

## Lower extremity injury

EMERGENCY RADIOLOGY

CASE STUDIES

By David T. Schwartz

新光急診科 吳柏衡醫師  
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## Ankle injury 受傷機轉

- 60% Supination- ext rotation
- 20% Pronation- ext rotation
- 20% Supination- adduction ( inversion)

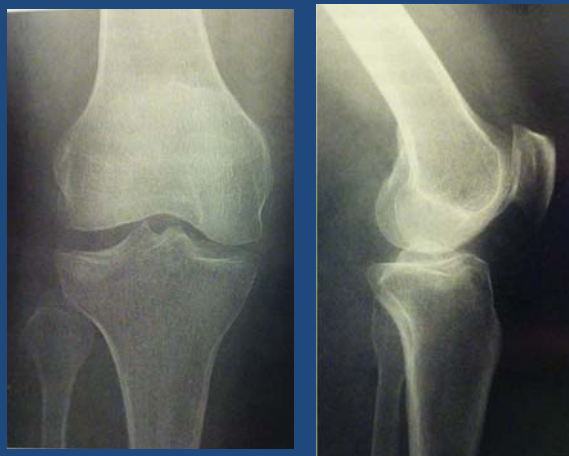
- Single malleolar fx 穩定 → 通常 non surgical
- Bi malleolar Fx 不穩定 → > 50% op
- Tri malleolar Fx → op
  - 小心 Vascular compromised, skin tenting → 先 reduction 再照 X ray

## Maisonneuve fracture

- Pt with ankle injury 腳踝扭傷
- Proximal fibula fracture + distal tibia-fibula joint separation
- Tx: op
- Ankle pain > knee pain 所以 病人不一定會說
- 所以: 腳踝 injury 一定要檢查 proximal fibula

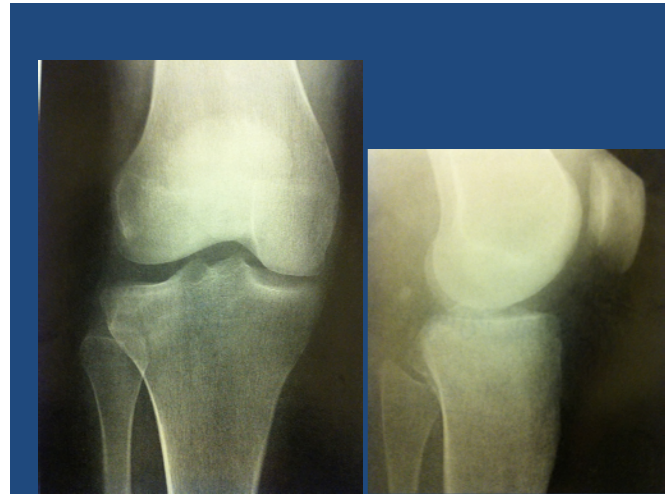
## Case 1

- 62 歲老婦兩天前搬動家裡沙發右膝扭到,之後必須用拐杖走路
- PE: 外側 tenderness, 似有 effusion, 彎曲限 60°  
no tenderness at patella, 肌肉有力



## Case 2

- 24歲少女右膝被汽車保險桿擦撞到後摔倒
- PE: 膝蓋腫, tenderness at ant&lat aspect of knee, 沒什麼joint effusion, 彎曲限45°, 韌帶等肌力測試穩定



## Knee radiography interpretation

- 比起wrist, ankle 來的容易許多, 因為構造簡單, 但是仍有missed fracture!
- 所以要從 “common and easily missed injuries” 來判讀X光!!
- 基本view: AP + Lat
- 輔助view:
  - oblique view,
  - axial patellar (sunrise) view,
  - intercondylar notch ( tunnel) view

## Knee injury

- Knee fractures
  - Patella 40%
  - Tibial plateau 32%
  - Fibular head 9%
  - Distal femur 8%
  - Tibial spine 7%
  - Tibial tuberosity 2%
  - Osteochondral injury 1%

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.)

- 判讀 X光- 從容易miss 的來判讀
- Tibia plateau fracture 最容易miss

## Tibial plateau fracture

- 通常為外側受傷 被汽車保險桿鉗到 所以又叫 “bumper Fx” “fender Fx”



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

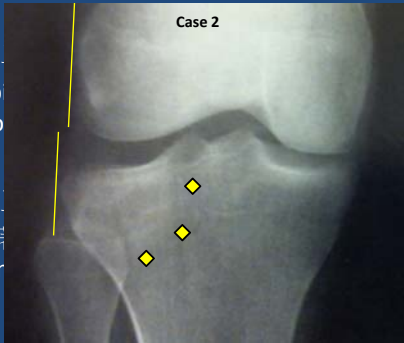
- Lateral tibial plateau 佔85-90%
- 嚴重的會傷到 popliteal artery, tibialis and peroneal nerves
- 輕微的容易missed on X ray 而造成displaced fracture → morbidity, operation
- 為何X光看不到?
  - 只在oblique view可見
  - Plateau surface 是斜的, depression fracture 照不出來

讓我們來判斷吧!!

- 生理: 身體重量在 tibia 內側的tibial plateau 這在 osteoporosis 這在
- 所以....
- 重點一:
  - 外側tibial plateau 示可能有骨折



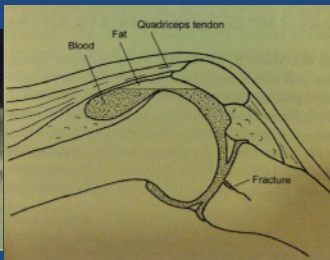
- 重點二:
  - Tibial plateau fracture lateral view
- 重點三:
  - 站立時 joint 一側的



- 重點四: Lateral view



- Cross table lateral view (病人 supine 照, 一般 lateral view 是請病人自己側躺照)
  - Lipohemarthrosis 呈現特有的 "fat-fluid level"



- Oblique view (但 AP + Lat view 仍看)



- Interpretations

- AP view: lat tibia 骨質增加, tibial lat margin 比 femur lat margin 突出
- Lat view: 內or外tibial plateau cortical surface 不平整
- OBLIQUE view: AP & lat view 不明顯 但仍懷疑時
- Cross lat view: 可看見 fat-fluid level

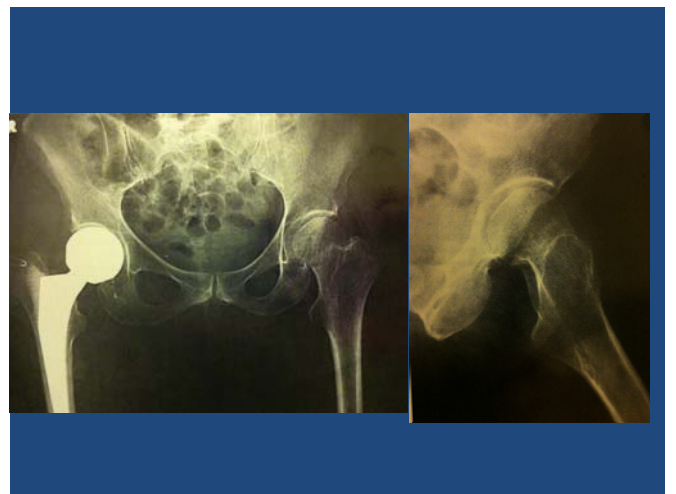
- Treatment:

- Depression 程度
  - > 8 mm 要 OP
  - < 8 mm, long leg splint, compressive dressing, functional cast, NON-weight bearing, 用拐杖
  - 6 weeks 後light weight bearing
- Ligament or meniscal injury
- Popliteal artery injury
  - 明顯displaced proximal tibial Fx 時要小心
  - 懷疑→ angiography



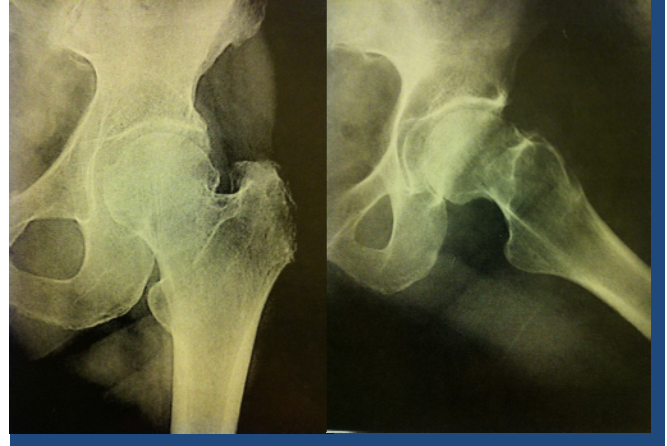
### Case 3

- 77 歲老人家摔倒,左側hip著地, 可以用拐杖走路,但因為仍會疼痛所以來到急診
- PE: 只有 internal rotation 時會痛



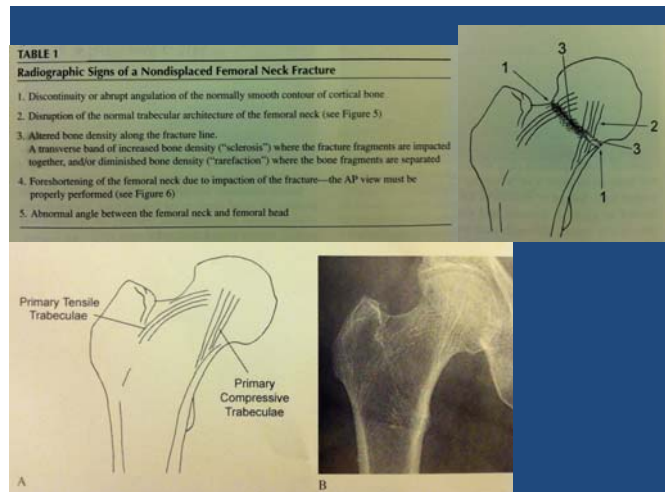
## Case 4

- 72 歲老先生人行道絆倒摔往左側,可以走路,但有點跛,因為持續疼痛,所以第二天到急診
- PE: hip tenderness, pain on internal & external rotation, no pain on hip flexion and extension



## Hip fractures

- 老人家站著→ 摔倒
- 標準姿勢: externally rotated + shortening
- 2%-9% missed 因為 non-displaced Fx
- Radiographic negative Fx = occult Fx  
→ bone scan (3-5天後), CT, MRI
- Misdiagnosis → 手術複雜 (non-displaced 變成 displaced), mortality



## Frog view

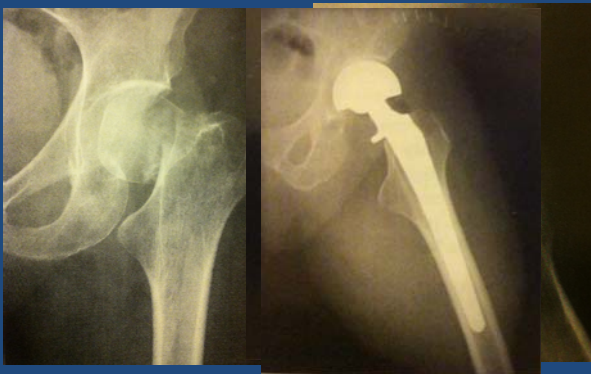


- Pelvic AP view 可以跟 uninjured side 做比較
- Frog-leg view (病人太痛要小心, 因為 nondisplaced → displaced)

- 診斷: (1) clinical findings (2) risk factors , 骨質疏鬆 (3) X-ray (4) other image
- Clinical signs: 不能站, 不能走, referred pain to knee, unproportional pain
- 以上並非絕對!! 有時候病人可以走!!
- 分類:
  - Femoral neck fracture
  - Intertrochanteric fracture

- Femoral neck fx 因為是 intracapsular, 一旦 displaced 會影響 blood supply → AVN
- Nondisplaced femoral neck fx → simple screw fixation
- Intertrochanteric fx → 手術較簡單 → plate + screw

Case 3



Case 4



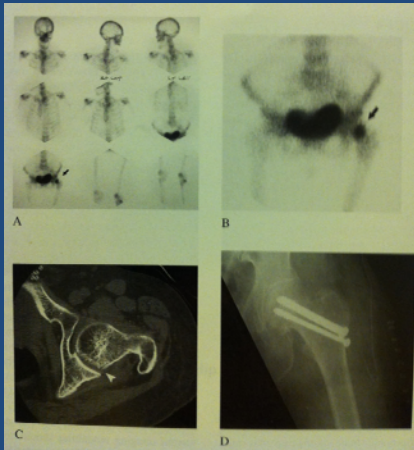
Case 5

- 85 歲老人下床時摔倒, right hip pain while walking
- PE: pain on hip flexion and internal rotation



## Case 6

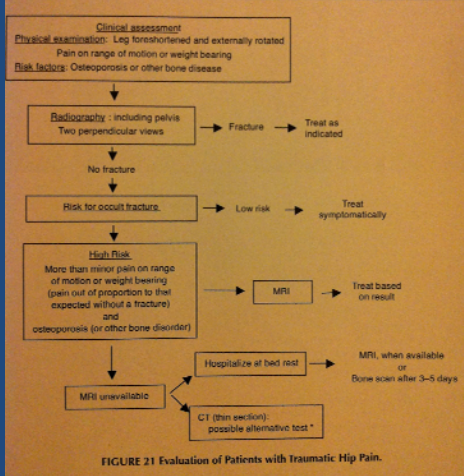
- 77 歲老人在浴室摔倒, 撞到左hip, 疼痛無法走路, 在家躺床休息五天, 仍疼痛無法步行
- PE: pain on internal rotation of hip



## Occult fracture

- Radiographically negative fracture 稱之
- 進一步檢查
  - CT
  - MRI
  - Bone scan ( 3-5 天後)

- Pitfall: 老人家不要輕易下“hip contusion”這個診斷, 懷疑者就做CT, MRI or bone scan





## Pelvic injury: acetabular fx

- Anatomy! anatomy! anatomy!
- Pelvic ring 有一處骨折, 很可能有另一處
- Ilium, ischium, pubis, acetabulum
- Ilioschial line: post. column of acetabulum
- Iliopubic line: ant. column of acetabulum
- Quadrilateral plate (med. wall of acetabulum)
- Acetabular dome (weight bearing portion): if involved → op

- Pelvic AP view: teardrop
- Teardrop NOT intact → fx
- Hip dislocation + ant column fx or post column fx → if fx large, 無法reduction → op
- Intra-articular bone fragment → op

- Inlet view: 看 sacrum, pubic bone
- Outlet view: 看 pelvic rim,
- Oblique view
- CT

## Pelvic fracture

- Combined bladder injury
- 受傷機轉 Lateral compression → pubic fx → bladder rupture 此最常見, 通常為 extraperitoneal type, 佔85%
- 受傷機轉 Anterior compression → full bladder rupture at weakest dome, 不一定有 pelvic fx → 此為 intraperitoneal type, 佔15%

- Classification of pelvic fracture
  - Lateral compression; LP
    - Closed pelvic injury, 較不會 massive bleeding
  - Anterior compression; AP
    - Open book injury, 易 massive bleeding
  - Vertical shear; VS
  - Mixed injury



## Pelvic fx algorithm

## Soft tissue foreign body

- 何時懷疑?
  - History, injury mechanism
  - Pain out of proportion
  - Signs of infection
- Modality?
  - X-ray (木頭, 植物, 刺, 泥土, 布料.....看不出來!!)
  - Sono
  - CT, MRI

- Sono要看什麼?
  - Echogenic FB
  - Acoustic shadow
  - Peri-FB edema, fluid accumulation