Nadir ve Atlanan Alt Ekstremite Yaralanmaları

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Acil Tıp AD.

Neden Önemli?-1

- Kaçırılan fraktürler ve ortopedik yaralanmaların uygunsuz yönetimi, acil çalışanları aleyhine açılan malpraktis davalarının önemli bir bölümünü oluşturmaktadır.

Carl A. Germann, Andrew D. Perron.Risk Management and Avoiding Legal Pitfalls in the Emergency Treatment of High-Risk Orthopedic Injuries. Emerg Med Clin N Am 28 (2010) 969–99

Neden Önemli?-2

- USA'da radyologların ikinci en sık karşılaştıkları medikal malpraktis vakaları ekstremite fraktürleridir.

Whang JS, Baker SR, Patel R, Luk L, Castro A .3rd. The causes of medical malpractice suits against radiologists in the United States. Radiology 2013; 266:548–554

Neleri kaçırıyoruz?

- Dislokasyonlar
- Okkült ve stres fraktürleri
- Fraktürün gözden kaçan diğer yarısı
- Damar ve sinir yaralanmaları

Neleri kaçırıyoruz?-2

- **Kalça:**
- Femur boyun fraktürleri(Yaşlılar,Osteoporozis)
- İntertrokhanterik fraktürler
- Ramus pubis fraktürleri veya diğer pelvis fraktürleri
- **Diz:**
- Tibia plato fraktürleri (lateral)
- Patella fraktürleri
- Osteokondral fraktürleri,ligament veya menisküs yaralanmaları
- **Ayak bileği:**
- Lateral malleol fraktürleri
- Ligament yırtıkları
- 5.metatars fraktürü, navikular veya diğer orta ayak fraktürleri
- **Ayak:**
- Calcaneus ve talus fraktürleri
- Tarso-metatars fraktürleri/dislokasyonları(Lisfrank fraktürü/dislokasyonu)

Neden Kaçırıyoruz?

- Yetersiz görüntü
- Kötü teknik
- Non-deplase fraktürler
- Hataların yaygın lokasyonları
- Küçük avülsiyon fraktürleri
- Tatmin edici yaralanmaların tanınması
- Dikkatsiz değerlendirme

Ha AS, Porrino JA, Chew FS. Radiographic pitfalls in lower extremity trauma. AJR Am J Roentgenol. 2014 Sep;203(3):492-500

Table 46-3 Blood Loss Associated with Fracture in Adults

FRACTURE SITE	AMOUNT OF BLOOD LOSS (ML)
Radius and ulna	150–250
Humerus	250
Tibia and fibula	500
Femur	1000
Pelvis	1500–3000

Table 46-4 Nerve Injuries Accompanying Orthopedic Injuries

ORTHOPEDIC INJURY	NERVE INJURY
Elbow injury	Median or ulnar
Shoulder dislocation	Axillary
Sacral fracture	Cauda equina
Acetabulum fracture	Sciatic
Hip dislocation	Femoral nerve
Femoral shaft fracture	Peroneal
Knee dislocation	Tibial or peroneal
Lateral tibial plateau fracture	Peroneal

Geiderman JM, Katz D: General Principles of Orthopedic Injuries. In: Marx JA, Hockberger RS, Walls RM et al. ed. Rosen's Emergency Medicine Concepts and Clinical Practice, 7th ed. Philadelphia: Mosby/Elsevier; 2010: 211-6

Acetabular fraktürler

- Non-deplase femur boyun fraktürleri ile benzer klinik özellikler
- Yüksek enerjili travma
- Osteoporozisli hastalarda basit düşme
- Bu fraktürleri gözden kaçırmak çok kolaydır.
- Dikkatli inceleme önemlidir

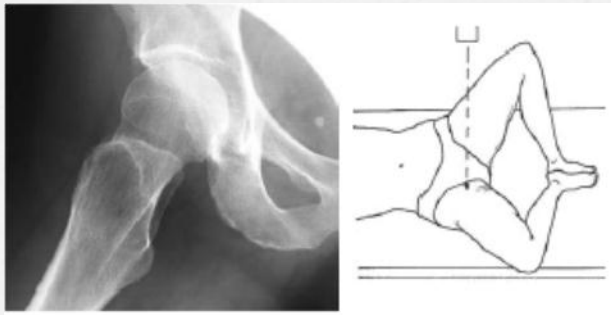

FIGURE 7 Frog-leg view of the hip.
The hip is abducted and externally rotated. The radiograph shows an AP view with patient supine, whereas the line drawing shows oblique positioning of the patient's pelvis; both are acceptable.

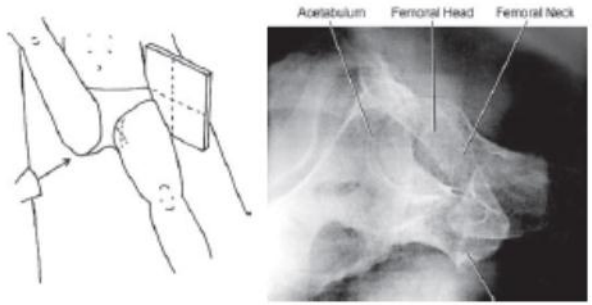

FIGURE 8 Cross-table lateral (groin lateral) view of the hip.
The uninjured leg is raised and the x-ray beam is directed as shown.

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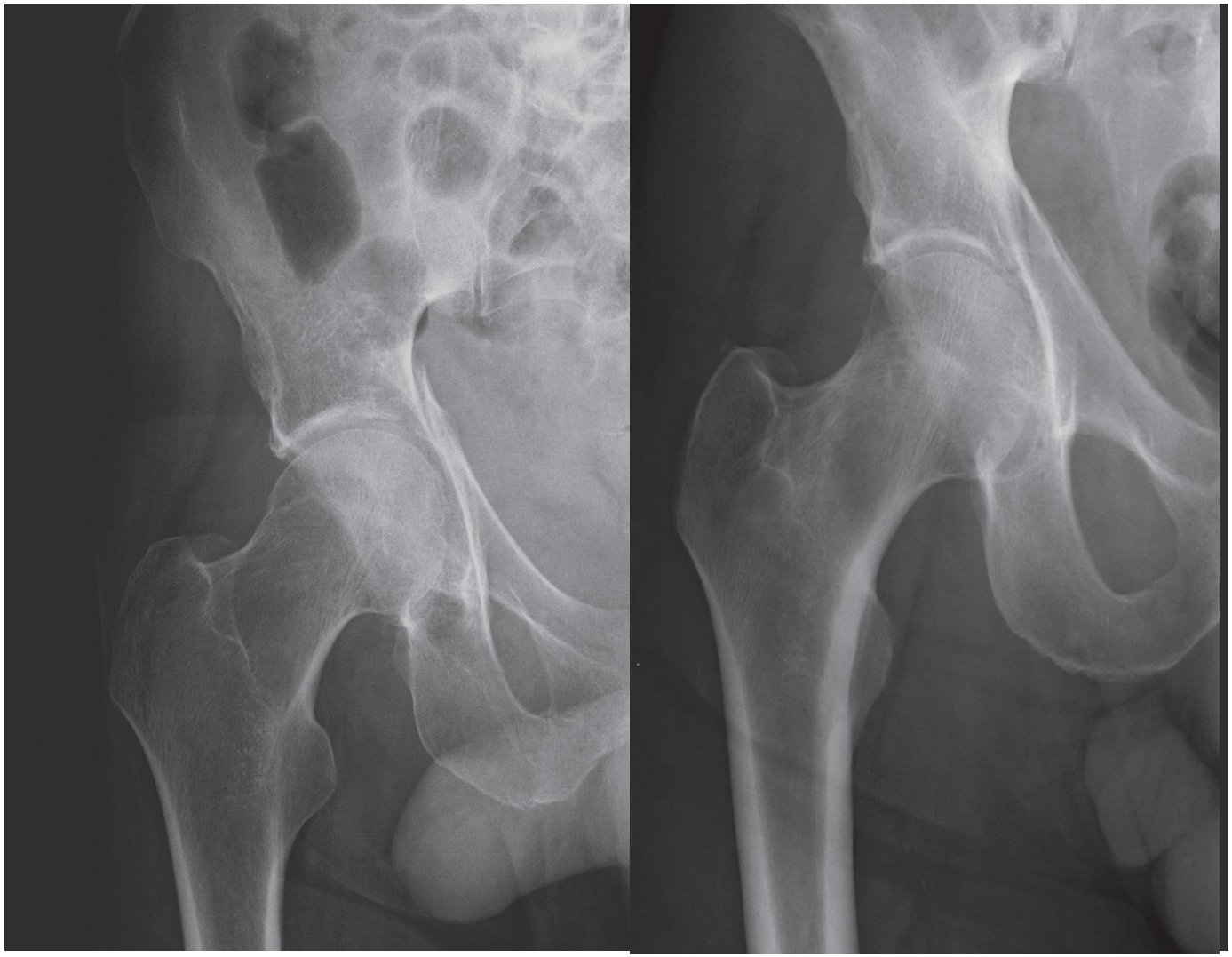

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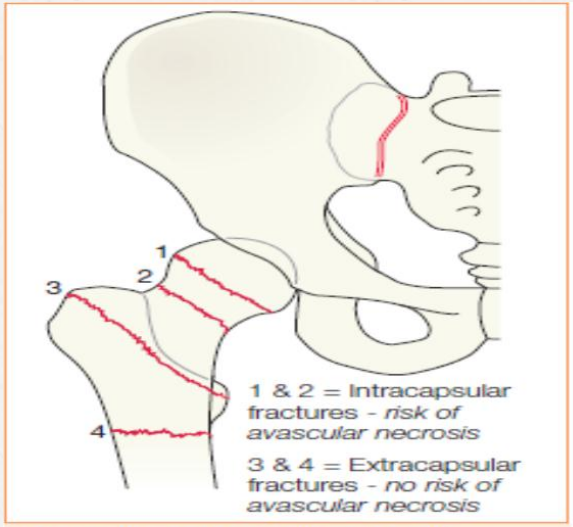
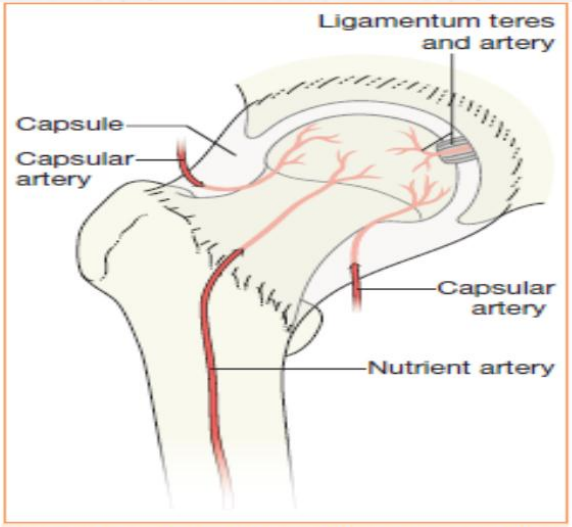
Proksimal femur fraktürleri

- Femur boyun ve trokhanterik fraktürler
- Femur boyun fraktürleri yaşlılarda en yaygın akut ortopedik geliş nedenidir.
- % 50 ‘si trokhanterik bölge
- Yaklaşık %95’i deplase ve kolay tanı
- %2-9 arası okült!!!
- Erken tanı ve cerrahi tedavide bile , bir yıl içindeki mortalite %14 - %36
- MR’ ın sensitivite ve spesifitesi %100



The radiographic findings enable a fracture of the femoral neck to be classified as intracapsular or extracapsular. This classification has a major impact on determining the choice of surgical treatment.



Intracapsular fractures risk compromising the blood supply to the head of the femur. The vessels passing through the capsule of the joint are extremely vulnerable. Disturbance/interruption of the capsular arteries increases the risk of non-union or avascular necrosis of the femoral head. The blood supply is not similarly affected with an extracapsular fracture.

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A B C

FIGURE 6 Positioning of the AP hip radiograph.

(*A*) Improper positioning with the hip in a neutral position (slight external rotation). The femoral neck appears foreshortened and the lesser tuberosity is prominent (*arrow*).

(*B*) Correctly positioned AP view with the hip rotated 15° internally (great toes touching). This elongates the femoral neck and improves fracture detection. The lesser tuberosity appears smaller (*arrow*).

(*C*) At rest, the legs tend to rotate externally. For correct positioning, the great toes should be touching (internal rotation of the legs).

[C from Ballinger PW, Frank ED: *Merrill's Atlas of Radiographic Positions and Radiologic Procedures,* 10th ed. Mosby, 2003, with permission.]

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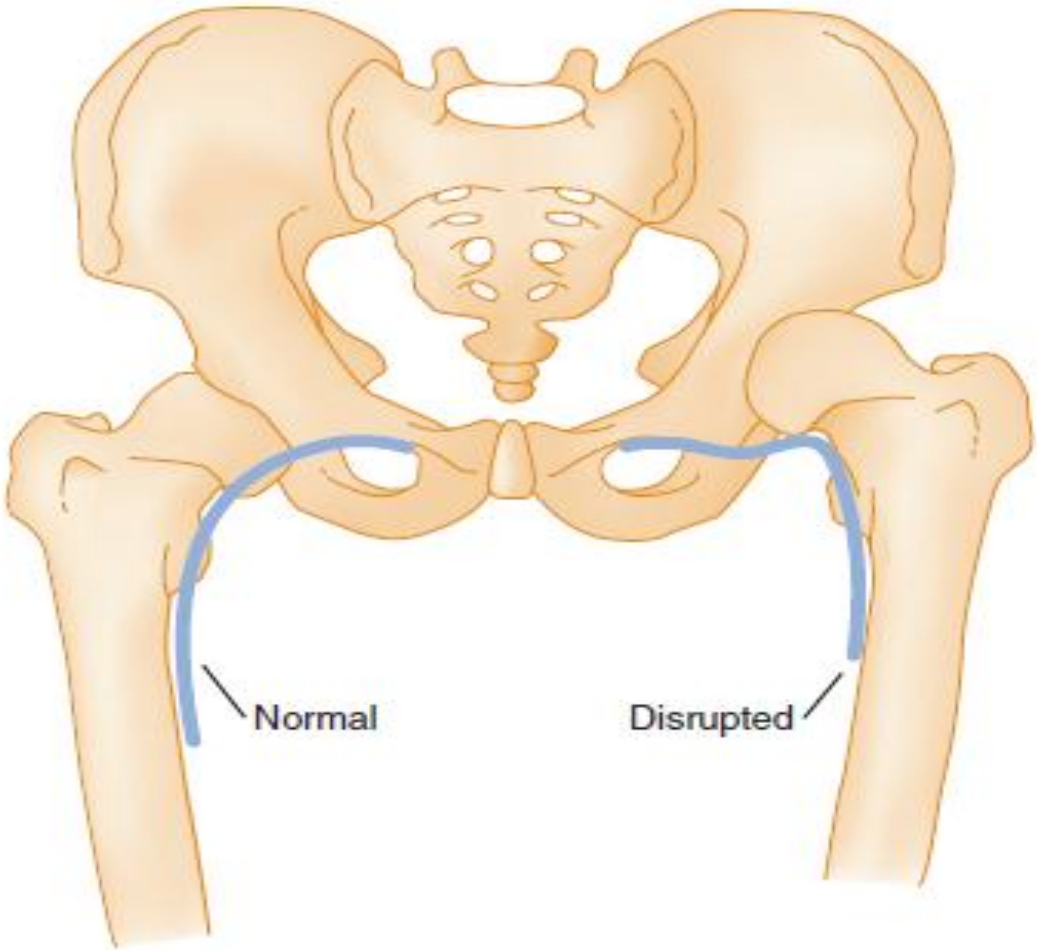
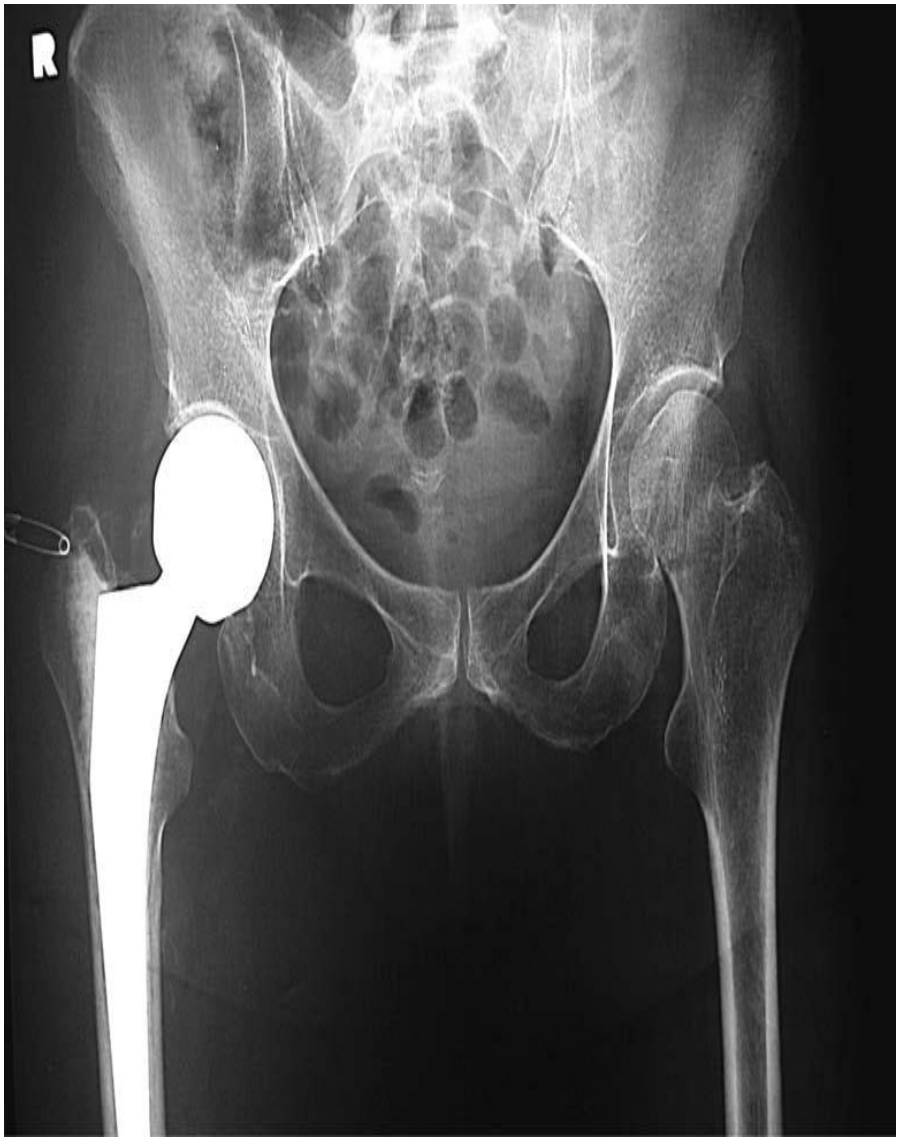


Figure 53-24. Shenton's line is a smooth curved line drawn along the superior border of the obturator foramen and medial aspect of the femoral metaphysis. Disruption of this line should raise suspicion of a femoral neck fracture or hip dislocation.

Fiechtl JF,Fitch RW: Femur and Hip. In: Marx JA, Hockberger RS, Walls RM et al. ed. Rosen's Emergency Medicine Concepts and Clinical Practice, 7th ed. Philadelphia: Mosby/Elsevier; 2010: 211-6



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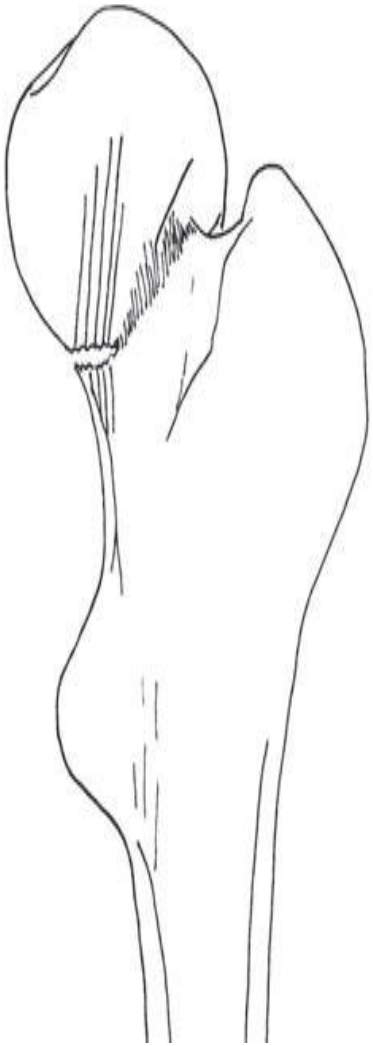

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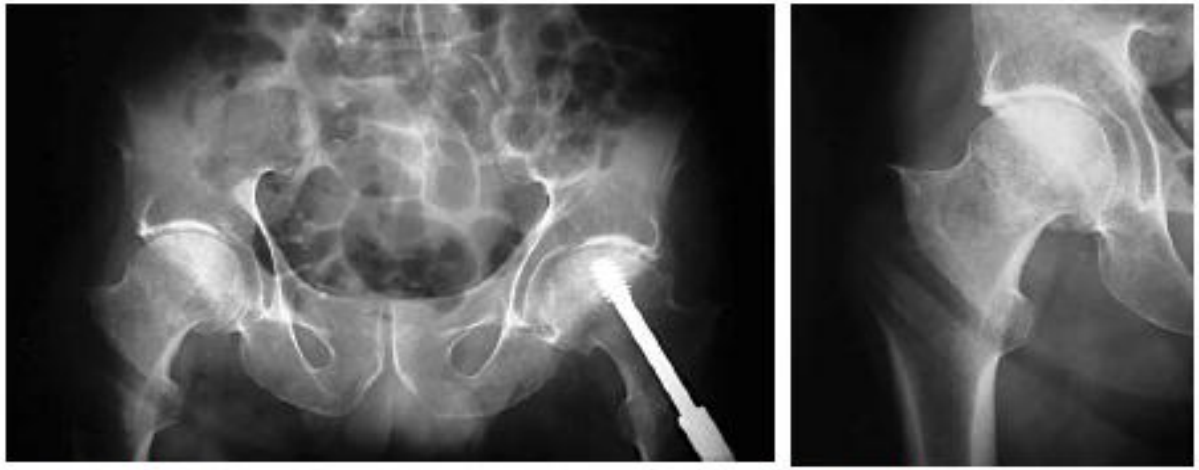

A. AP pelvis

B. AP hip

C. "Frog-leg" view

D. MRI

E. Postop view

FIGURE 22 **A "non-occult" hip fracture diagnosed using MRI.**

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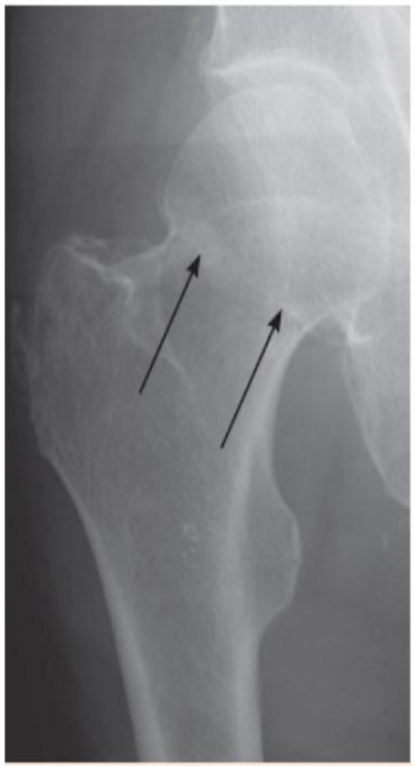
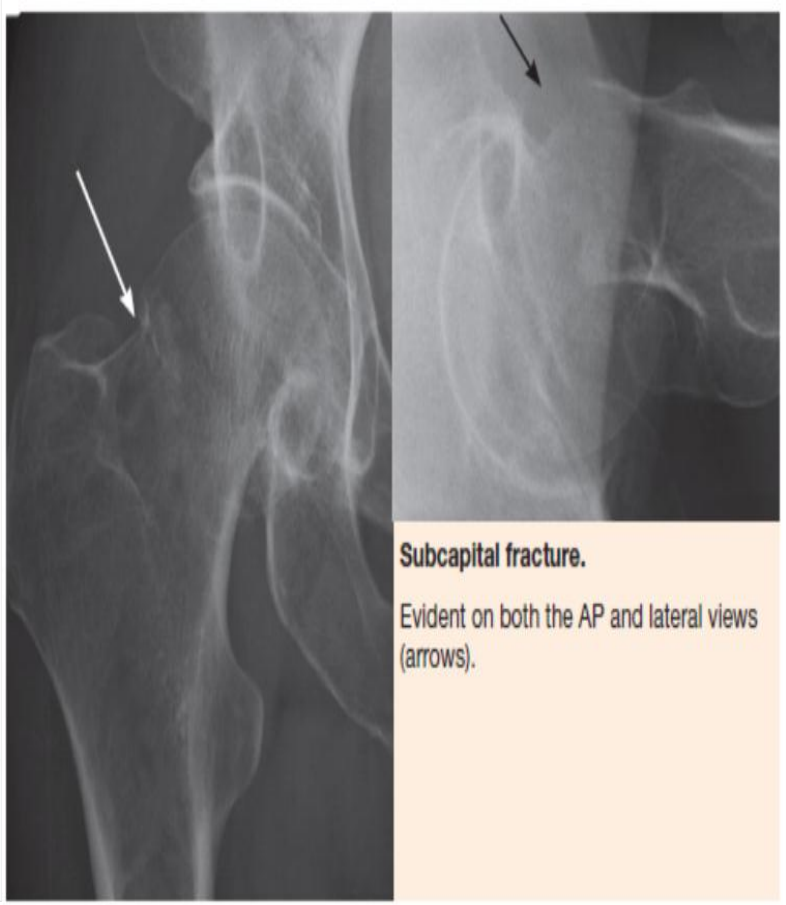


Subcapital fracture.

The white line (arrows) indicates impaction.

Subcapital fracture.

Abnormal angulation (arrow) of the femoral neck is evident.



Subcapital fracture.

Evident on both the AP and lateral views (arrows).

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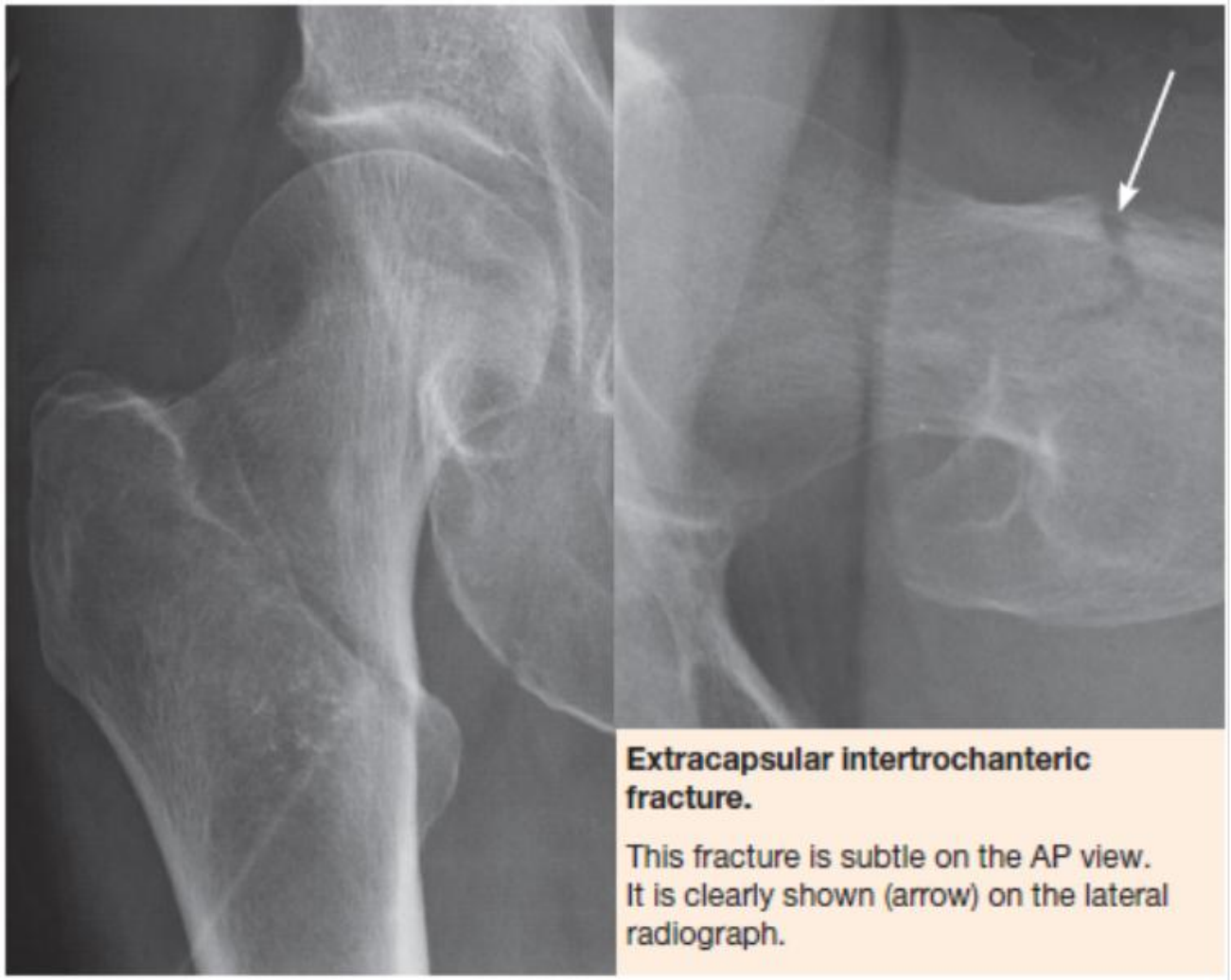

Extracapsular intertrochanteric fracture.

This fracture is subtle on the AP view. It is clearly shown (arrow) on the lateral radiograph.

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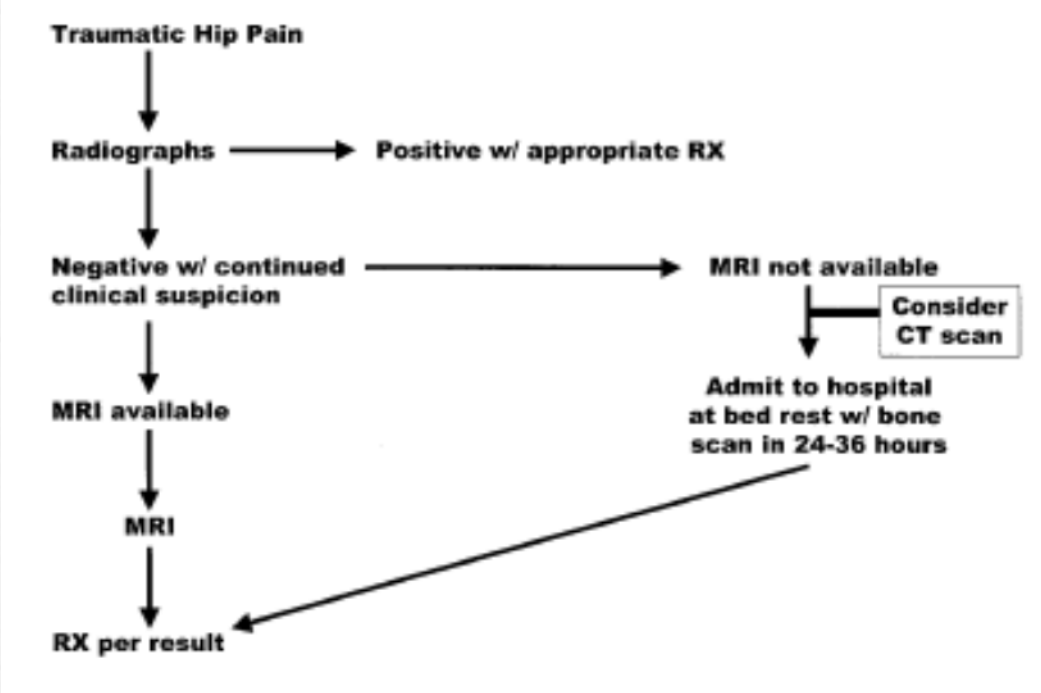
Kalça travmalarında algoritm



Perron AD, Miller MD, Brady WJ.Orthopedic pitfalls in the ED: radiographically occult hip fracture.Am J Emerg Med. 2002 May;20(3):234-7.

Diz travmaları

TABLE 1

Relative Frequencies of Various Fractures About the Knee in Adult ED Patients

Patella	40%
Tibial plateau	32%
Fibular head	9%
Distal femur	8%
Tibial spine	7%
Tibial tuberosity	2%
Osteochondral junction (articular cartilage) fracture	1%

Data from 192 patients
(Stiell 1996, Weber 1995, Bauer 1995)

TABLE 2

The Most Frequently Overlooked Radiographically Apparent Fractures in an ED

	PERCENT MISSED	NUMBER MISSED/TOTAL
Tibial plateau	16%	3/19
Radial head	14%	12/84
Elbow—child	14%	5/35
Scaphoid	13%	7/53
Calcaneus	10%	5/50
Patella	6%	3/53
Ribs	4%	23/548

3%, ankle, metacarpals, metatarsals, phalanges.
(Data from Freed and Shields 1984.)

Tibia plato fraktürleri

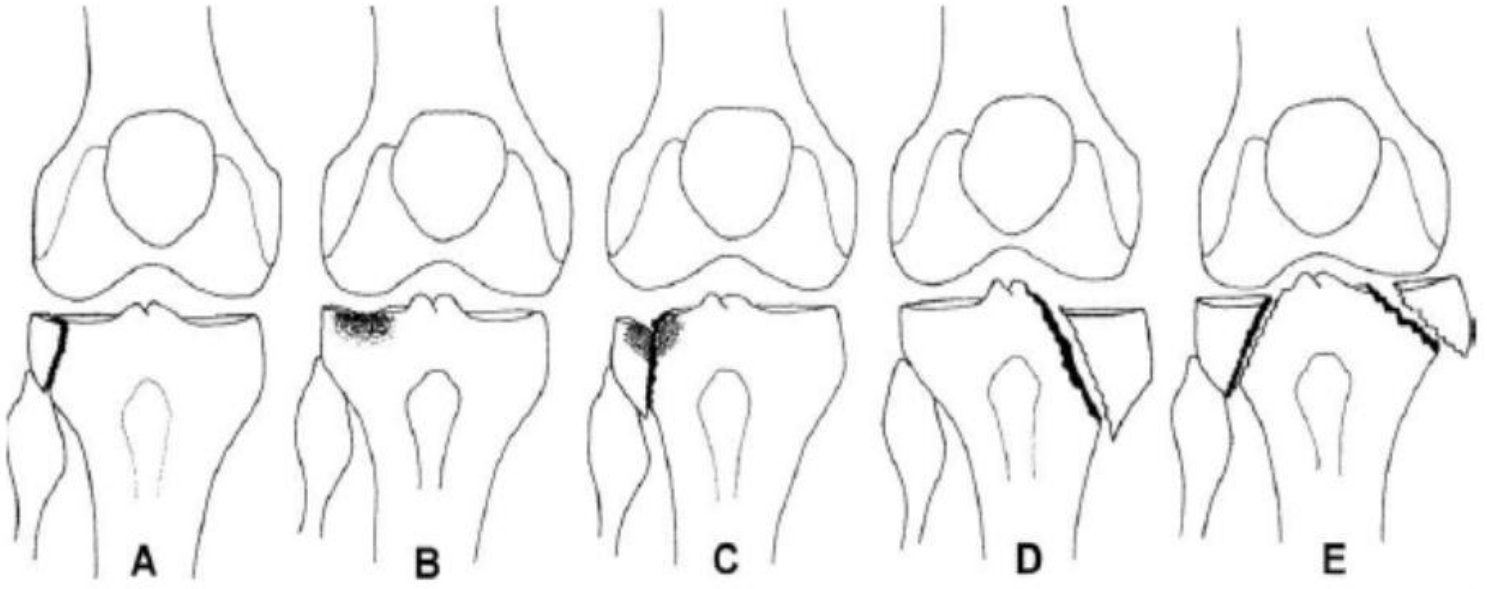


FIGURE 3 Classification of tibial plateau fractures.
(*A*) Split. (*B*) Local compression. (*C*). Split-compression. (*D*) Medial condyle (10–15%). (*E*) Bicondylar.

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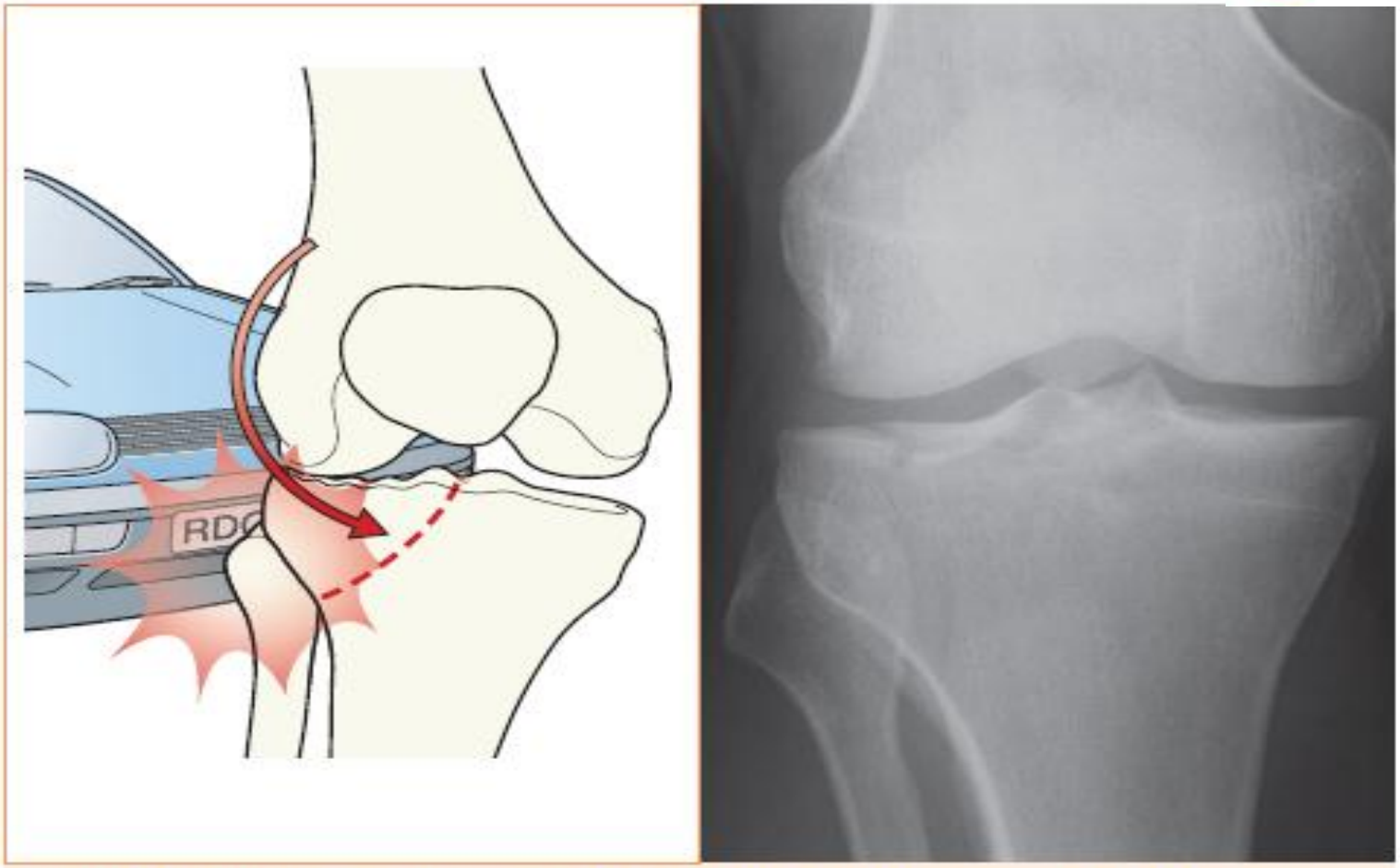

80% of tibial plateau fractures involve the lateral plateau as a result of a severe valgus stress combined with a violent compressive force which drives the femoral condyle into the tibial plateau.

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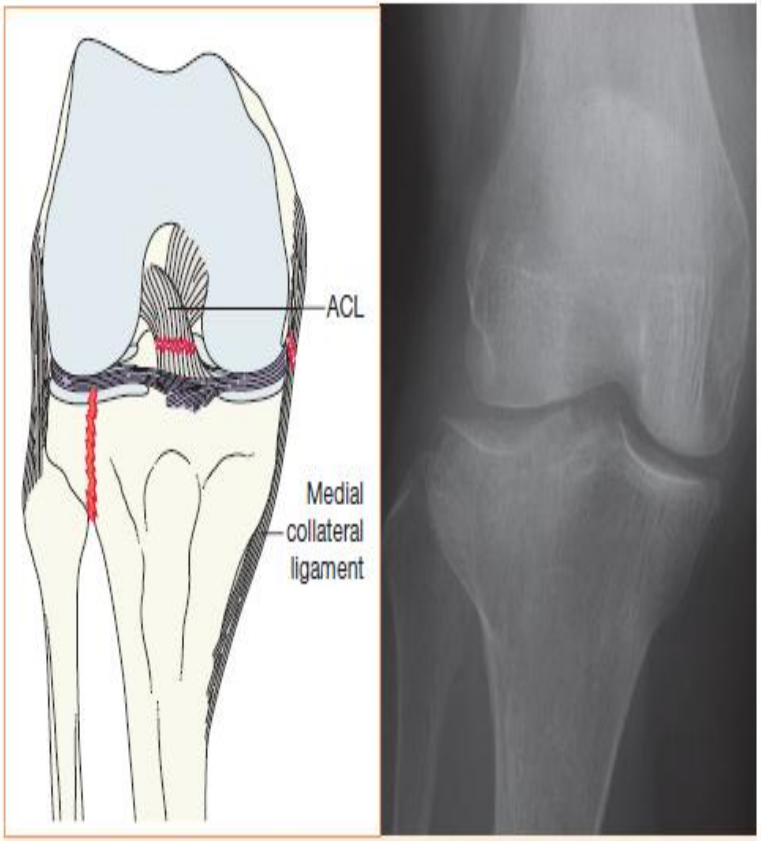
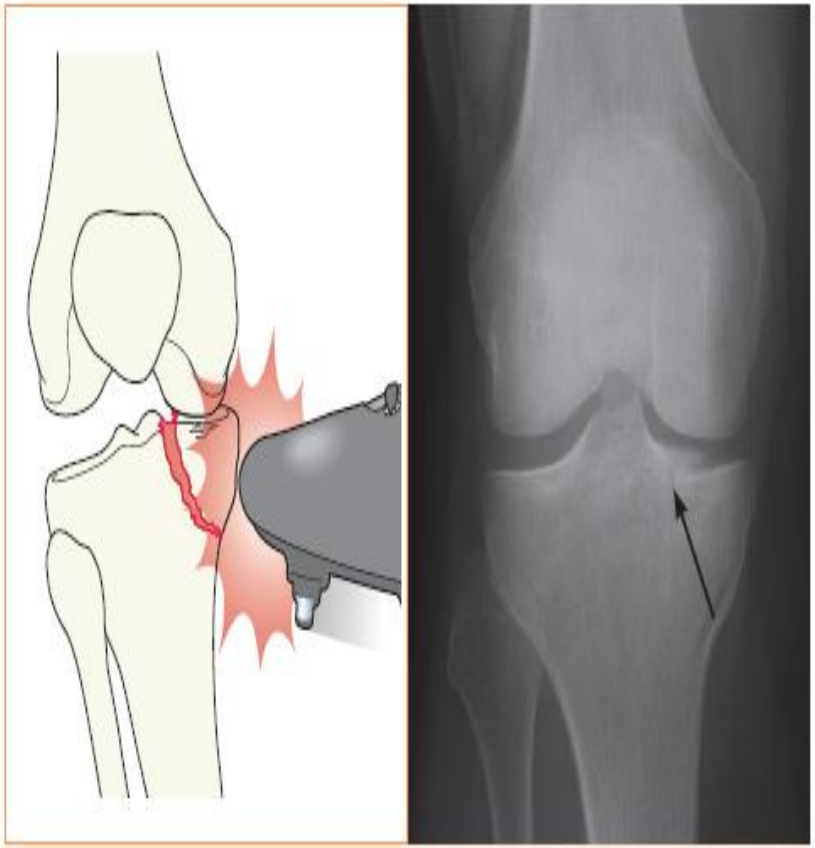


Lateral plateau fractures are often associated with significant damage to the medial collateral ligament or to a cruciate ligament.



Injury to the medial plateau (arrow) from a blow to the medial side of the joint.

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Feature (1). The normal plateau is smooth—but this alters when the plateau is fractured. The fractured plateau has an irregular surface or becomes layered. Additionally, fracture lines may extend inferiorly.

Feature (2). An area of focal increase in density below the plateau due to bone compression causing an impaction. Lateral plateau fracture.

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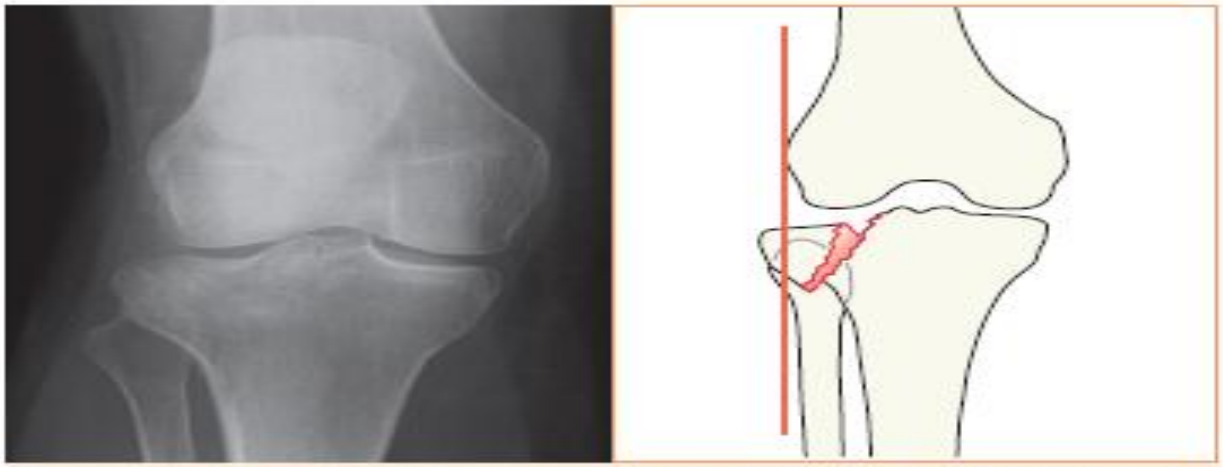
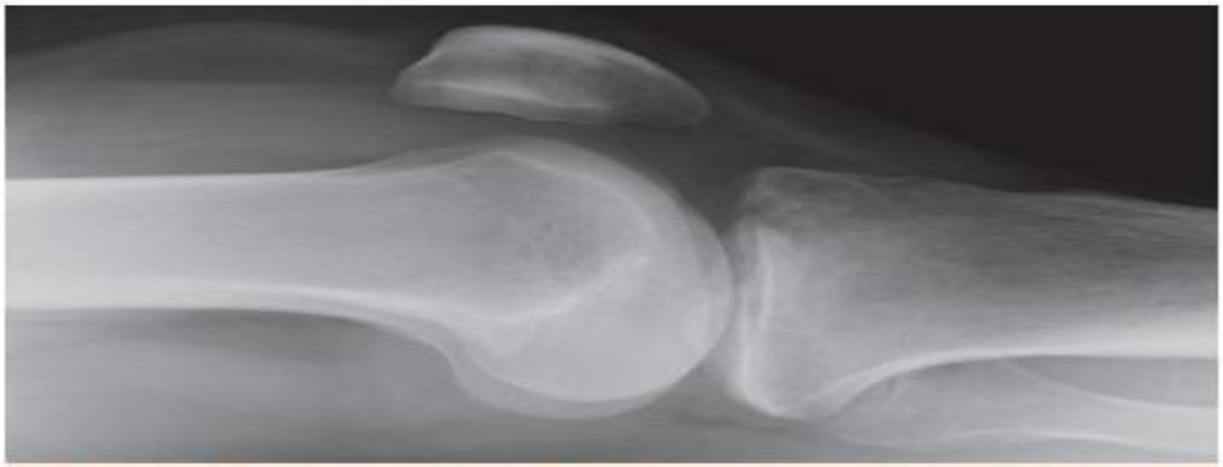


Feature (3). Tibial margin displacement. Use this rule: "a perpendicular line drawn at the most lateral margin of the femur should not have more than 5 mm of the adjacent margin of the tibia beyond it". Lateral plateau fracture.



Feature (4). On the lateral radiograph, in most cases of a fracture involving a plateau there will be a fat–fluid level[8,9], as shown here.

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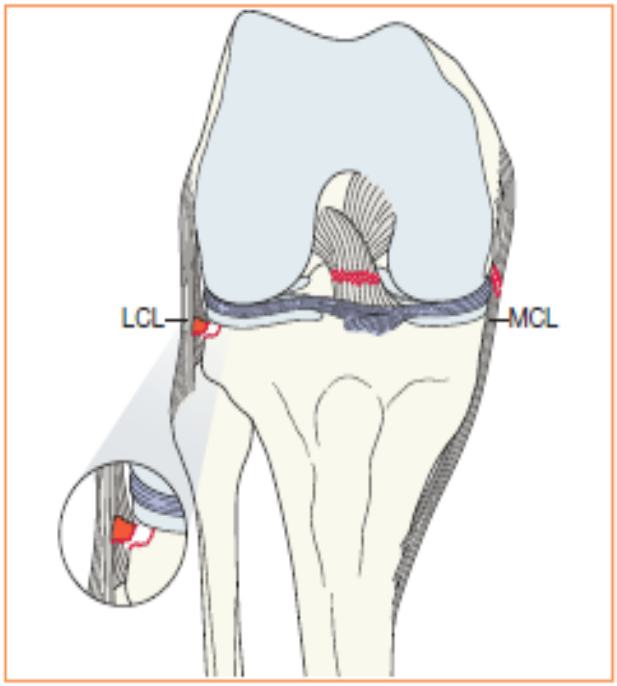
Diz çıkığı

- Diz çıkığı çok nadir görülür.
- Popliteal arter yaralanmasına dikkat
- Diz çıkığı ile birlikte ana popliteal arter yaralanma insidansı %21-32
- Yüksek enerjili bir travma sonrası insidans %40
- 8 saati geçen yaralanma-tedavi süresinde ampütasyon oranı %85
- 8 saatten az olan sürelerde ampütasyon oranı %15
- Bu olguların atlanması durumunda hastanın karşılaşabileceği komplikasyon oranları, zamanla doğru orantılı olarak artmaktadır.

Segond fraktürü-1

- Segond fraktürü, lateral tibia platosunun kopma tarzında bir fraktürüdür.
- Atlanması olasılığı yüksektir.
- Bu fraktürlere sıklıkla ön çapraz bağ(ACL) ve/veya menisküs yaralanmaları eşlik eder.
- Segond fraktürlerinin %75inde ACL yırtığı
- Radyografide görülen segond fraktürü ACL yırtığının indirek işareti olarak görülür.

Segond fraktürü-2



The lateral capsular ligament has pulled a fragment away from the cortex of the tibia. This detached fragment represents the Segond fracture.

Some of the possible associated ligamentous tears are illustrated.

LCL = lateral capsular ligament.

MCL = medial capsular ligament.

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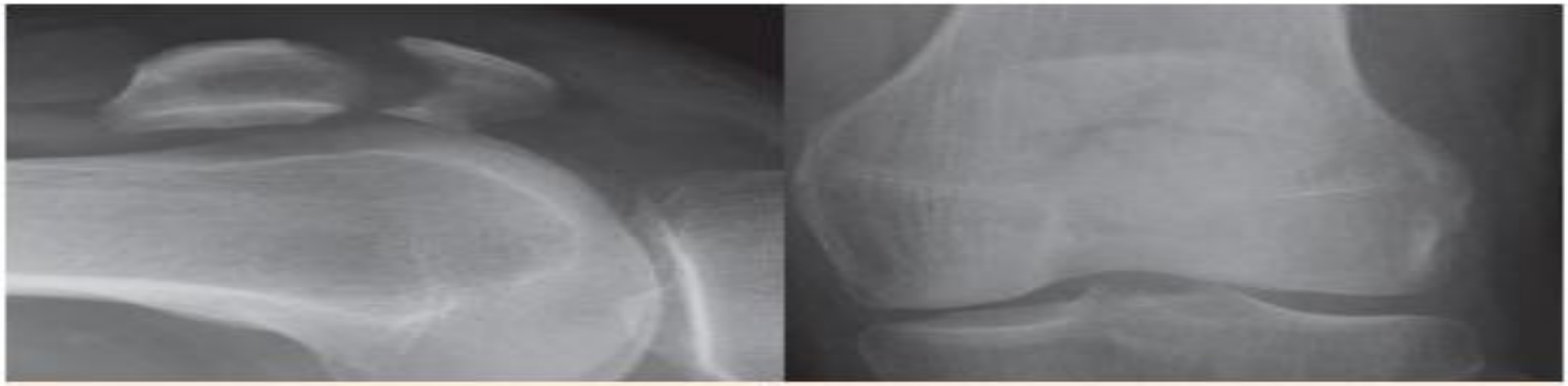
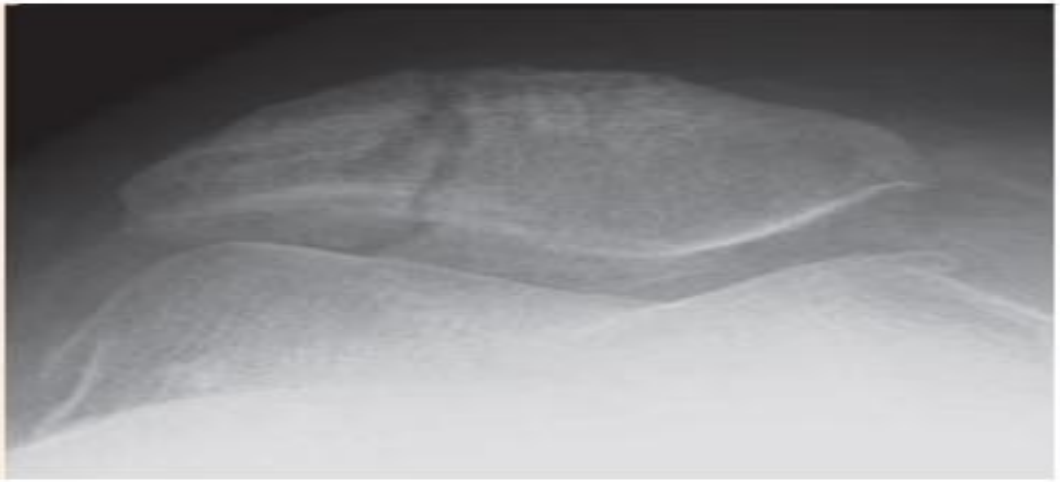
Patella fraktürü



Horizontal (left) and comminuted (right) fractures of the patella.

Caution: this fracture was not seen on the standard views of the knee. Occasionally this occurs, usually with an undisplaced vertical fracture. Clinical concern will determine whether an additional projection is necessary[1,2].

This is a skyline view.



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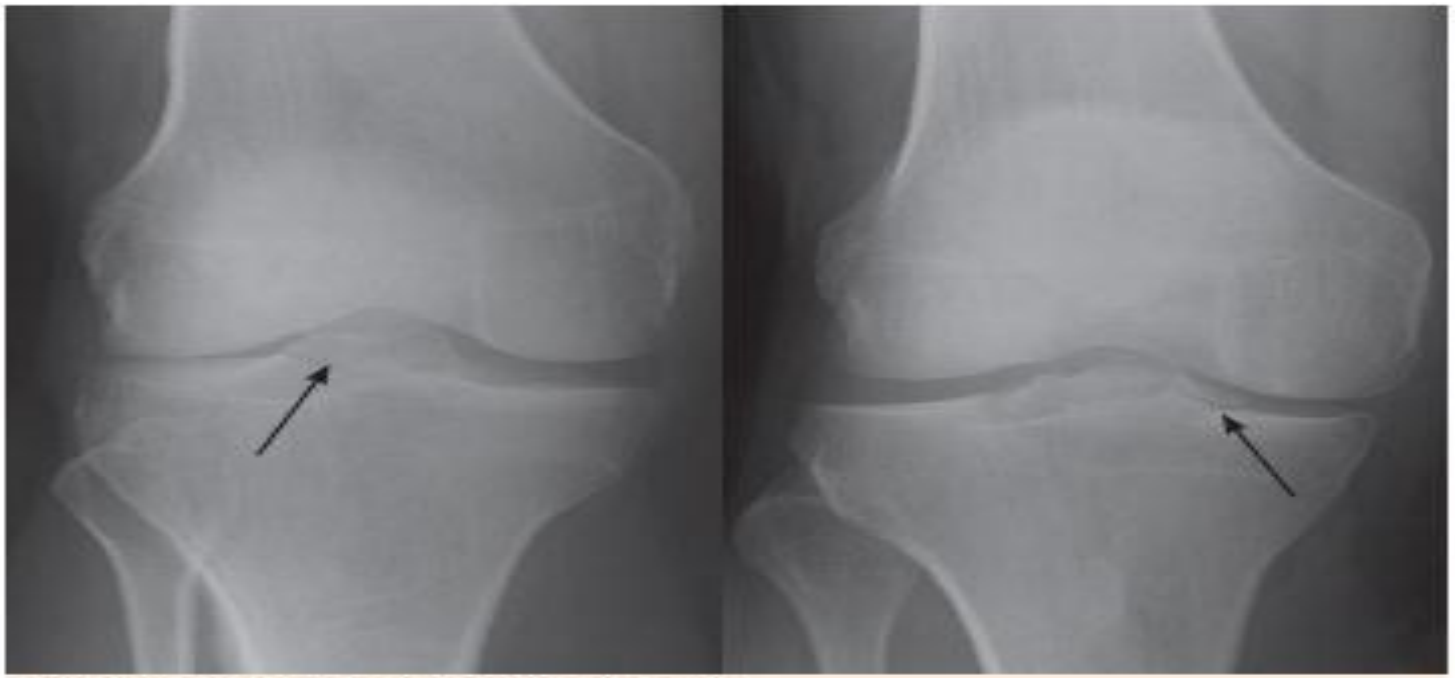
Tibia eminensia fraktürü

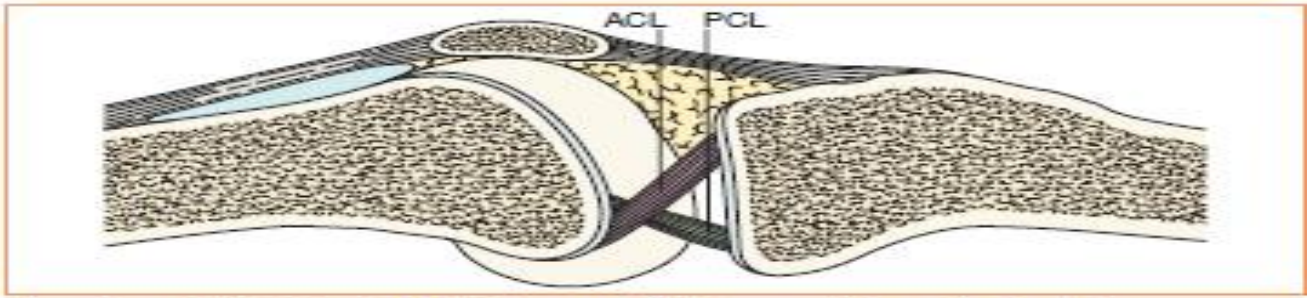
Fracture/avulsion of the tibial spine

An avulsion fracture of the tibial spine (the intercondylar eminence) indicates a cruciate ligament injury because this area is the site of attachment of these ligaments.



Avulsion fractures (arrows) of the tibial spine.

Cruciate ligament yaralanması



Insertion of the ACL and PCL, shown on this intercondylar sagittal section.

PCL avulsion fracture.

If a tiny fragment (arrow) is identified close to the tibial articular surface posteriorly then the PCL is likely to have been injured.

ACL avulsion fracture.

If a tiny fragment of bone (arrow) is identified close to the intercondylar eminence (ie the tibial spine) this is invariably consequent on an avulsion of the tibial attachment of the anterior cruciate ligament. Occasionally, the detached bone fragment may be lying loose and visible elsewhere within the joint.

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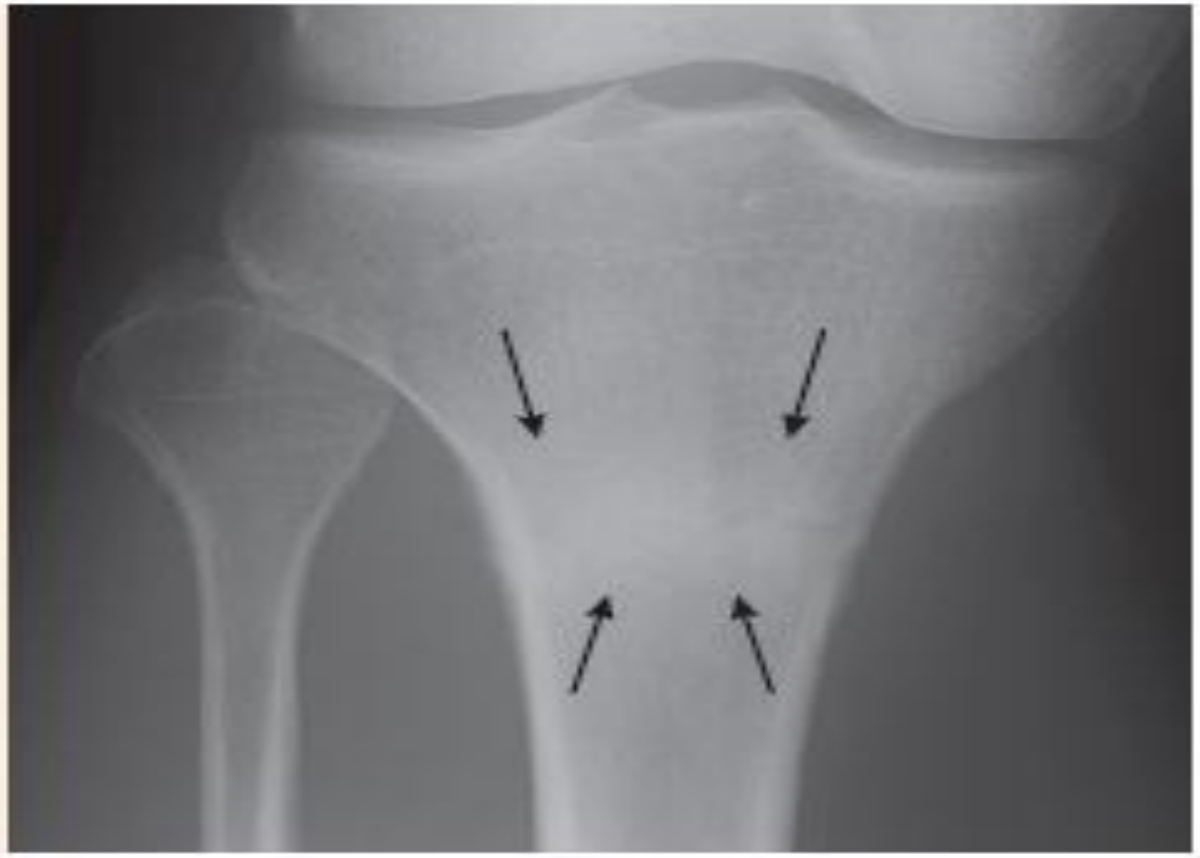
Tibia stres fraktürü



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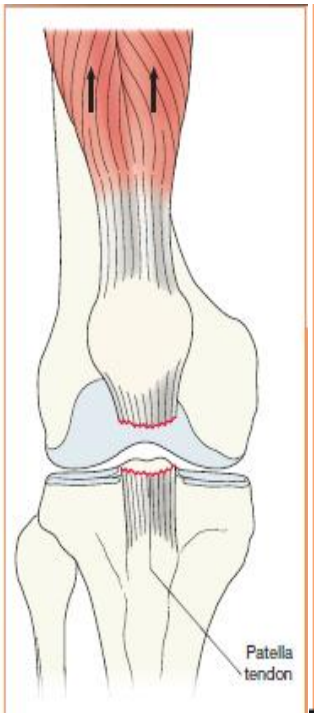
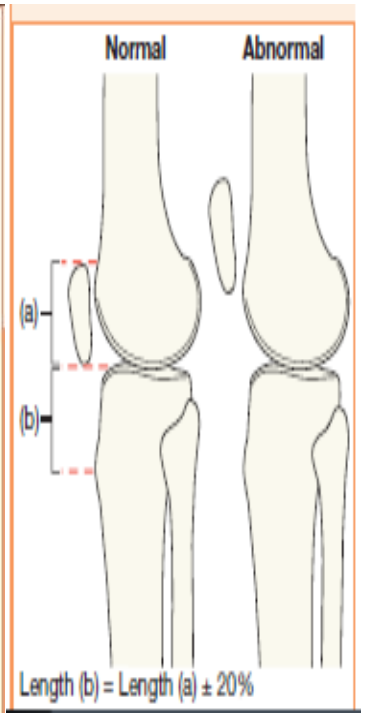
Patellar tendon rüptürü





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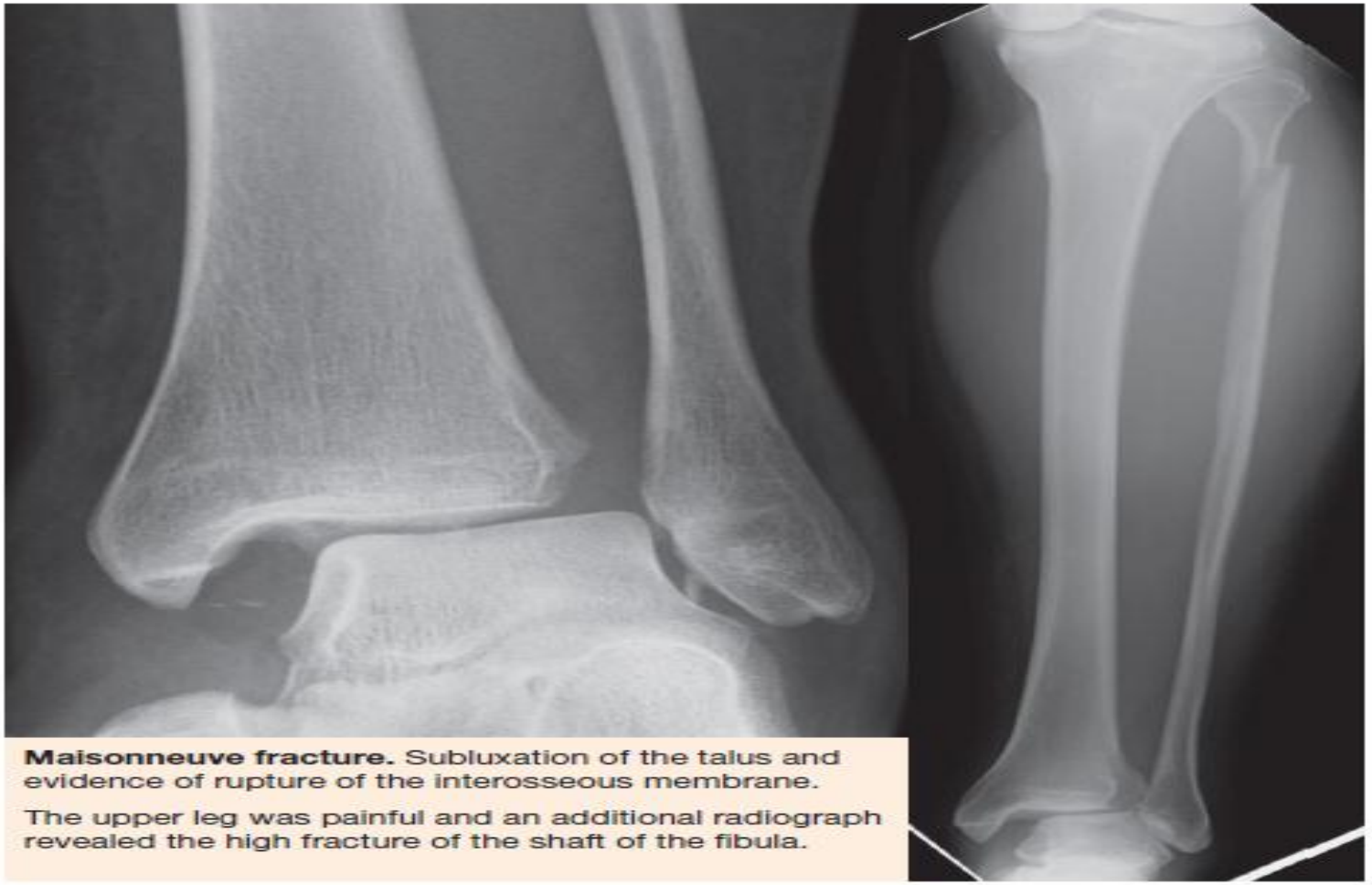
Maisonneuve fraktürü-1

- Proksimal fibula kırığı ile birlikte medial malleol kırığı ya da deltoid bağ yaralanmasının birlikte görülmesidir.
- Ayak bileği kırıklarının % 5'nde görülür.
- Ayak bileği travmalarında mutlaka proksimal fibulada bir patoloji olup olmadığına bakılmalıdır.

Maisonneuve fraktürü-2



Maisonneuve fracture. Subluxation of the talus and evidence of rupture of the interosseous membrane.

The upper leg was painful and an additional radiograph revealed the high fracture of the shaft of the fibula.

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FIGURE 9 Mortise view—Patient 2B.

There is a comminuted medial malleolar fracture (*arrowhead*) and widening to the distal tibiofibular joint (*arrow*).

FIGURE 10 Maisonneuve fracture of the proximal fibula (*arrow*).

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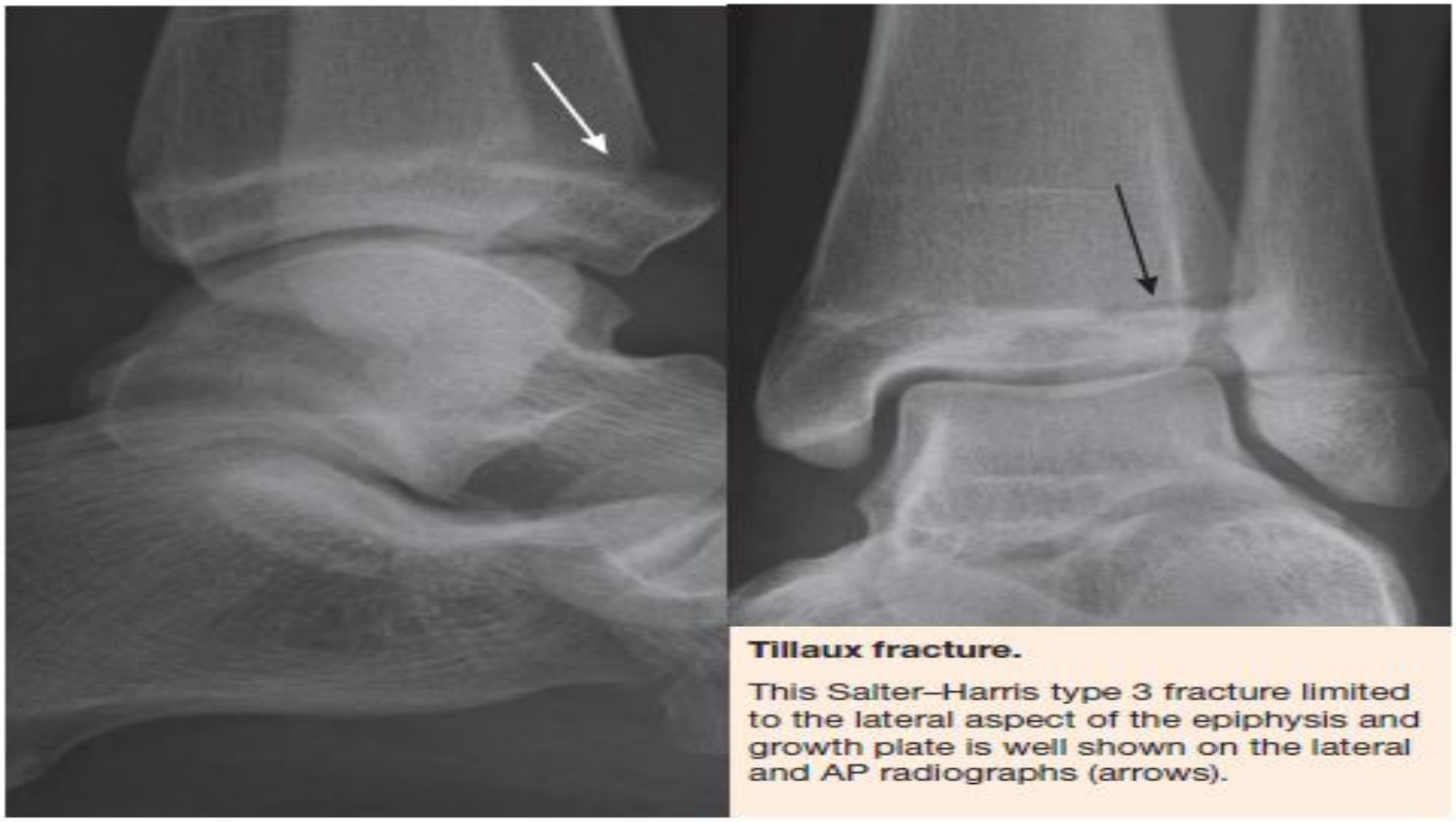
Tillaux fraktürü

Anterior tibiofibular bağın çekmesiyle tibianın distal eklem lateral kenarında meydana gelen bir avülsiyon kırığıdır



Tillaux fracture.

This Salter–Harris type 3 fracture limited to the lateral aspect of the epiphysis and growth plate is well shown on the lateral and AP radiographs (arrows).

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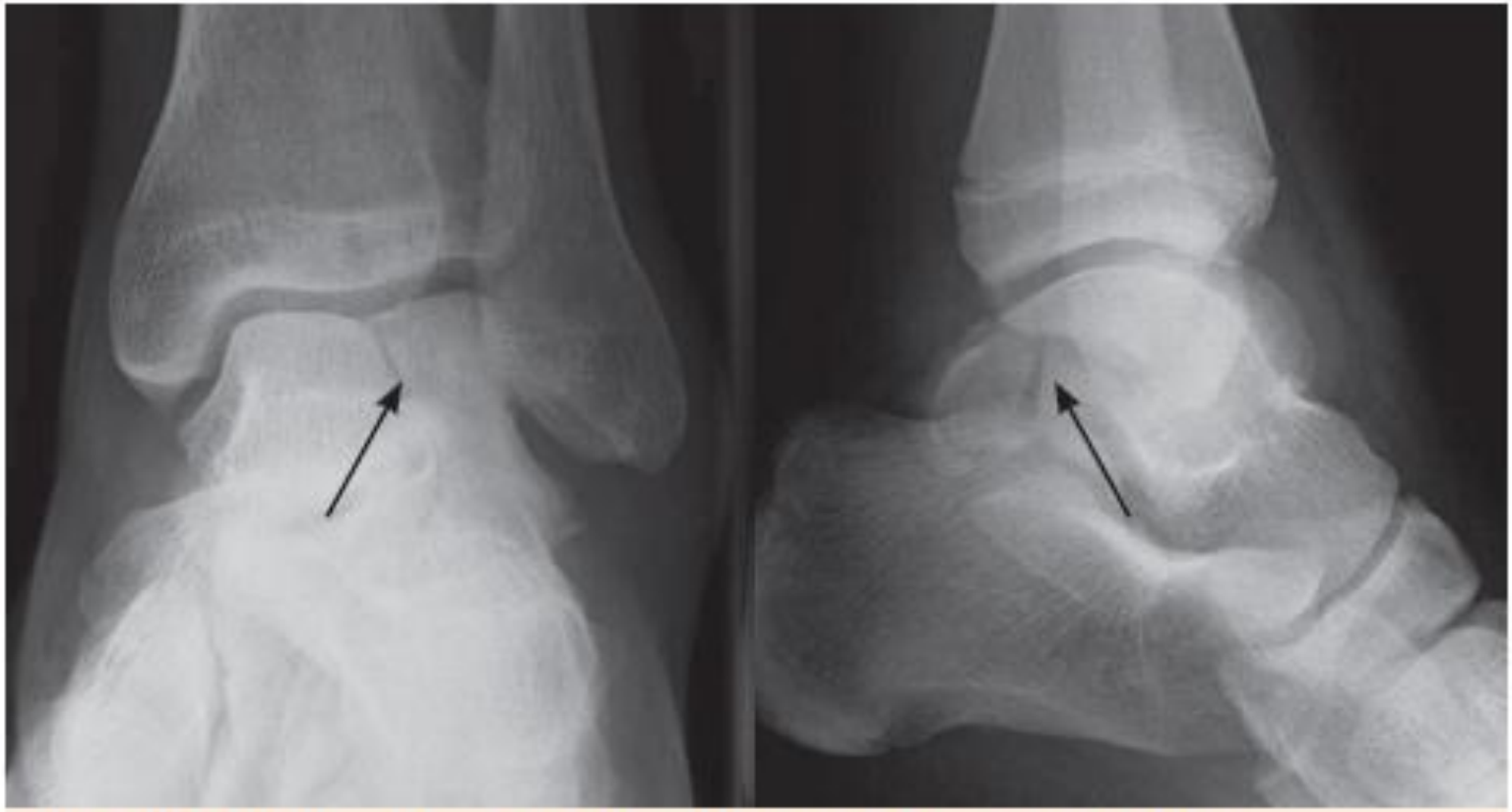
Talus fraktürleri-1

- Talar kırıkları nadirdir.
- Çoğu yüksek enerjili yaralanma
- AVN ve dejeneratif artrit riski!!
- Non-deplase kırıklara dikkat!!
- Talar kubbe–osteokondral kırıklara dikkat.

Talus fraktürleri-2



Fractures (arrows) can occur in the coronal, sagittal or horizontal planes.

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Talus fraktürleri-3

Displaced fracture through the neck of the talus (arrow).

Undisplaced fracture through the neck of the talus (arrow).

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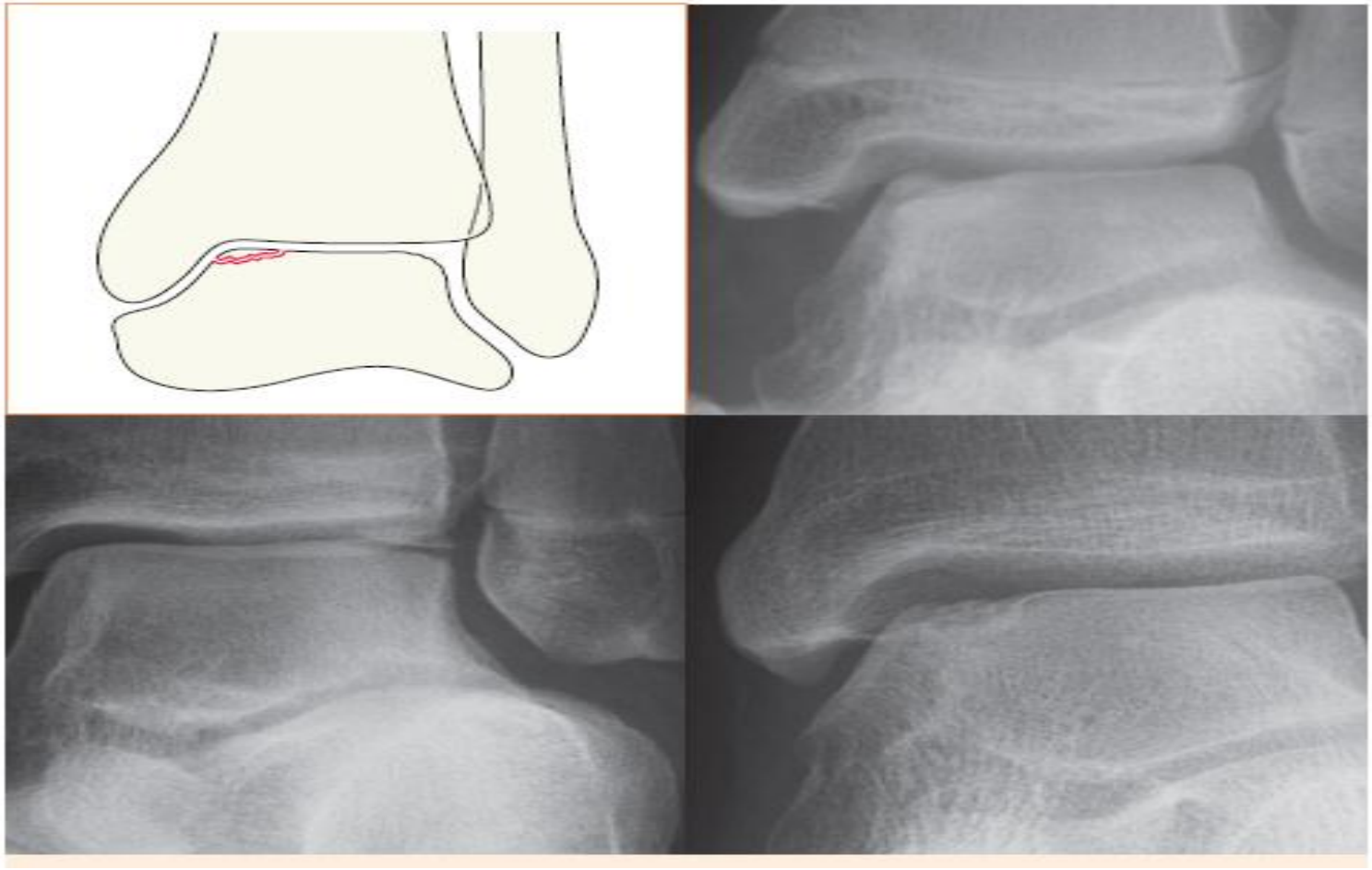
Talus fraktürleri-4



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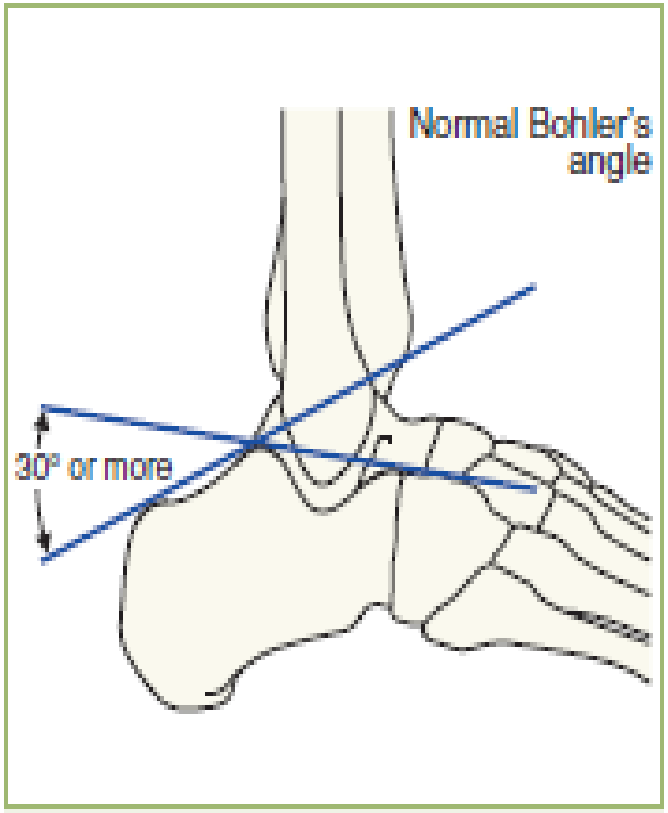
Calcaneus fraktürleri-1

- Genellikle yüksek enerjili travmalar.
- %50'sinden fazlasında ekstremitenin başka bir bölgesinde veya spinal kolonda fraktür olasılığı vardır.
- Yaklaşık %7 oranında karşı calcaneusta fraktür, %25 oranında diğer alt ekstremite de fraktür ve %10 oranında torakolomber kompresyon fraktürü başta olmak üzere spinal yaralanma görülebilmektedir.
- İlk değerlendirmede atlanma olasılığı yüksek
- Bütün ayak kemiği fraktürlerinin yaklaşık %60'nı oluşturur.
- Calcaneus fraktürleri tanısında atlanma oranı %10 .

Germann CA, Perron AD, Miller MD, Powell SM, Brady WJ. Orthopedic pitfalls in the ED: calcaneal fractures. Am J Emerg Med. 2004 Nov;22(7):607-11.

Calcaneus



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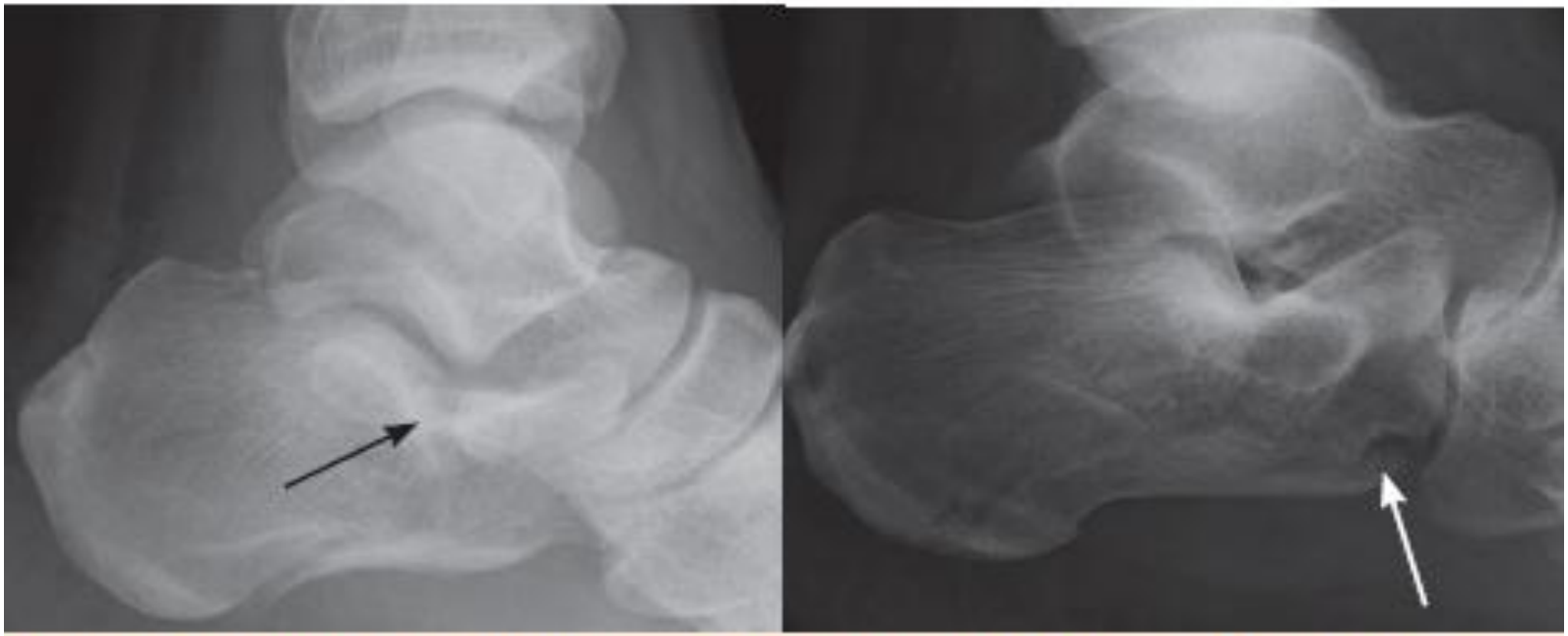
Calcaneus fraktürleri-2



Intra-articular fractures (arrows) involve the subtalar joint (left) or calcaneo-cuboid joint (right).

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Calcaneus fraktürleri-3

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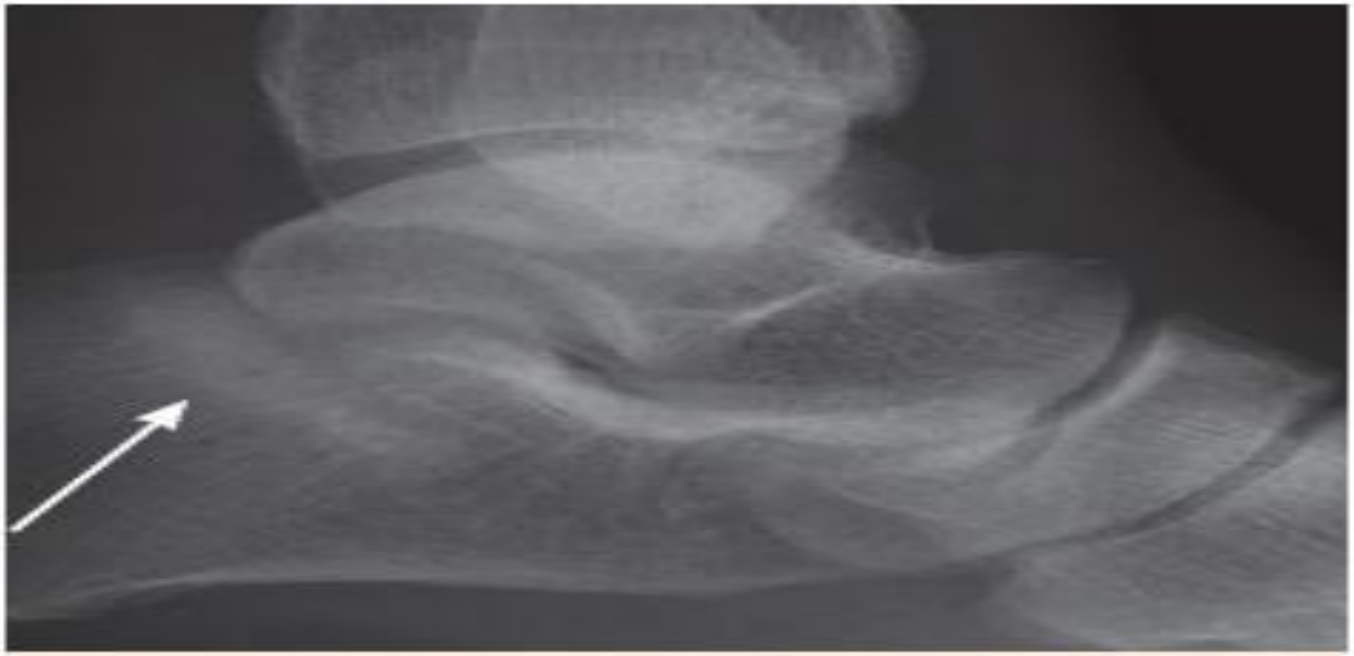
Calcaneus fraktürleri-4



Fatigue fractures due to repetitive stress are rare but do occur. Usually identified as an area of bone sclerosis on the lateral radiograph (arrow).

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Calcaneus fraktürleri-5

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Lisfranc fraktürü-1

- Lisfrank fraktürü çok nadirdir ve bütün ortopedik travmaların %1'den azında görülür.
- Yaklaşık %20 olgu da acil serviste ilk değerlendirmede atlanır.
- Eğer tanı konulamaz ise kronik ağrı ile birlikte fonksiyonel kayıp riski yüksektir.
- Akut dönemde hasta ayağının üstüne basabilir ancak Lisfrank eklemi boyunca hassasiyet vardır.
- Kompartman sendrom riski
- Ayağın plantar kesiminde ekimoz görülebilir
- Standart grafi ile tanı konulamaz ise MR ve BT

Perron AD, Brady WJ, Keats TE. Orthopedic pitfalls in the ED: Lisfranc fracture-dislocation. Am J Emerg Med. 2001 Jan;19(1):71-5

Lisfranc fraktürü-2

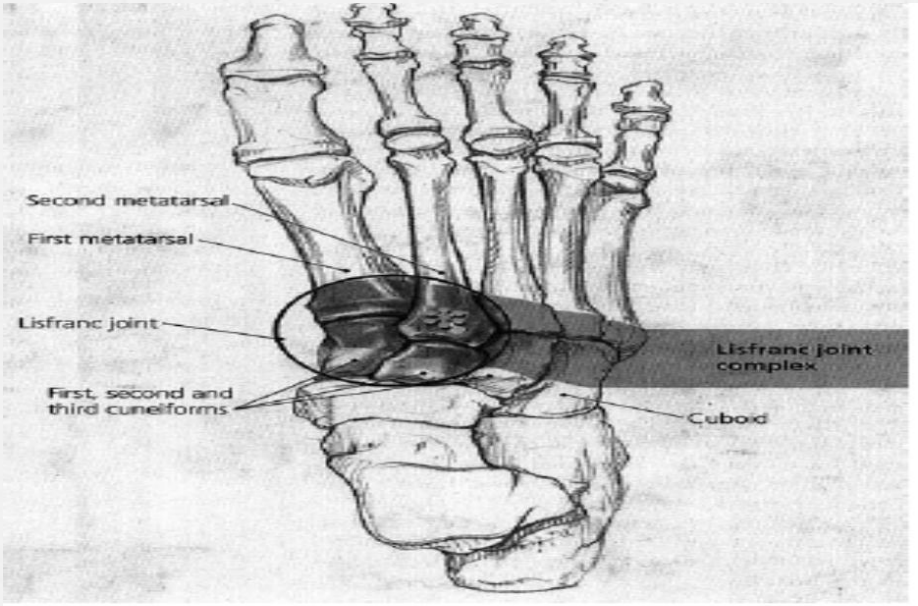


FIGURE 5. Dorsal AP view of the foot, showing the Lisfranc joint complex. Note the alignment of the second metatarsal with the second cuneiform, and its "keystone" wedging into the 3 cuneiforms. Illustration by Marsha J. Dohrman. Reprinted with permission from Burroughs KE, Reimer CD, Fields KB: Lisfranc Injury of the Foot: A Commonly Missed Diagnosis. Am Fam Phys 1998;58:118-124.[1]

Lisfranc fraktürü-3

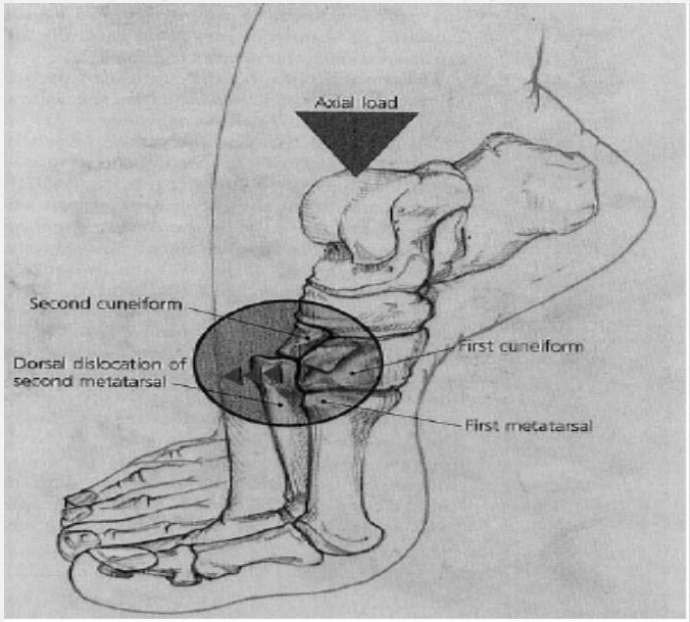
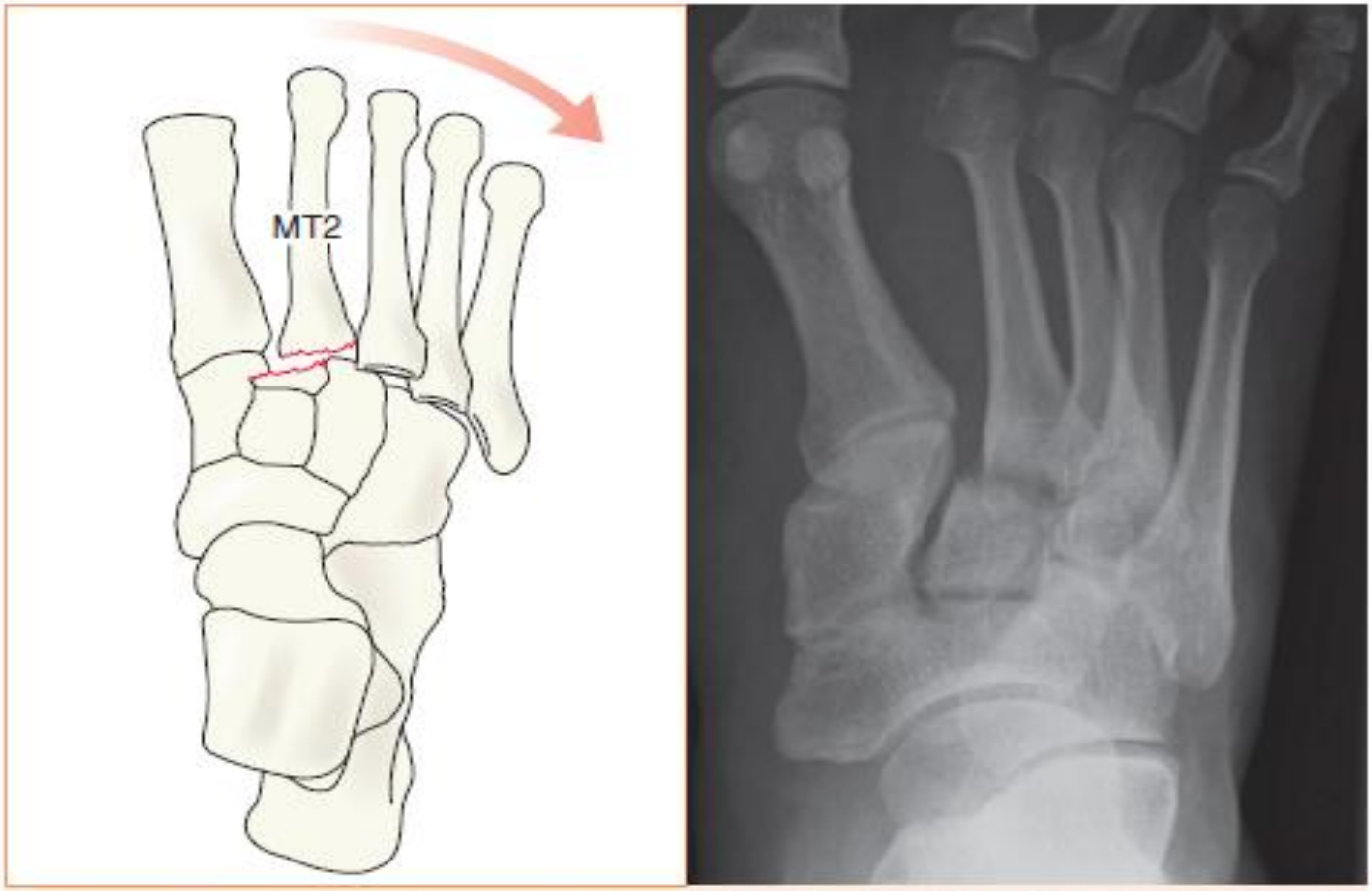


FIGURE 6. Common mechanism for Lisfranc fracture-dislocation. An axial load is placed on the plantar-flexed foot, with dorsal dislocation of the proximal second metatarsal head. Illustration by Marsha J. Dohrman. Reprinted with permission from Burroughs KE, Reimer CD, Fields KB: Lisfranc Injury of the Foot: A Commonly Missed Diagnosis. Am Fam Phys 1998;58:118-124.[1]



Lisfranc subluxation: fracture near the base of the 2nd metatarsal has freed the shaft of this bone from the restraining cuneiform mortice. Lateral slippage of the metatarsal bases has occurred in this patient.

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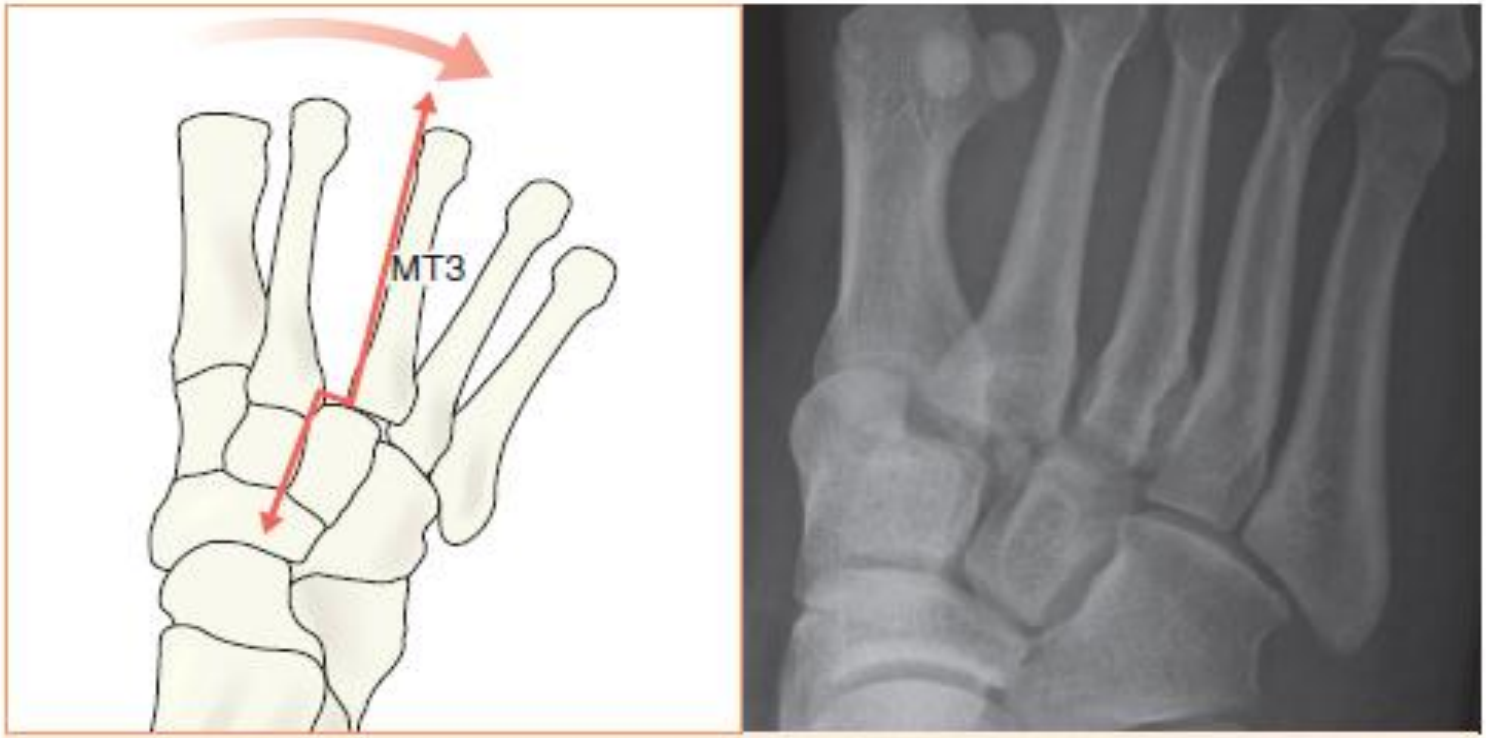

Lisfranc subluxation: the ligaments holding the 3rd metatarsal to the lateral cuneiform bone have been ruptured. Consequently, the 3rd metatarsal has subluxed laterally. The answer to question (2) at the botton of p. 296 is "No".

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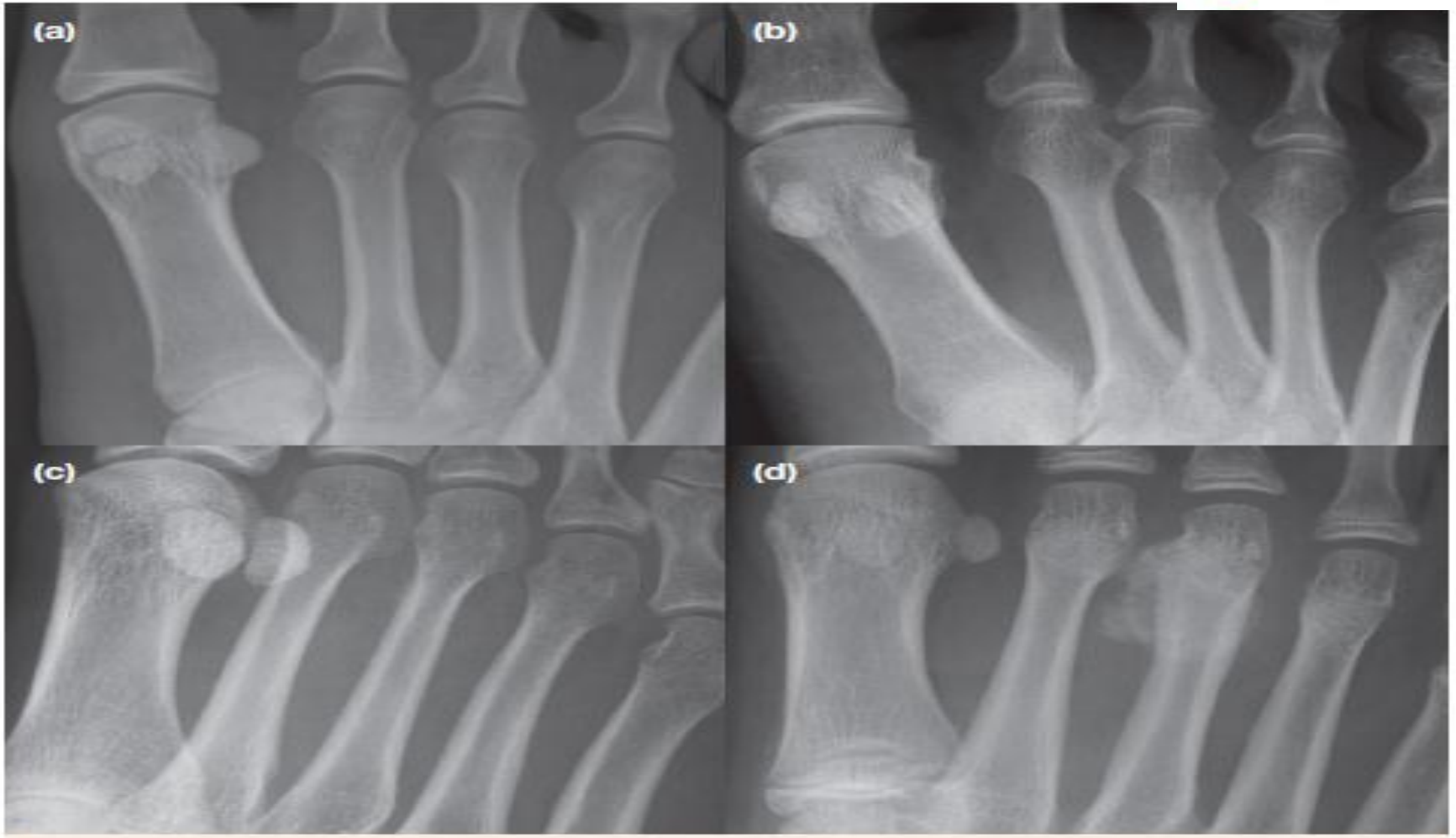
Lisfranc fraktürü-4

Metatarsal fraktürleri

- 2 ve 3. metatarsal kemik yaralanmaları en çok gözden kaçan yaralanmalardır.
- Bariz olmayan kırıklar gözden kaçar
- 2-3 hafta sonra tespit edilir.



Fatigue fractures.

Four radiographic patterns may be present: (a) Normal; (b) Transverse or oblique crack (3rd metatarsal); (c) Faint periosteal reaction or fluffy callus (3rd metatarsal); and (d) Profuse callus (3rd metatarsal).

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Son Söz

- Her zaman FM'ye güven!
- Standart grafide bulgu yok ve klinik şüphe varsa;
- Diğer alternatif grafiler
- MR
- BT
- USG düşün!!

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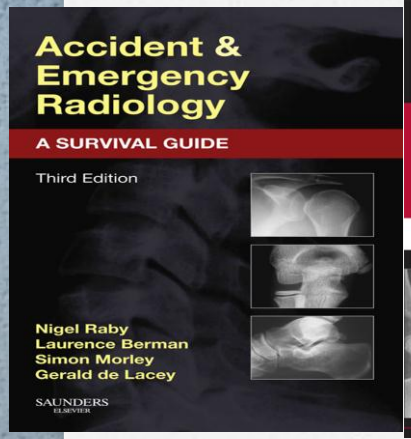
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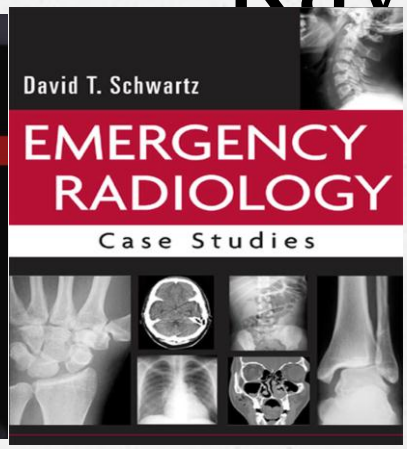
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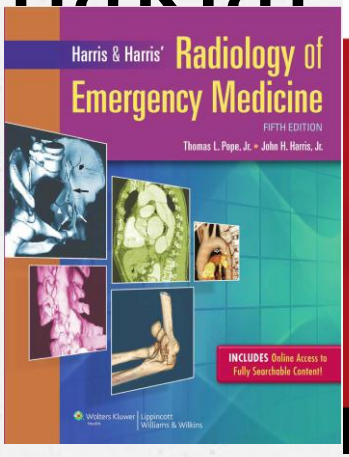
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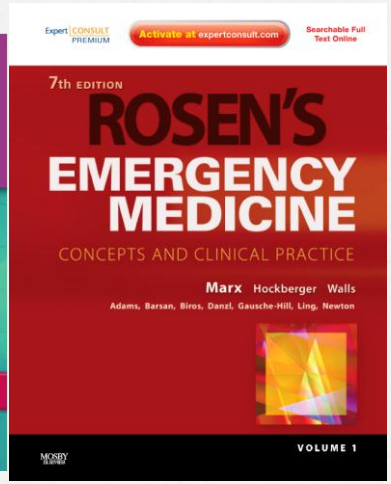
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