-brachial index in 0.80) and, in selected cases, no arteriography.

Results: At the vascular examination, 32 knees (86%) were found to be normal and 25 (44%) to be abnormal. None of the 32 knees with normal examination results had substantial vascular injuries, as determined by arteriography in 12 cases (43%) or by clinical follow-up assessment in 19 cases (59%). All 25 patients with abnormal vascular examination results underwent arteriography, with 12 patients (48%) demonstrating vascular injury (7 major and 5 minor injury). Seven patients (16 with major and 1 with minor injury) underwent surgical repair with reverse saphenous vein grafting.

Conclusions: The study with initial normal vascular examination results was found to have a vascular injury that required treatment. Routine screening arteriography may not be necessary for all patients with traumatic knee dislocations.

Key Words: Arteriography, Knee dislocation, Vascular status, Popliteal artery.

J Trauma. 2004;56:766-768.


No vascular lesion if ABI > 80 AND presence of normal foot pulses

Vascular status

ABI > 0,9 (0,8)

- Normal vascularisation
- Arteriogram not needed
- Repeat exam several times during first days
 - Intimal tears can manifest late
 - Thrombosis

Vascular status



Pulseless foot


- Immediate surgery
- Revascularisation
- No time waste with arteriogram
- CT angiogram ?

Vascular status

Vascular lesion

- Amputation rate – revascularisation
 - < 6 hours: 6 %
 - < 8 hours: 11 %
 - > 8 hours: 86 %

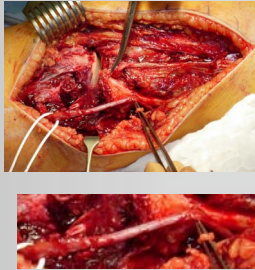
Neuro. status



- Sensitivity
- Motricity
- Peroneal nerve
- DD compartment syndrome

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Peroneal nerve lesion




- Posterolateral ligament injuries (15-30 %)
- < 30 % recover
- 45 % probability to have associated tibial nerve injury.
- if complete disruption consider early nerve transfer

Fanelli GC, 1995; LaPrade RF, 1997
Christel P, 2007

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Soft-tissue status



- Open
 - Gustilo classification
 - Tscherne class.
- Closed
- Compartment syndrome

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Open fracture



- Debridement
- Jet-lavage
- Minimal fixation
- VACuum closure

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Compartment syndrome




- Compartment pressure
- Diastolic blood pressure
- Dermatofasciotomy if $\Delta p < 30$ mm Hg

Whitesides TE J Am Acad Orthop Surg 1996

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Compartment syndrome



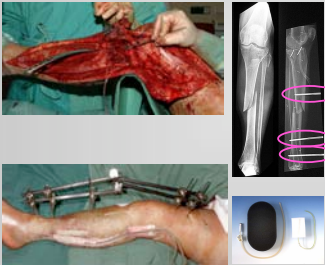
Compartment syndrome in 414 tibia fractures:

- Proximal: 1,6 %
- Shaft: 8,1 %
- Distal: 1,4 %

Park S, J Orthop Trauma 2009


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Compartment syndrome



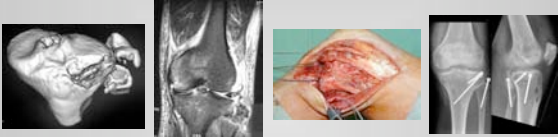
- Fasciotomy of 4 compartments
- Gross fracture reposition
- VACuum closure

Ligament status




- Exam under anesthesia
- Before / after fracture stabilization
- If in doubt intraop stress x-ray

Associated intraarticular injuries



	Flexion	Extension
ACL / PCL	4%	96%
MCL / LCL	15%	85%
Menisci	67%	33%

Ligament status



Postop. 5 months