Disclaimer

Osteomyelitis

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Circumstances

- Spontaneous
- Open #
- Implant (fixation / Joint replacement)

When does it involve plastics ?

Assistance to Orthopaedic Surgeon

Your own Problem

When does it involve plastics ?

Assistance to Orthopaedic Surgeon

- Debridement open #
- Debridement infection
- We want soft tissue cover

Your own Problem

When does it involve plastics ?

Assistance to Orthopaedic Surgeon

- Debridement open #
- Debridement infection
- We want soft tissue cover

Your own Problem

- Complication of your fixation
- Paediatric / hand surgery

Things plastics need to know

- ***Be suspicious***:
- ***Diagnose*** :

- ***Trauma***:

Things plastics need to know

- ***Be suspicious***: don't be talked into a flap
- ***Diagnose*** :

- ***Trauma***:

Things plastics need to know

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- ***Diagnose*** : infection doesn't clear / flap doesn't settle
- ***Trauma***:

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Things plastics need to know

- ***Be suspicious***: don't be talked into a flap
- ***Diagnose*** : infection doesn't clear / flap doesn't settle
- ***Trauma***: proper debridement & timing of cover

- Hard to eradicate
- Harder if implant
- Don't always have to

Osteomyelitis

5 most important aspects of Rx

1. .
2. .
3. .

4. .

Osteomyelitis

5 most important aspects of Rx

1. Debridement.
2. Free drainage / Dead space.
3. Antibiotic.

4. Coverage

Osteomyelitis

5 most important aspects of Rx

1. Debridement. Appropriate ~~***(radical)***~~
2. Free drainage / Dead space.
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Osteomyelitis

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Osteomyelitis

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(organism & sensit. , Antibiotic , Penetration, Admin, Duration)

4. Coverage

Osteomyelitis

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Osteomyelitis

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4. Coverage ***timely, but not dictated***

5 . ***Know when to bail / not get involved***

know when to bail

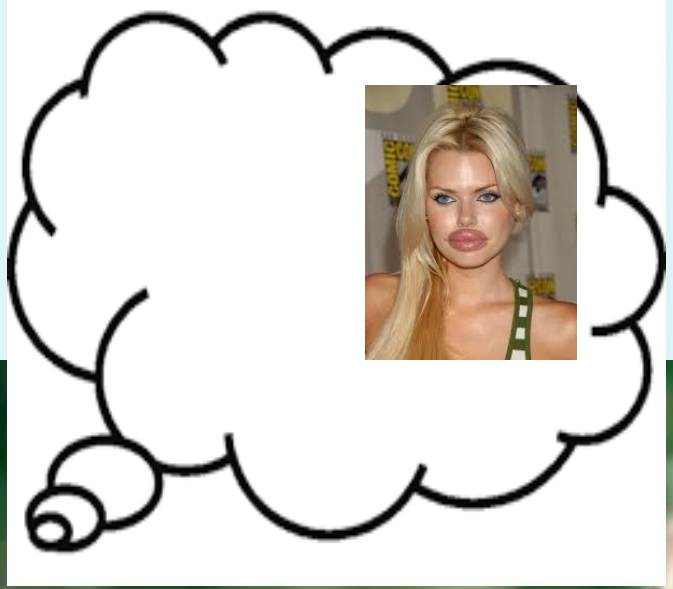
Problem with Osteomyelitis… subject is dry as a bone

What would interest you ?

What would interest you ?

What would interest you ?

What wou ou ?



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GETTY IMAGES

Osteomyelitis

- What is it (really)
- Cause
- How to Diagnose
- Avoiding it
- Treatment

What is it ?

Infection of bone

What is it ?

Infection of bone

What is it **really** ?

Infection of bone

What is it **really** ?

Infection of bone

\+ / -

- Bone death
- Articular destruction

What is it **really** ?

Infection of bone

+ / -

- Bone death
- Articular destruction

- Skin loss
- Musculo-tendon loss
- Dysfunction of the part

“collateral damage”

Infection of bone

+ / -

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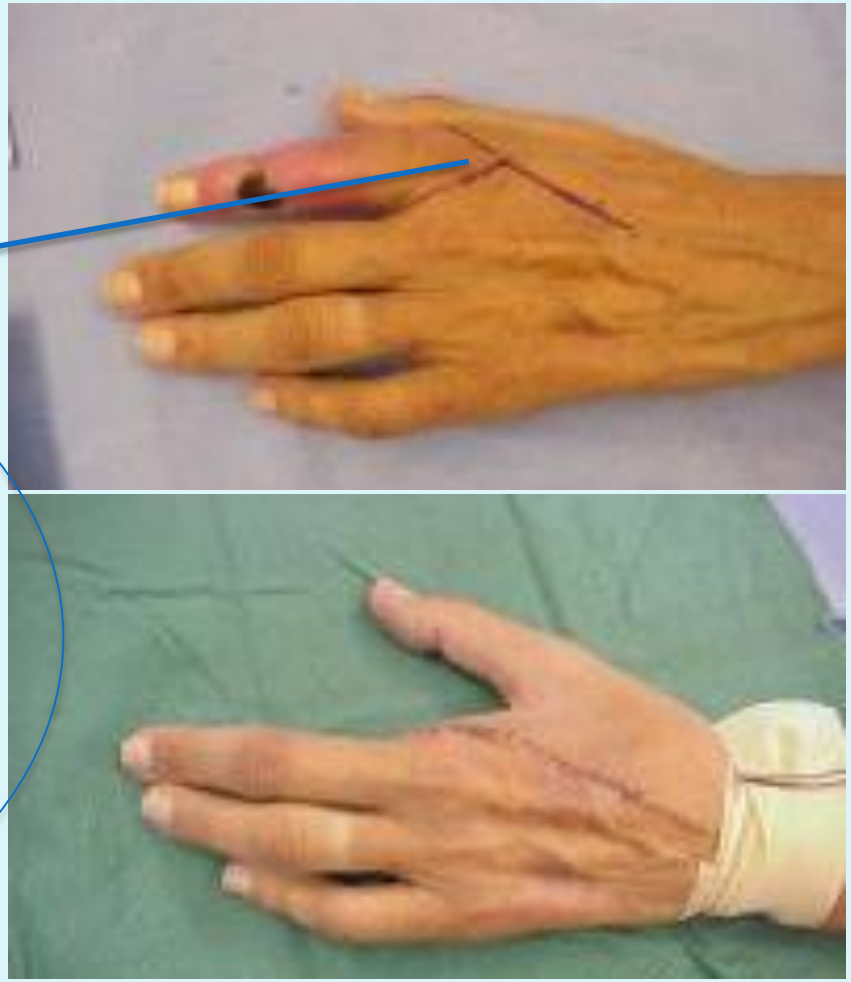

know when to bail

Infection of bone

+ / -

- Bone death
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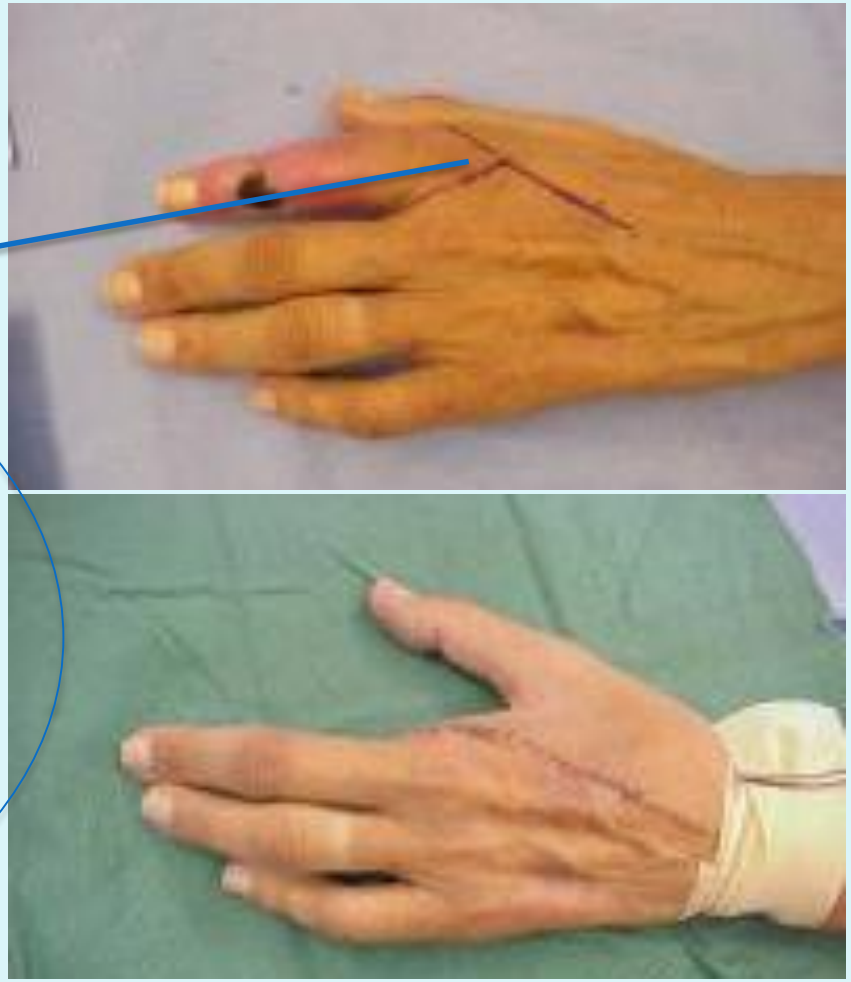

What forms can infection take ?

Cellulitis: acute

Cellulitis: acute chronic

Cellulitis: acute on chronic

Abscess: acute chronic

Necrosis

Atypical

What forms can bone infection take ?

What forms can bone infection take ?

same

What forms can bone infection take ?

- “Cellulitis of bone “ - acute
  - chronic
- Abscess
- Necrosis

- Atypical eg: fungal

What is the Origin

1. Direct invasion

2. Spread from soft tissues

3. Haematogenous

What is the Origin

1. *<u>Direct invasion</u>*

- Open #

  Staph aureus

  Gram neg.

What is the Origin

1. <u>Direct invasion</u>

- Open #

  Staph aureus

  Gram neg.

culture when infected, swab at presentation useless

What is the Origin

1. *<u>Direct invasion</u>*

- Open #

  Staph aureus

  Gram neg.

- Implant

  Staph epi

  Staph aureus

Culture vital: only 1 good chance

"collateral damage"

1. *<u>Direct invasion</u>*

- Open #

  Staph aureus

  Gram neg.

- Implant

  Staph epi

  Staph aureus

Culture vital: *only 1 good chance*

What is the Origin

2. *Spread from soft tissues*

What is the Origin

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- ***Intact periosteum is a great protector***

What is the Origin

2. *<u>Spread from soft tissues</u>*

- ***Intact periosteum is a great protector***
- Pressure points / skin & soft tissue breakdown
- esp. Diabetic feet
- Zoo of organisms

again : much more than just bone infection

2. *Spread from soft tissues*

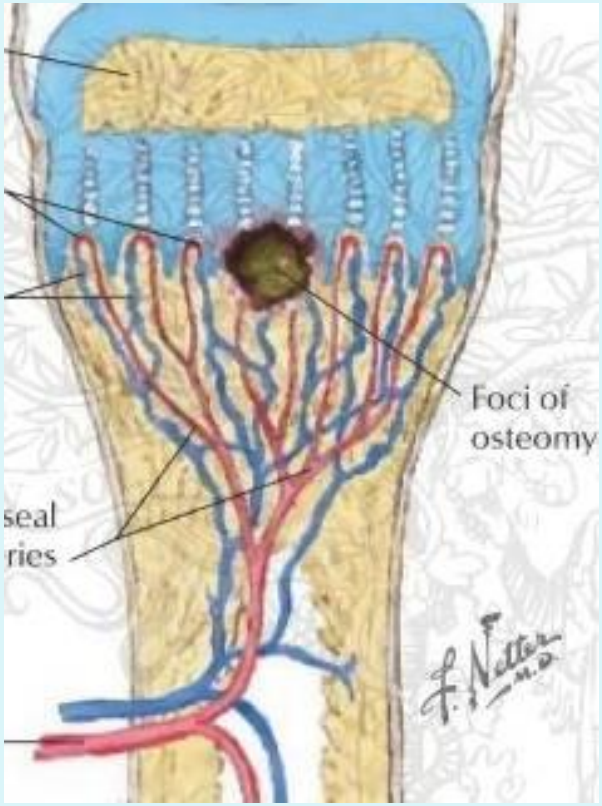
- ***Intact periosteum is a great protector***
- Pressure points / skin & soft tissue breakdown
- esp. Diabetic feet
- Zoo of organisms

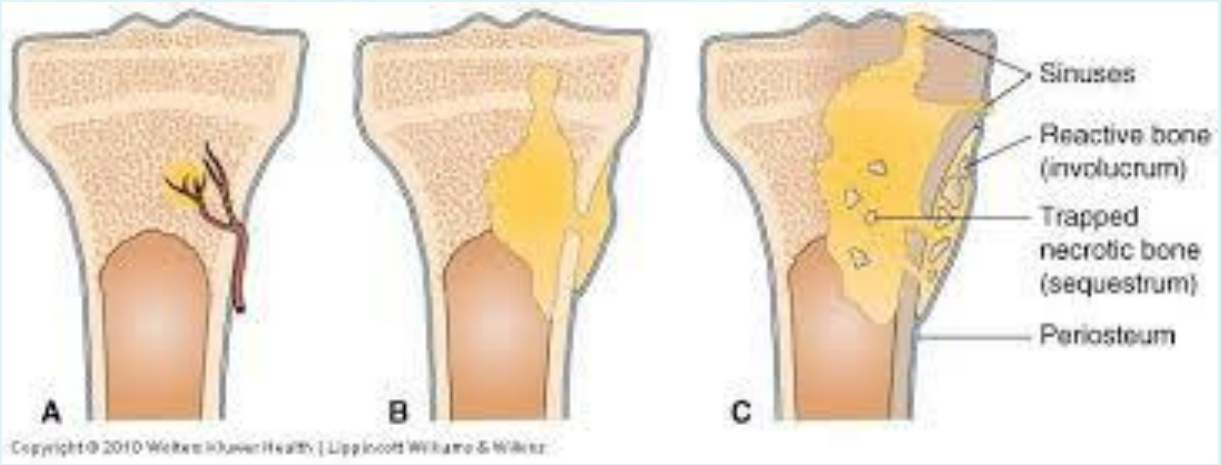
What is the Origin

3. *Haematogenous*

- Children
- IV Drug users
- immune compromise
  (ICU, HIV, Cancer)

Acute, Suppurative, Haematogenous Osteomyelitis of childhood





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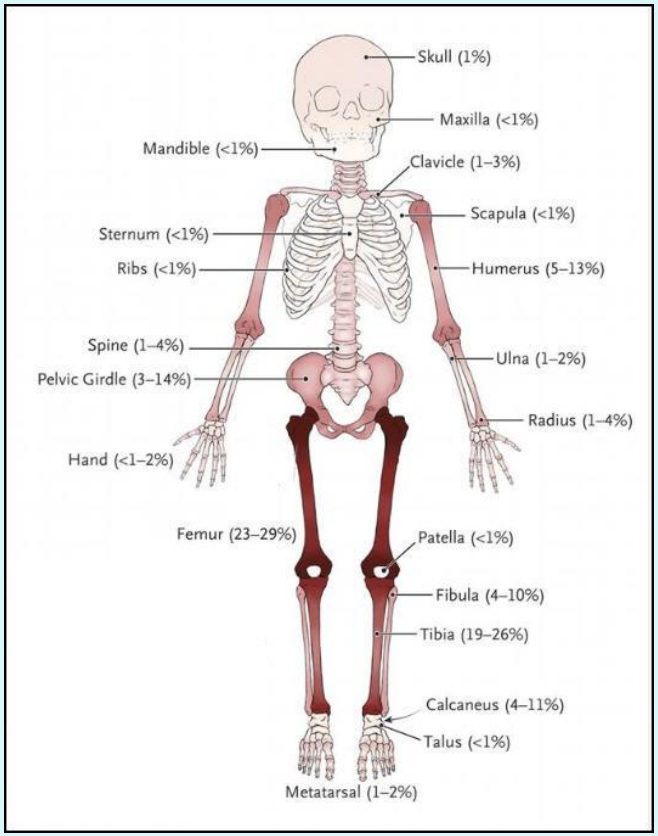

Acute, Suppurative, Haematogenous Osteomyelitis of childhood

- **Unwell**
- Fever
- Won’t use limb

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- **Unwell**
- Fever
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Observe, don’t examine

Once you lose their trust..

Acute, Suppurative, Haematogenous Osteomyelitis of childhood

- **Unwell**
- Fever
- Won’t use limb

- Local inflammation
- WCC, ESR, CRP ⇑⇑
- X- ray NORMAL (initially)

Chronic Recurrent Multifocal Osteomyelitis of childhood

- Weird disorder
- Non bacterial
- *“pseudo infection”*
- Auto-immune
- Lytic then sclerotic
- Differential diagnosis

  osteomyelitis / bone tumour

Diagnosis

1. History

1. Examination

2. Investigations

3. Imaging

History

- Isolated : Pain , swelling, fever, discharge
- Fracture : “ + slow healing wound   +non-union
- Joint replac. : Pain, wound healing problems

History

- Isolated : Pain , swelling, fever, discharge

- Fracture : “ + slow healing wound   +non-union

Pain, wound healing problems

***Suspicious**: wound healing issues, courses of Ab’s*

Examination

Investigations

- FBP
- ESR
- **CRP**
- Staph titre

Investigations

- FBP + / - .***Beware low Hb, WC abnorm***.
- ESR Fairly sensitive , non specific
  if raised, useful to monitor Rx
- **CRP** highly sensitive. -ve excludes infec
  no use first 2 weeks post op
- Staph titre waste of money

Imaging

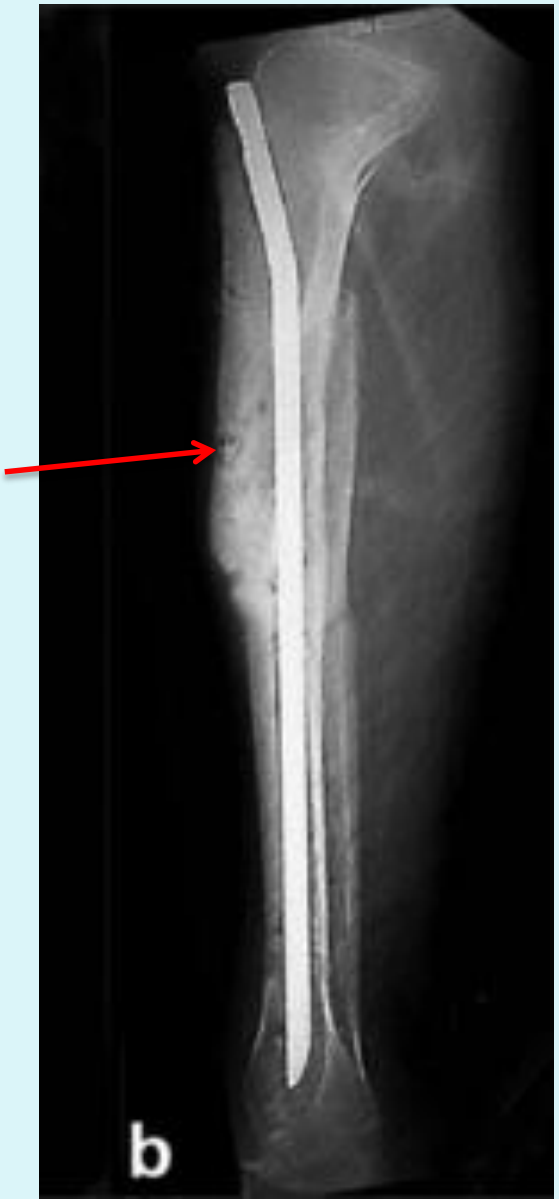
- Xray
- Nuclear scan
- CT
- MRI

X ray

- Normal
- Periosteum - first sign.
- Cortex - patchy erosion
  - thickening late
  - involucrum
- Sequestra


b


b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Involucrum , sequestrum

Bone Scan

- Sensitive ++
- Positive early (24/24)
- Used commonly in kids

Bone Scan

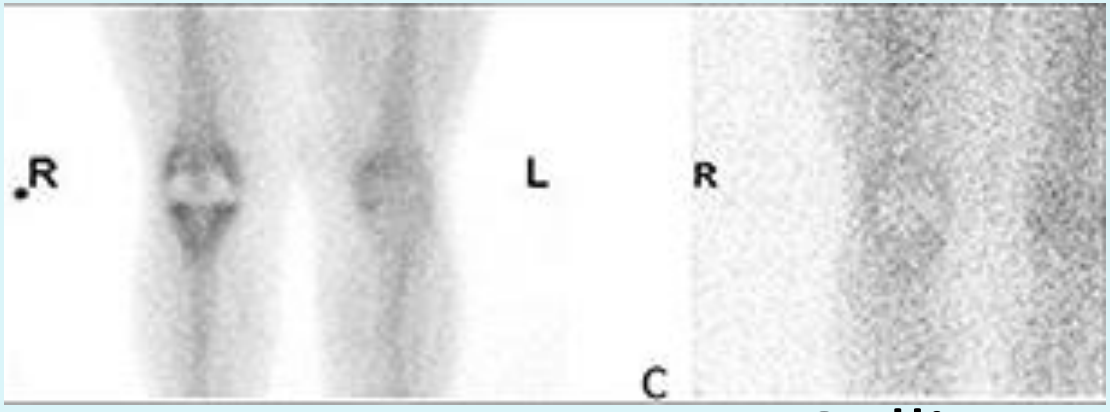
- Sensitive ++
- Positive early (24/24)
- Used commonly in kids

- Non specific
- Prostheses, ↑ uptake for 1 year
- # non union ↑ uptake

Gallium scan

- Binds to neutrophil membrane (live or dead)
- Positive result : = > than bone scan uptake

Bone & gallium

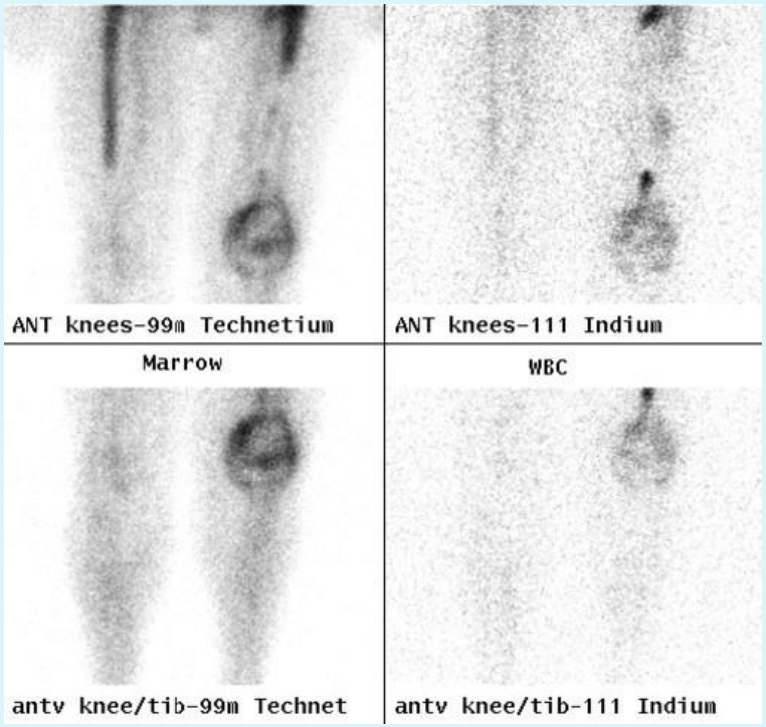


Bone > Gallium negative

Bone = Gallium positive

White cell scan

- Indium tagged neutrophils
- more sensitive acute uncomplicated infect.



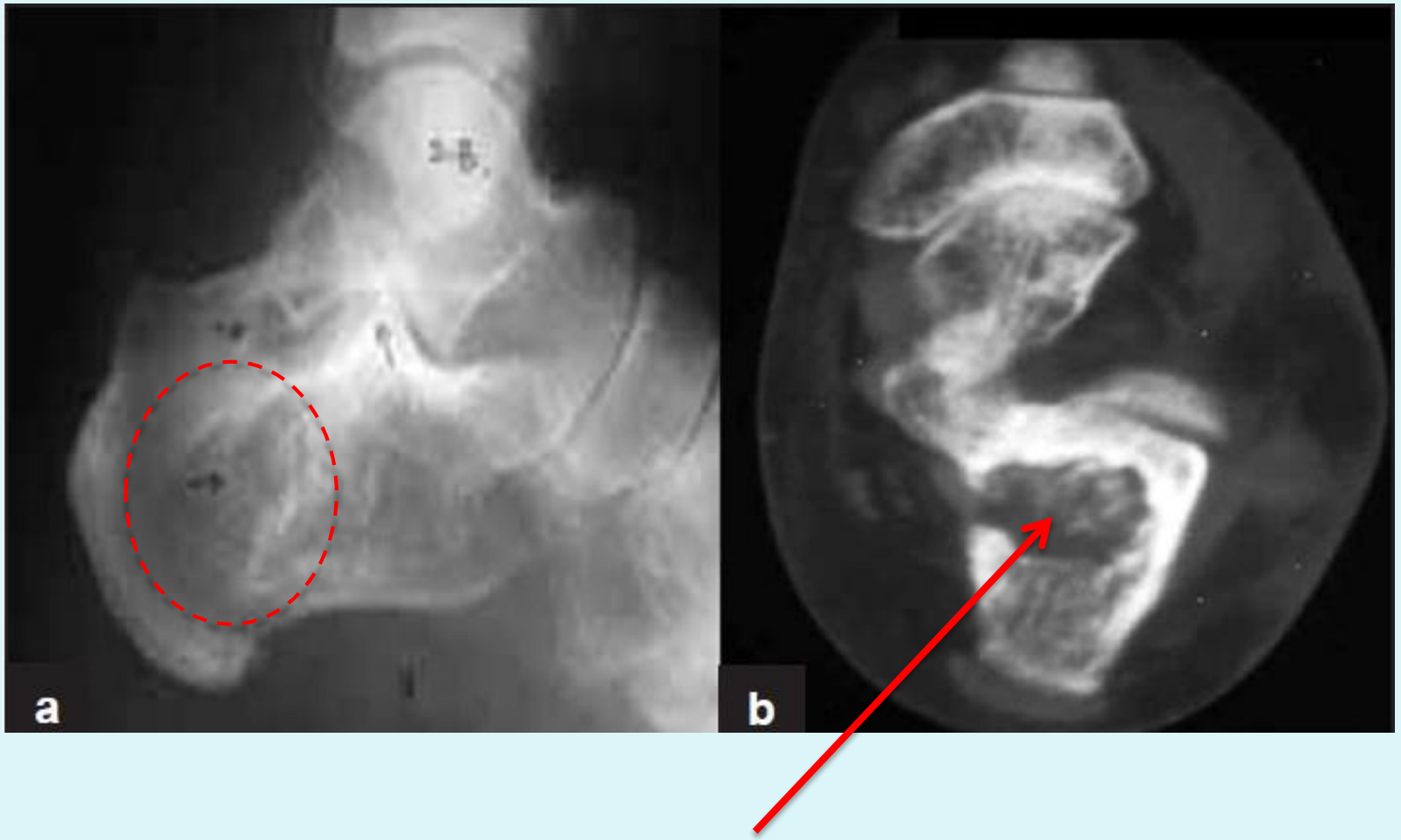
CT

- Periosteal reaction
- Medulla lesion
- Cortex erosion

} more obvious

- ***Best Ix to show small sequestra***

CT



MRI + gadolinium

- No use if fixation / prosthesis
- Useful : neuropathic changes vs. infection

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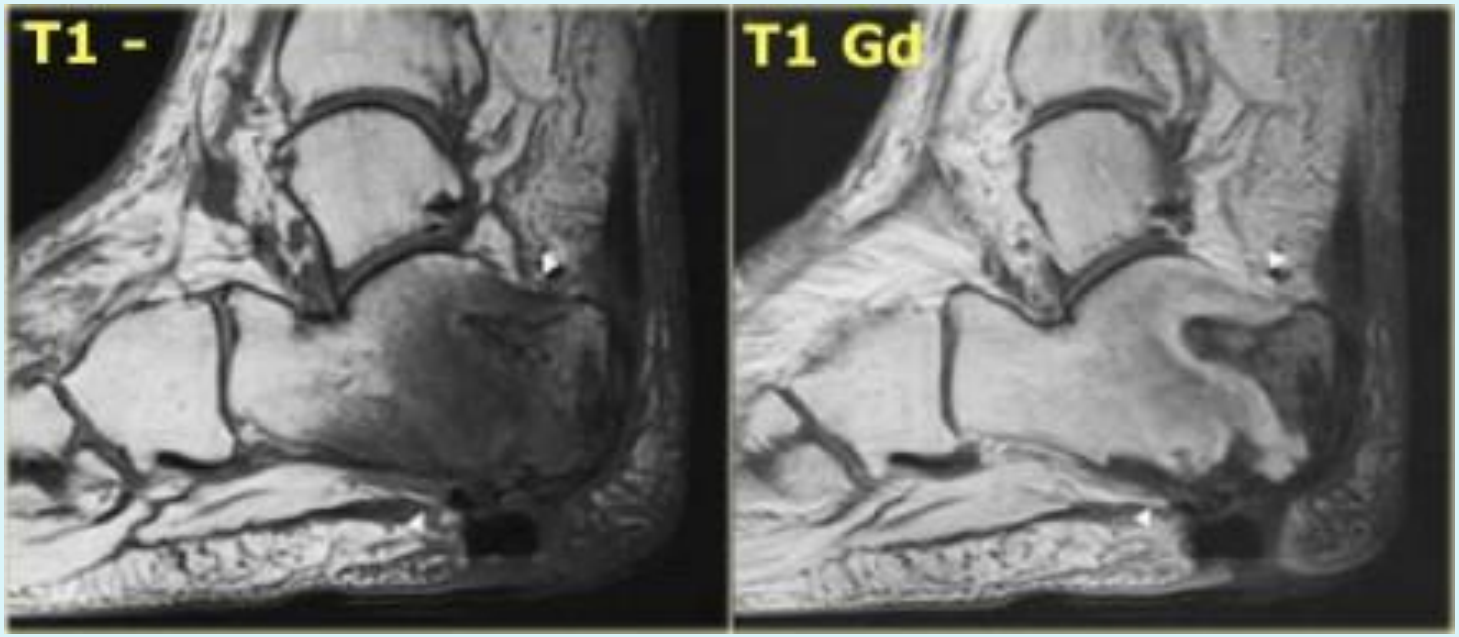

What is the organism

- ***Must make every effort to identify***

What is the organism

- ***Must make every effort to identify***

What is the organism

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What is the organism

- ***Must make every effort to identify***

- Culture before Antibiotics
- Cease Ab's 2/52
- ***Don't delegate***
  Swab / aspirate / biopsy
- Multiple specimens
- ***"Resuscitate organisms"***
- ***Involve micro before op.***

Different to other organ infections

- Harder to eradicate
  1 Vascularity
  2 Structure of bone
  3 Biofilm

1. Vascularity, “Bone paradox” : like a river thru a desert

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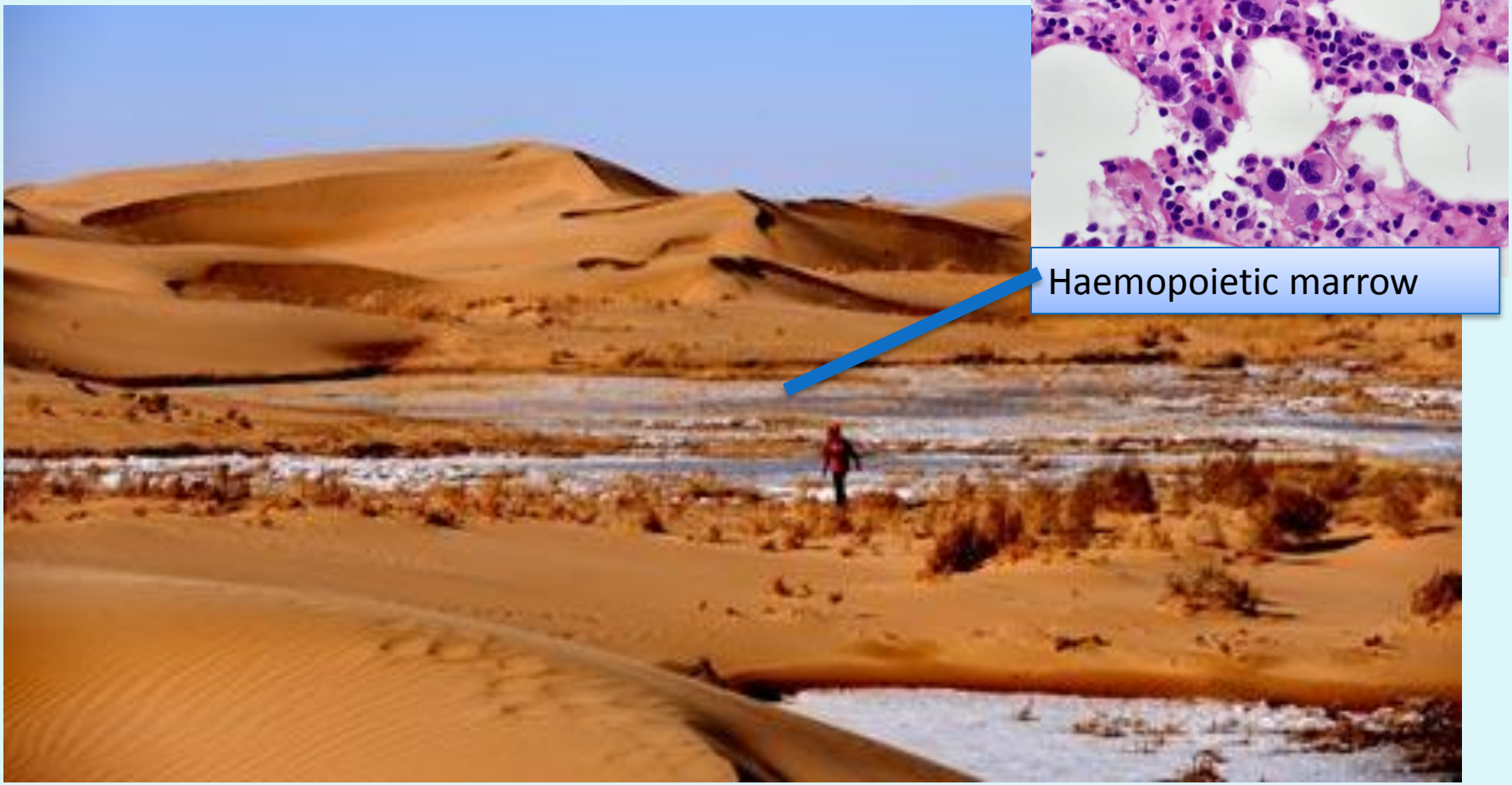

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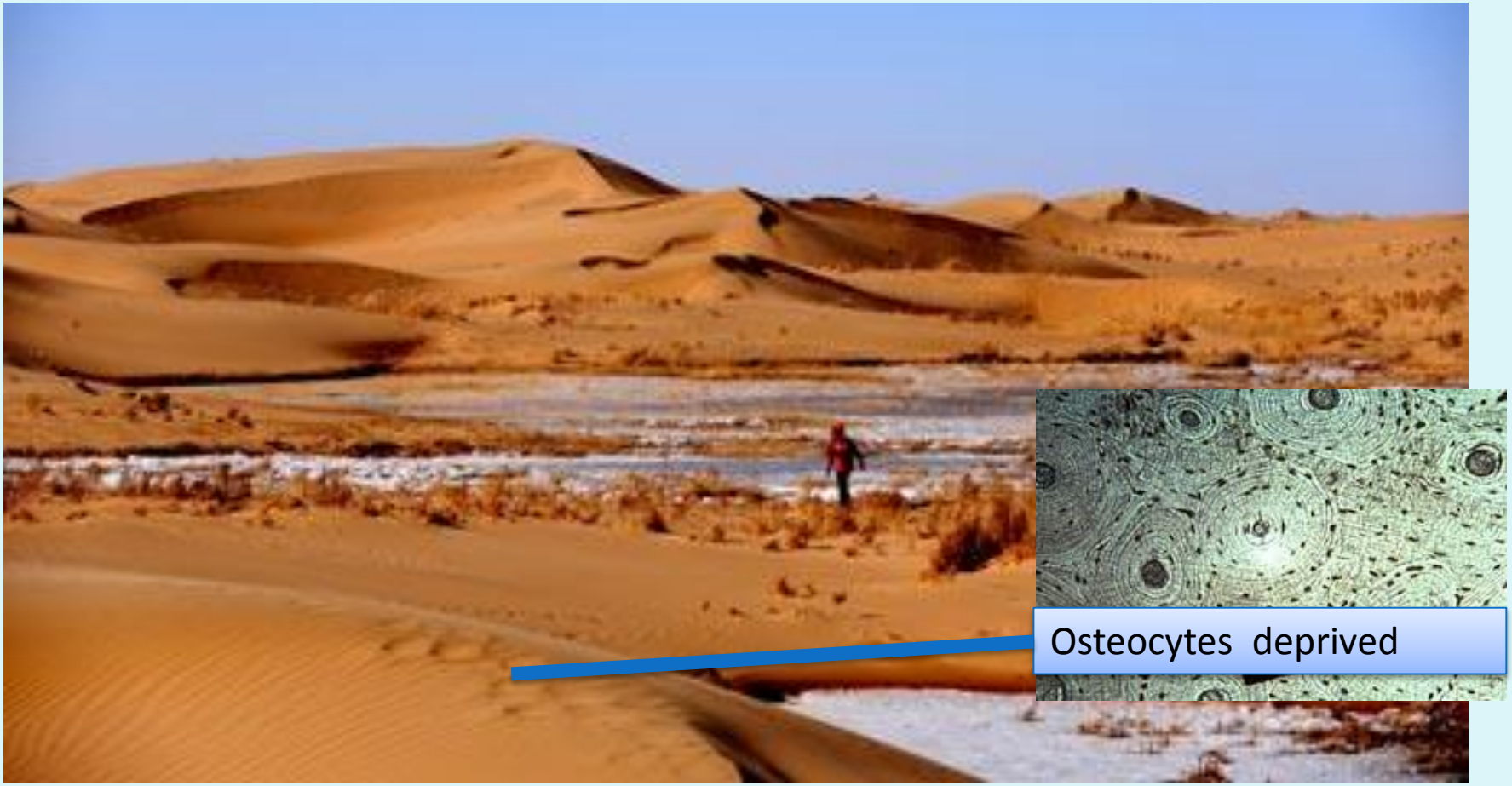

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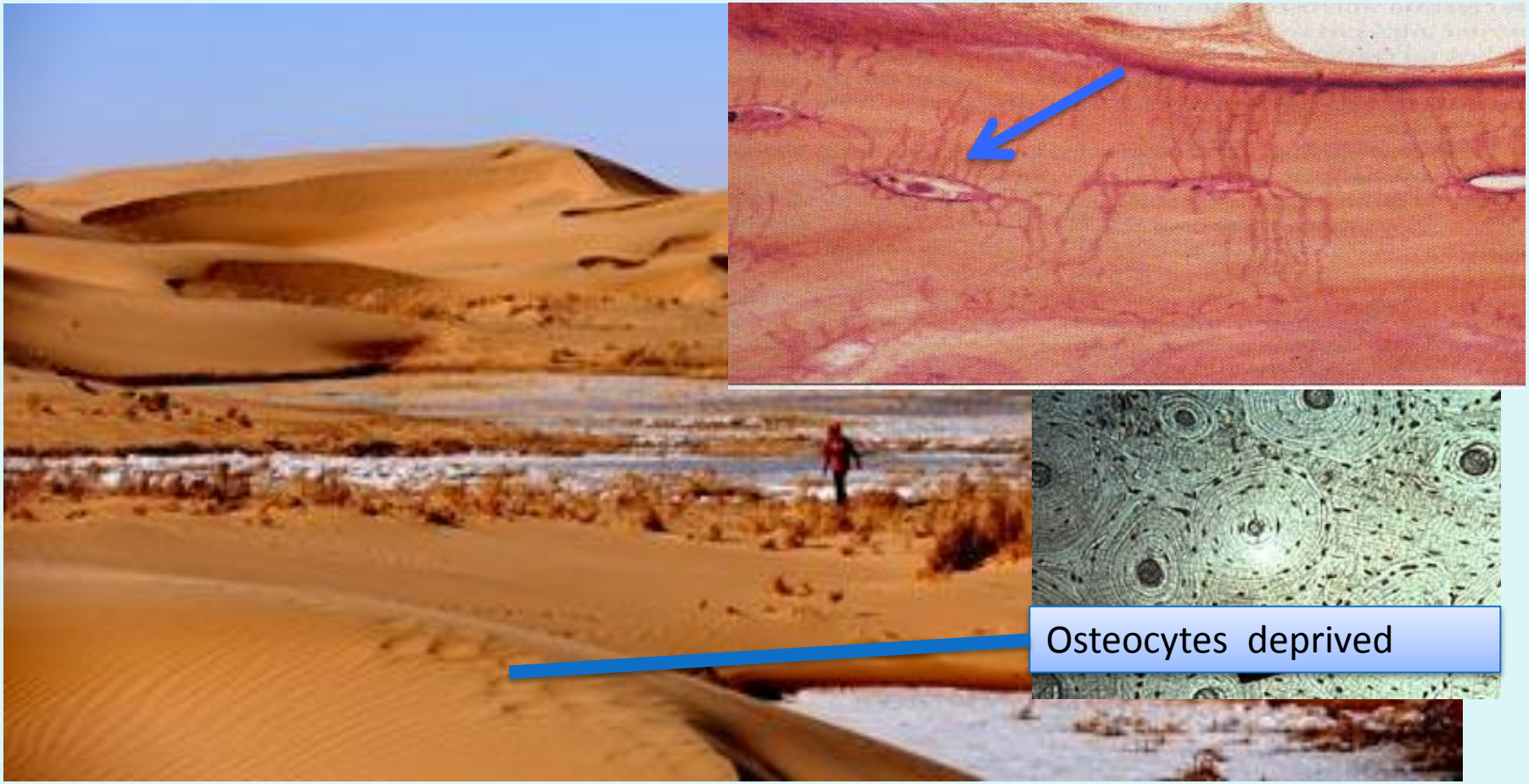
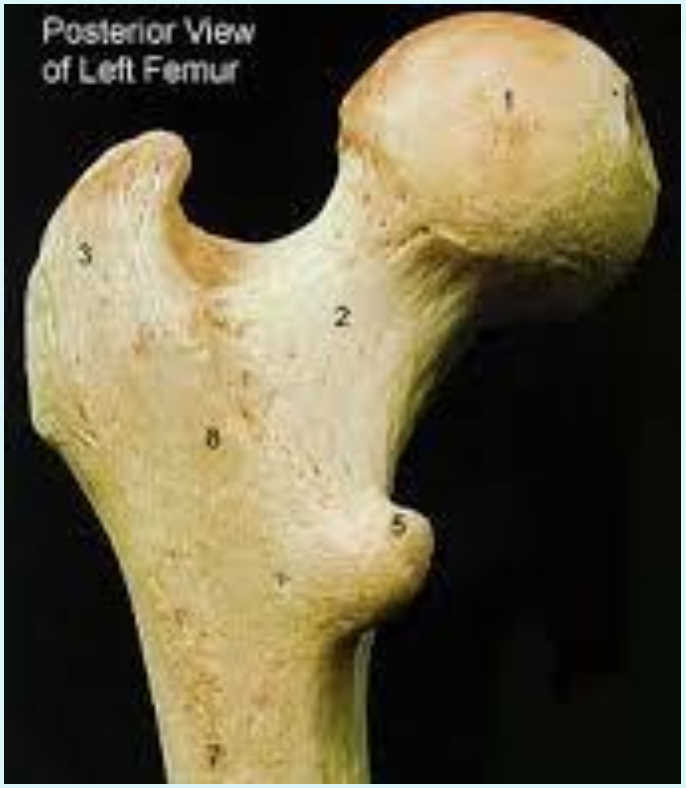
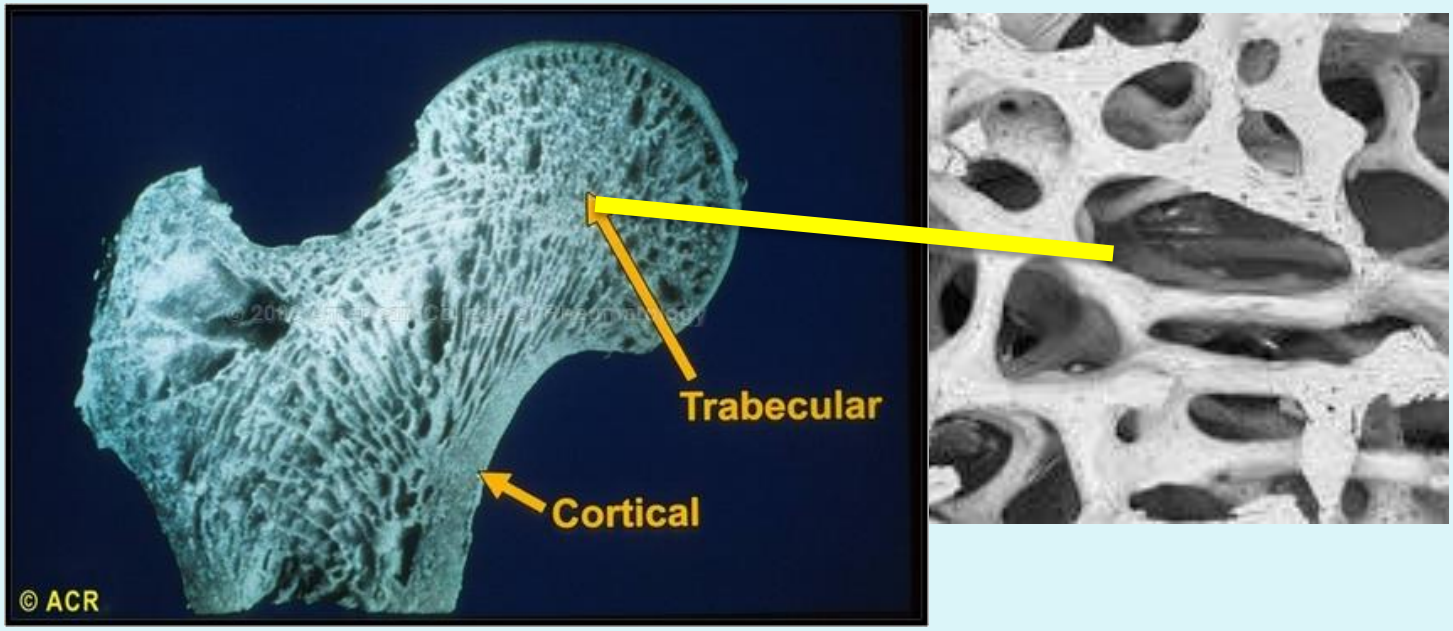


2. Structure of bone



Hard matrix

2. Structure of bone



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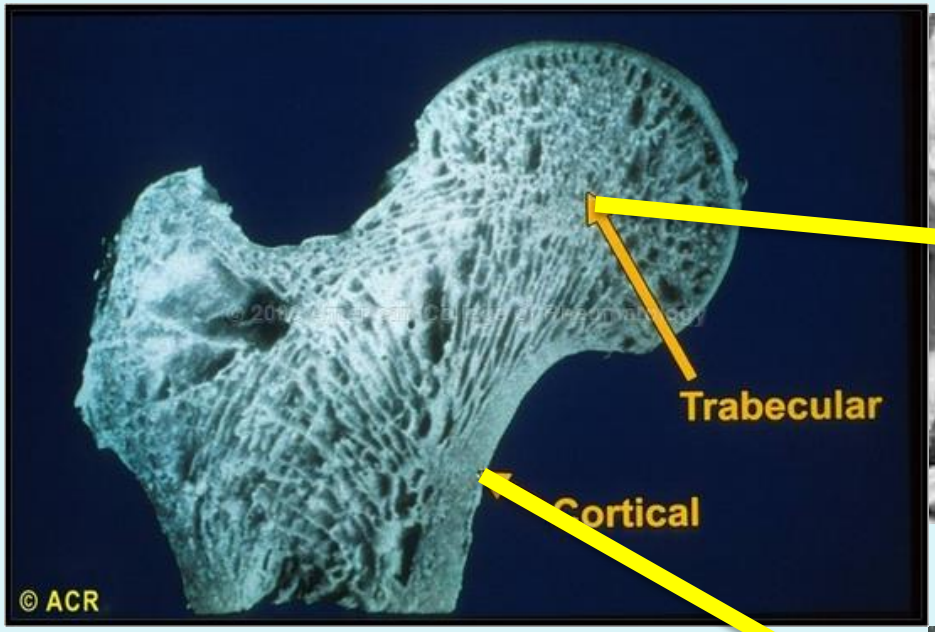
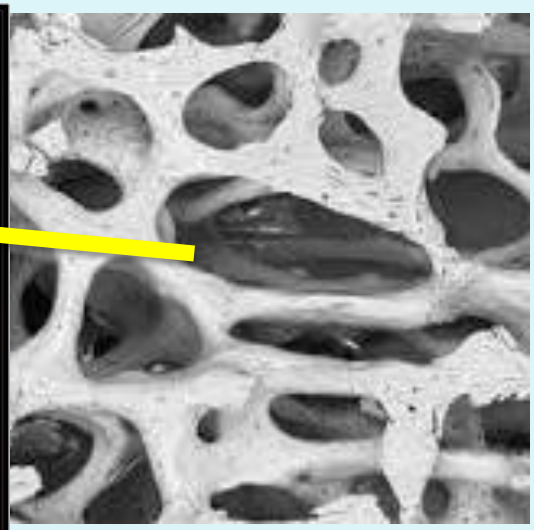
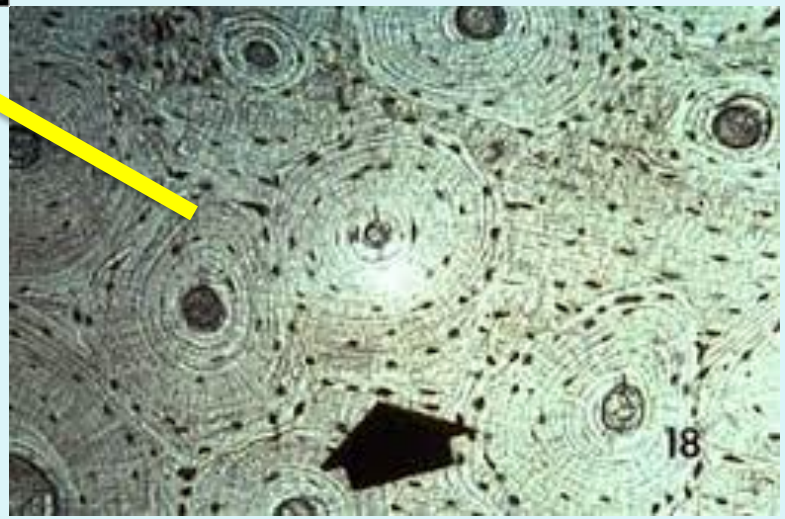
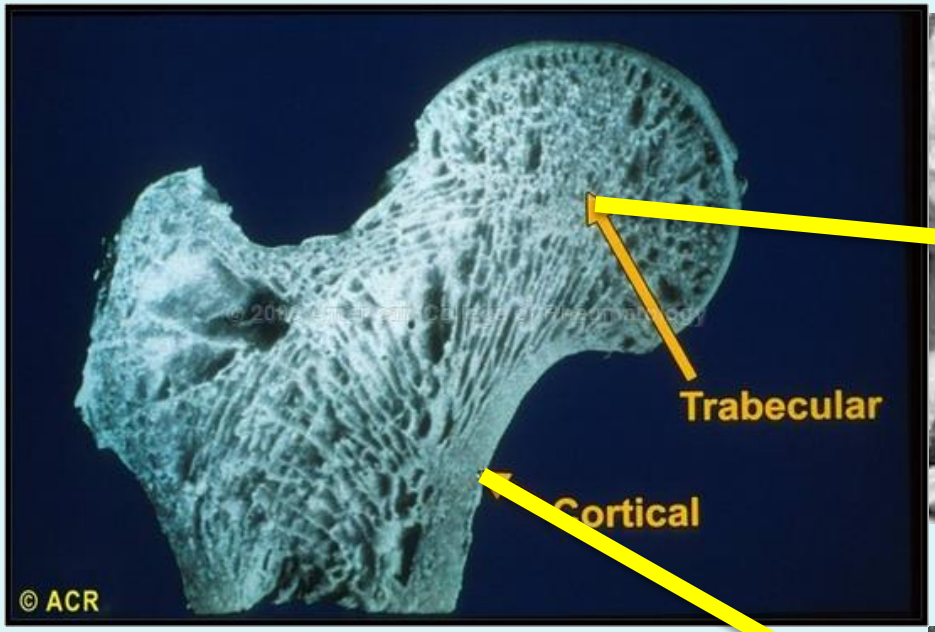
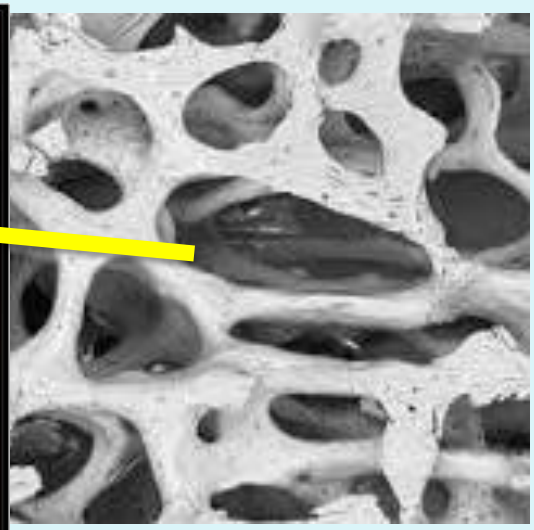


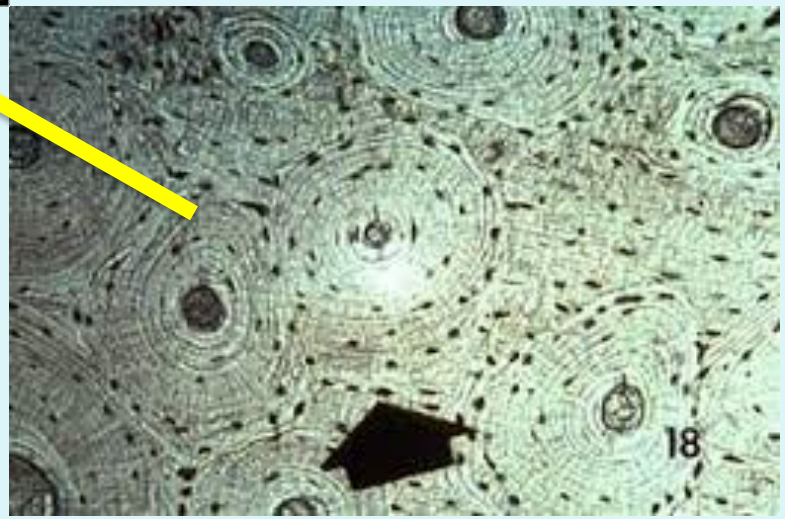




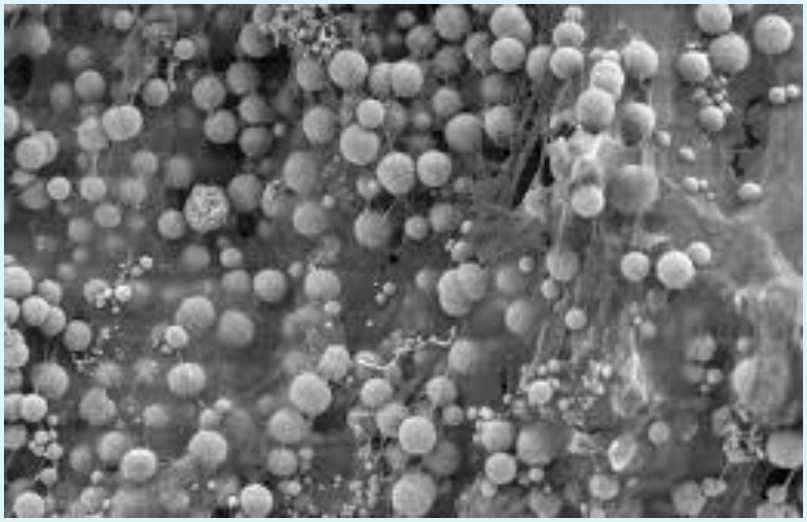
To a bacterium a bone is an aircraft carrier







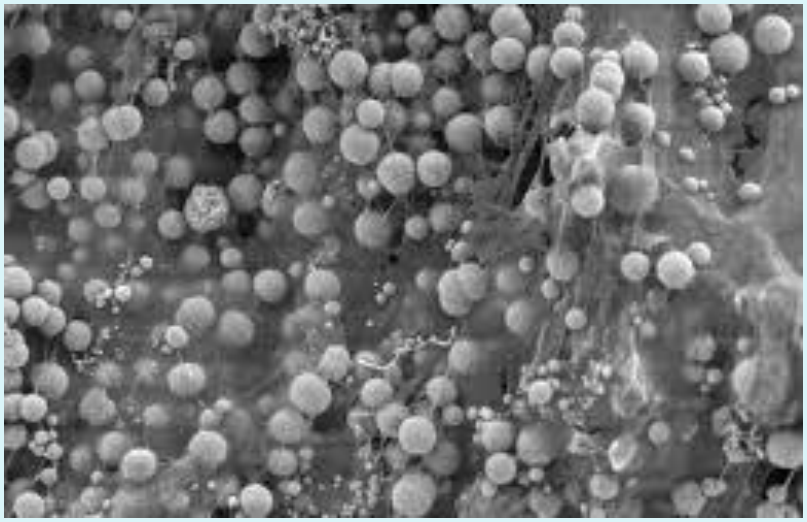
3. Biofilm (slime)



- Extra cellular matrix (polysaccharide)
- Adhere to inert surface Implant , sequestrum

- Staph aureus / epi , Strep, Pseudomonas

safe house for bacteria



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Avoiding infection

BRITISH ORTHOPAEDIC ASSOCIATION and
BRITISH ASSOCIATION OF PLASTIC, RECONSTRUCTIVE AND AESTHETIC SURGEONS
STANDARD for TRAUMA – 2009

BOAST 4: THE MANAGEMENT OF SEVERE OPEN LOWER LIMB FRACTURES

The wound, soft tissue and bone excision (debridement) is performed by senior plastic and orthopaedic surgeons working together on scheduled trauma operating lists within normal working hours and within 24 hours

Definitive skeletal stabilisation and wound cover are achieved within 72hours and should not exceed 7 days.

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BAPRAS
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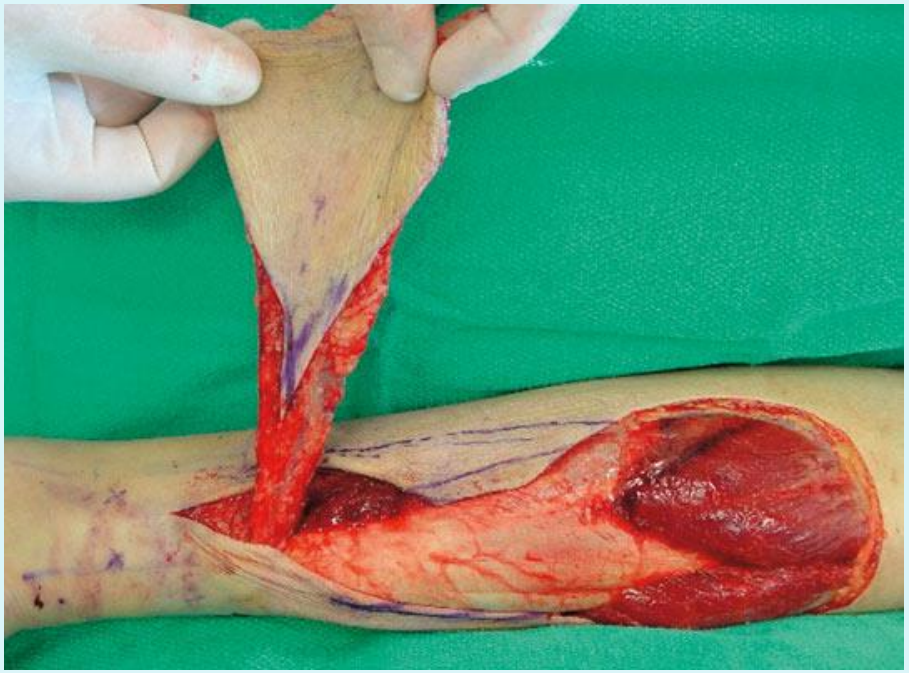
“fix and flap” mentality

- Implant into contaminated field



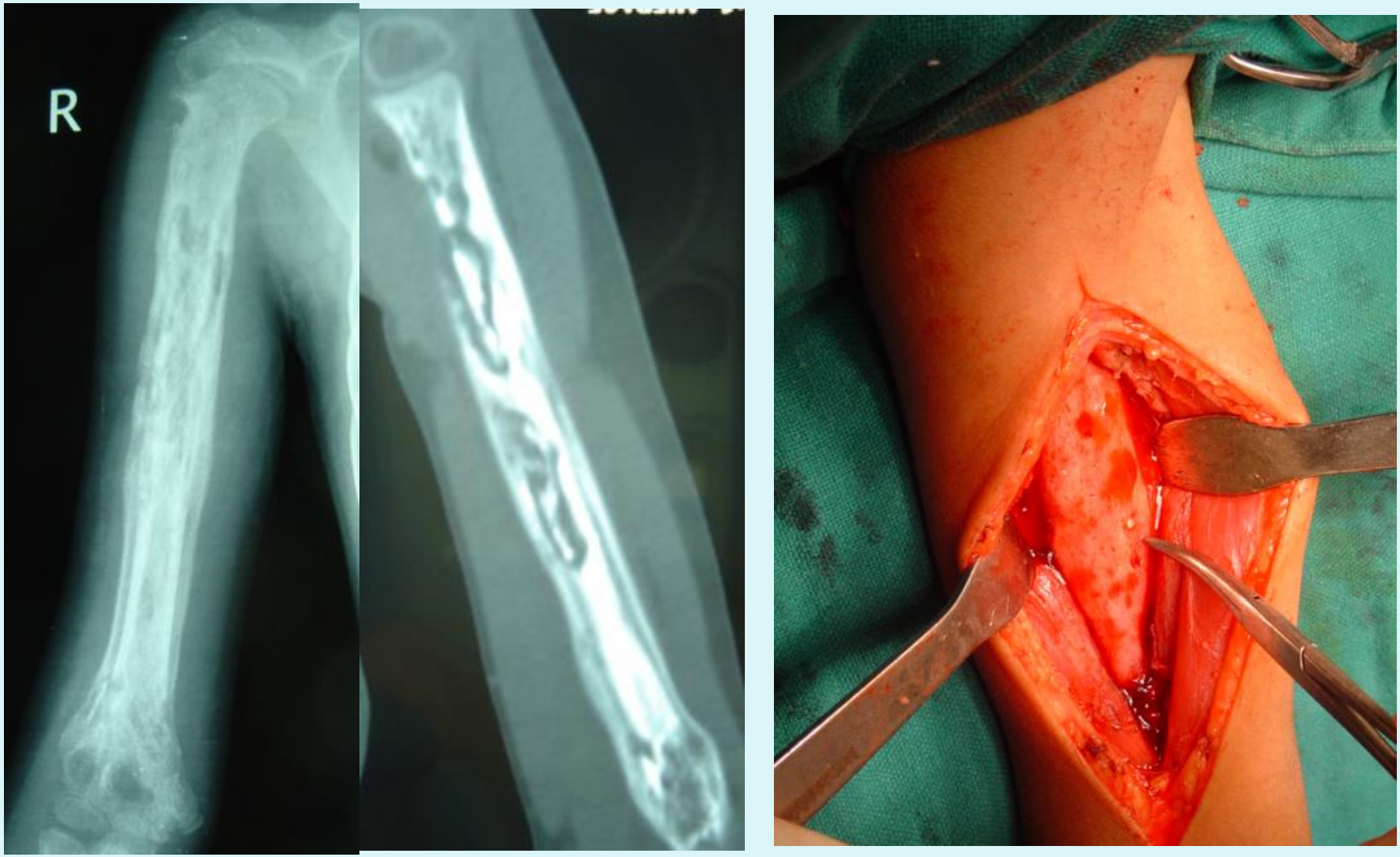
Treating infection

- Find organism
- Antibiotics - usually IV
  - usually 6 weeks min.
  - then oral
- Remove dead stuff
- Remove implant
- No dead space
- Soft tissue cover
- Reconstruct losses

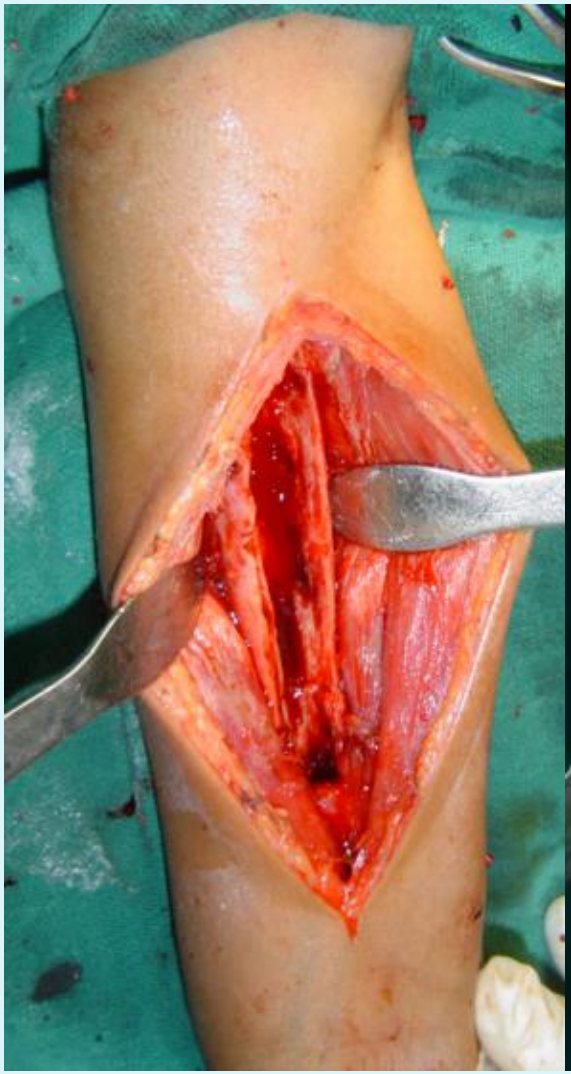
Removing implant = remove the safe house

Removing implant = remove the safe house

Debridement = remove dead bone



Debridement = remove dead bone



Infection + bone loss

Excision + lengthening

- Ms Z. M. 47 yo Australian , residing SE Asia
- Alternate lifestyle
- MBA , 3b open Tib #

- Ex Fix , wound left open for 3/12
- Ex Fix came loose, replaced
- MRSA infection had intermittent antibiotics
- Presents to ED on weekend

- 10 x 4 cm wound
- Mummified bone
- Pus in wound & pins
- Loose Ex fix
- Equinus ankle 10* , stiff ankle & subtalar
- Tib Ant , EHL 2/5 Ext Dig 3/5

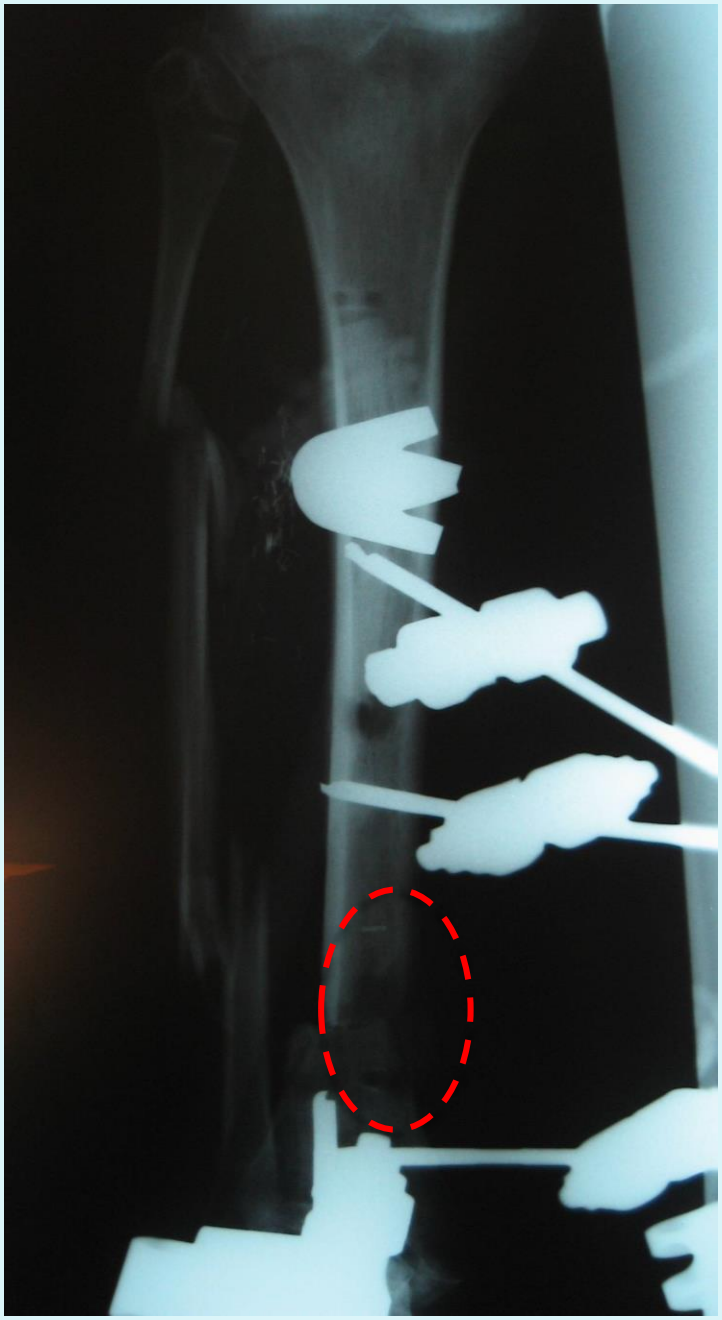
PMH

- Hep C +ve
- Depression

Social

- No friends or family in Perth
- No possessions


R

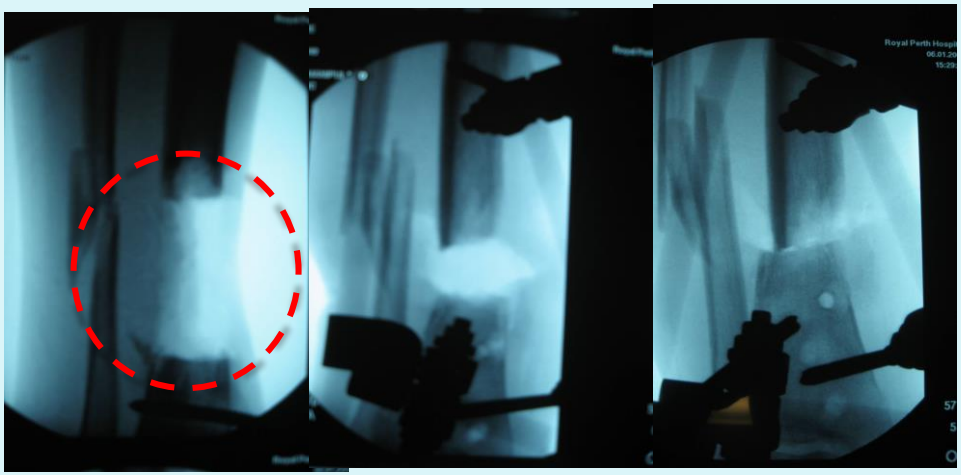


ORTHOPAEDIC FIRST AID

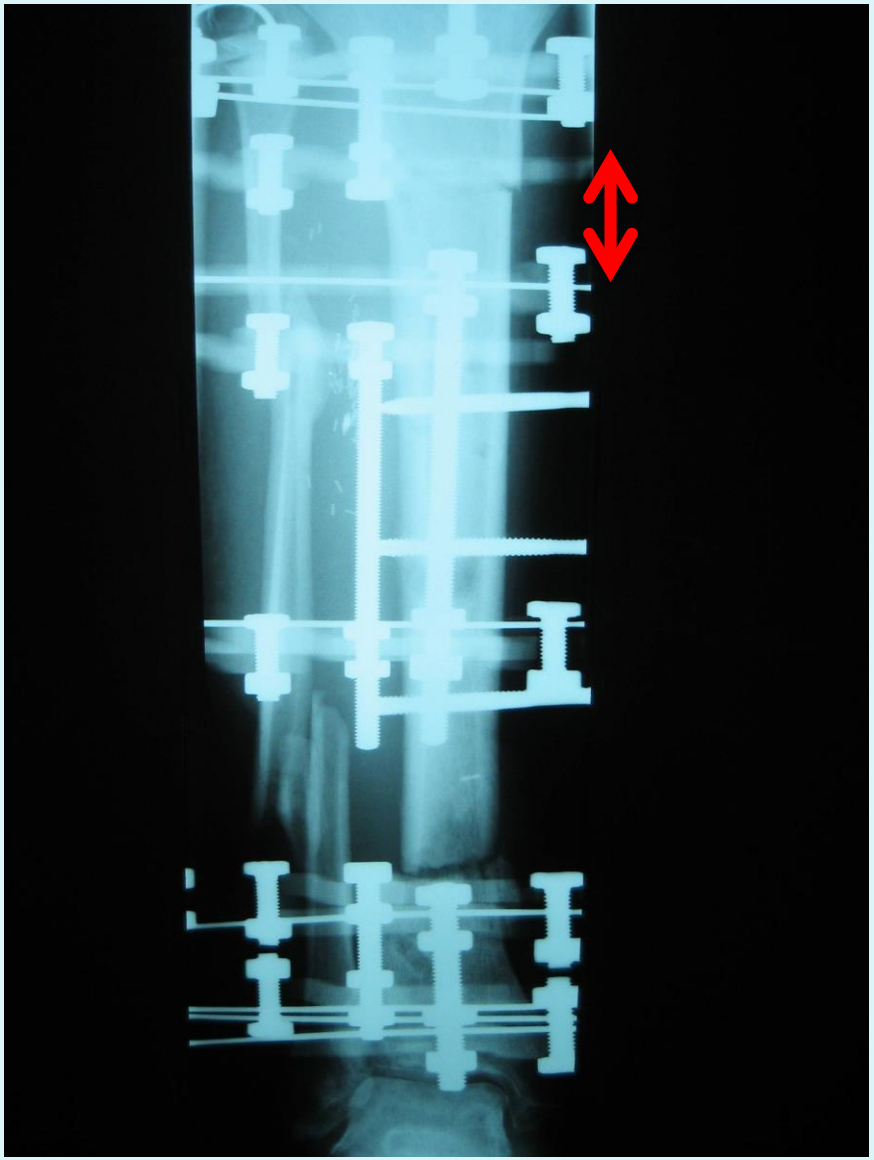
- Change Ex Fix
- Excise mummified bone
- Debride
- Curette pin sites
- Swabs : MRSA
- Vancomycin + Timentin

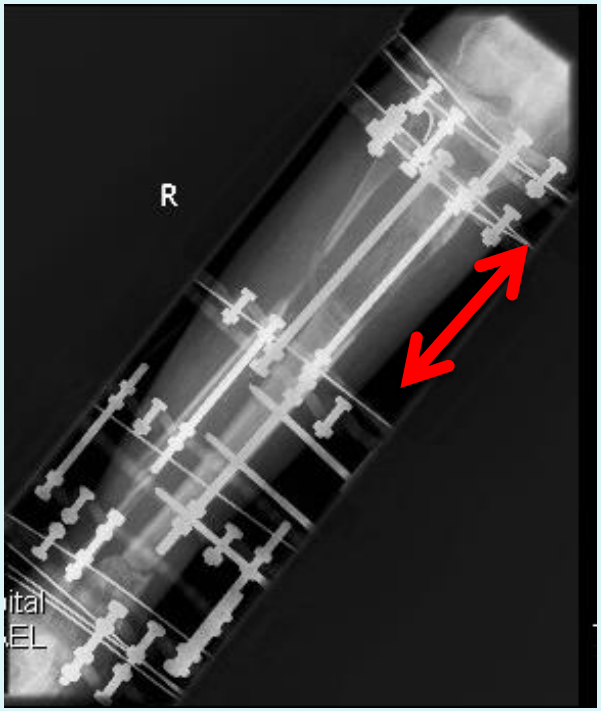
- Serial deridements
- Gradual shortening
- Difficult customer
- Refused discussion on amputation
- Narcotic + Ketamine ++
- Infection appeared controlled

- Free flap applied



Definitive Treatment

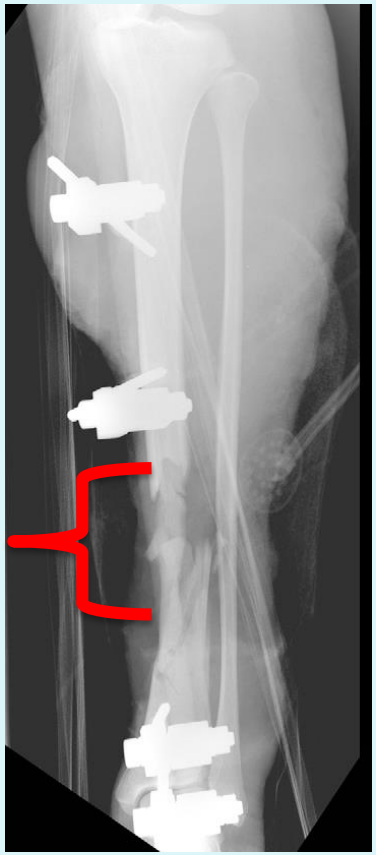




Outcome

- Pain control difficult
- Compliance / self physio poor throughout
- Equinus to 25* then improved . Final 5*
- Union , length + eradication of infection
- Walks unaided

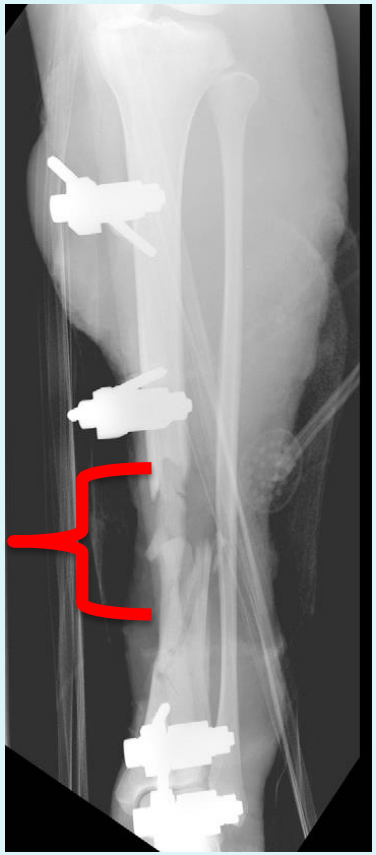
Masquelete technique



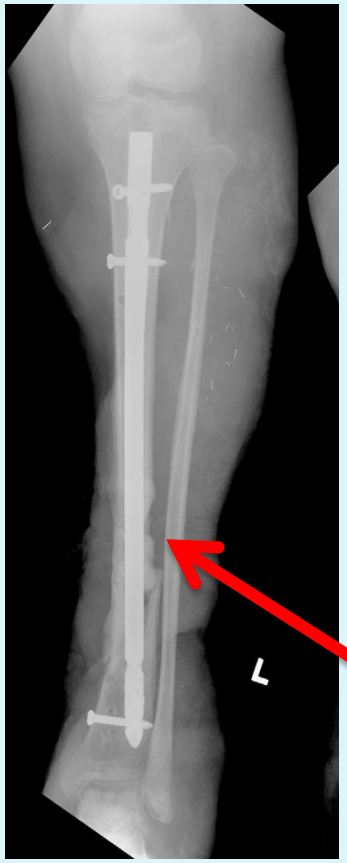
Bone defect

- Membrane induced osteogenisis
- Staged bone grafting
  after antibiotic cement

Masquelete technique



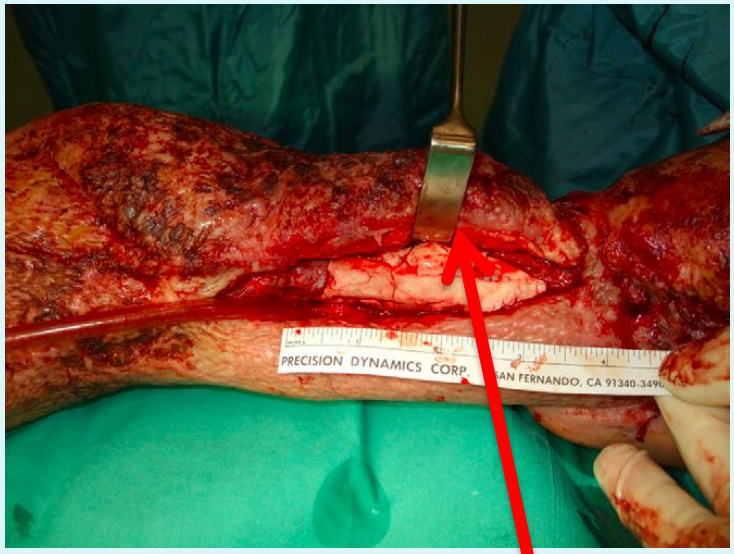
Bone defect



- Membrane induced osteogenisis
- Staged bone grafting after antibiotic cement

Cement

Masquelete technique



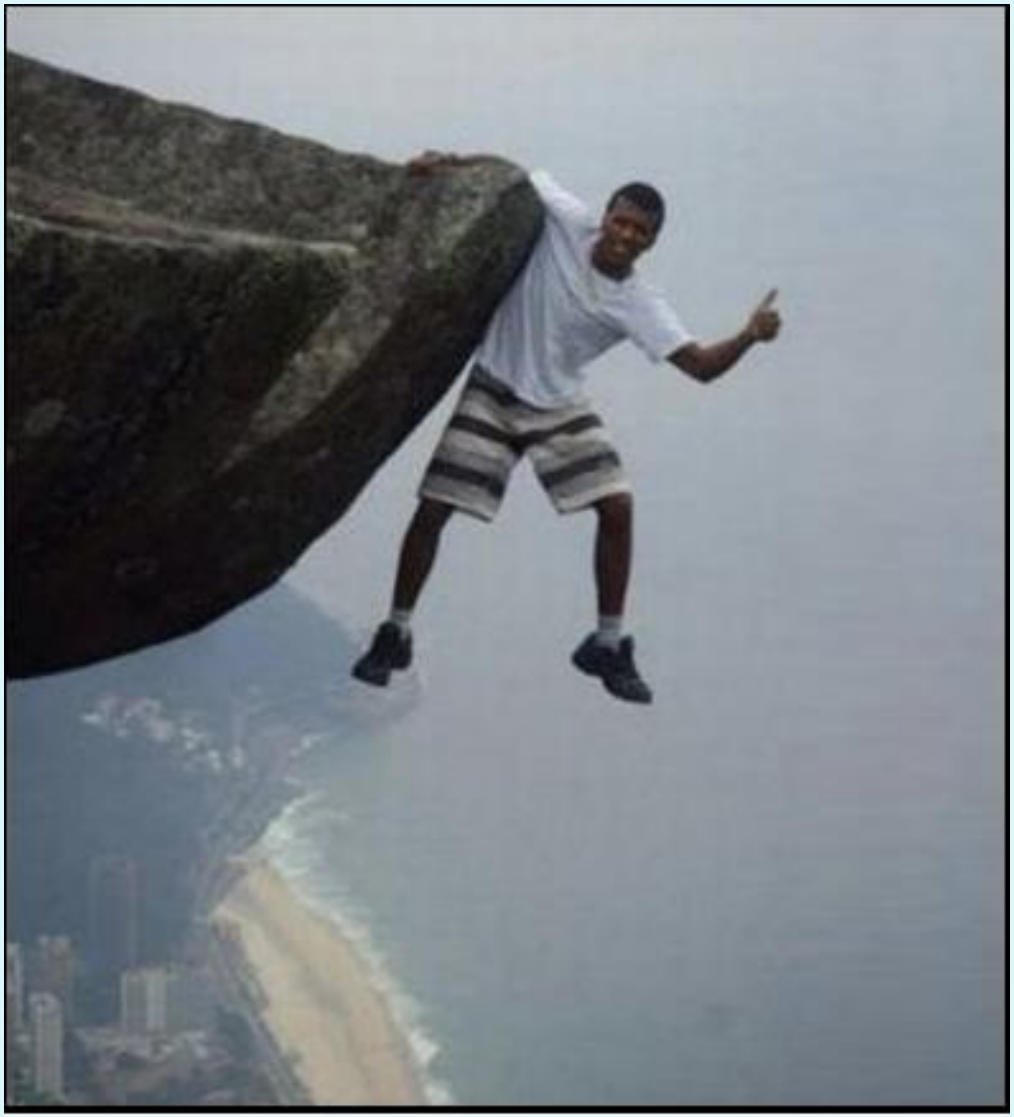
: membrane

Masquelete technique

Bone gratt / RIA

Bone

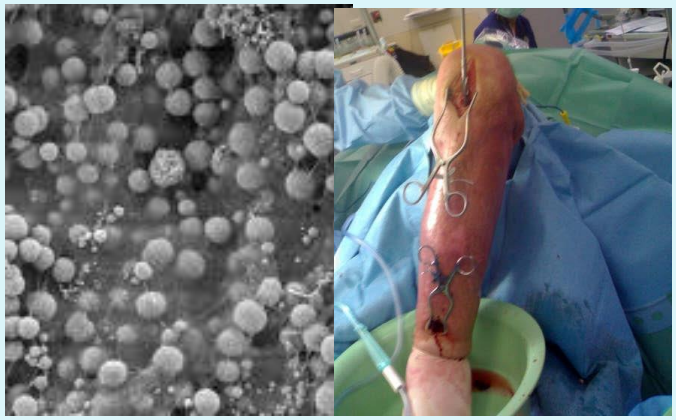
just because it worked …

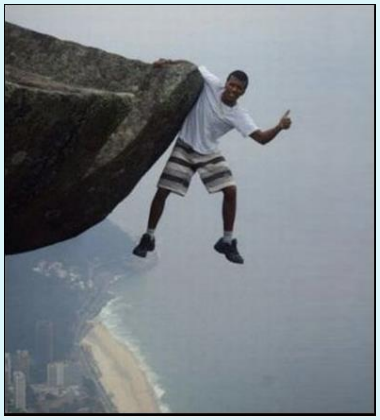


Summary

- ***Be suspicious***:
- ***Diagnose*** :

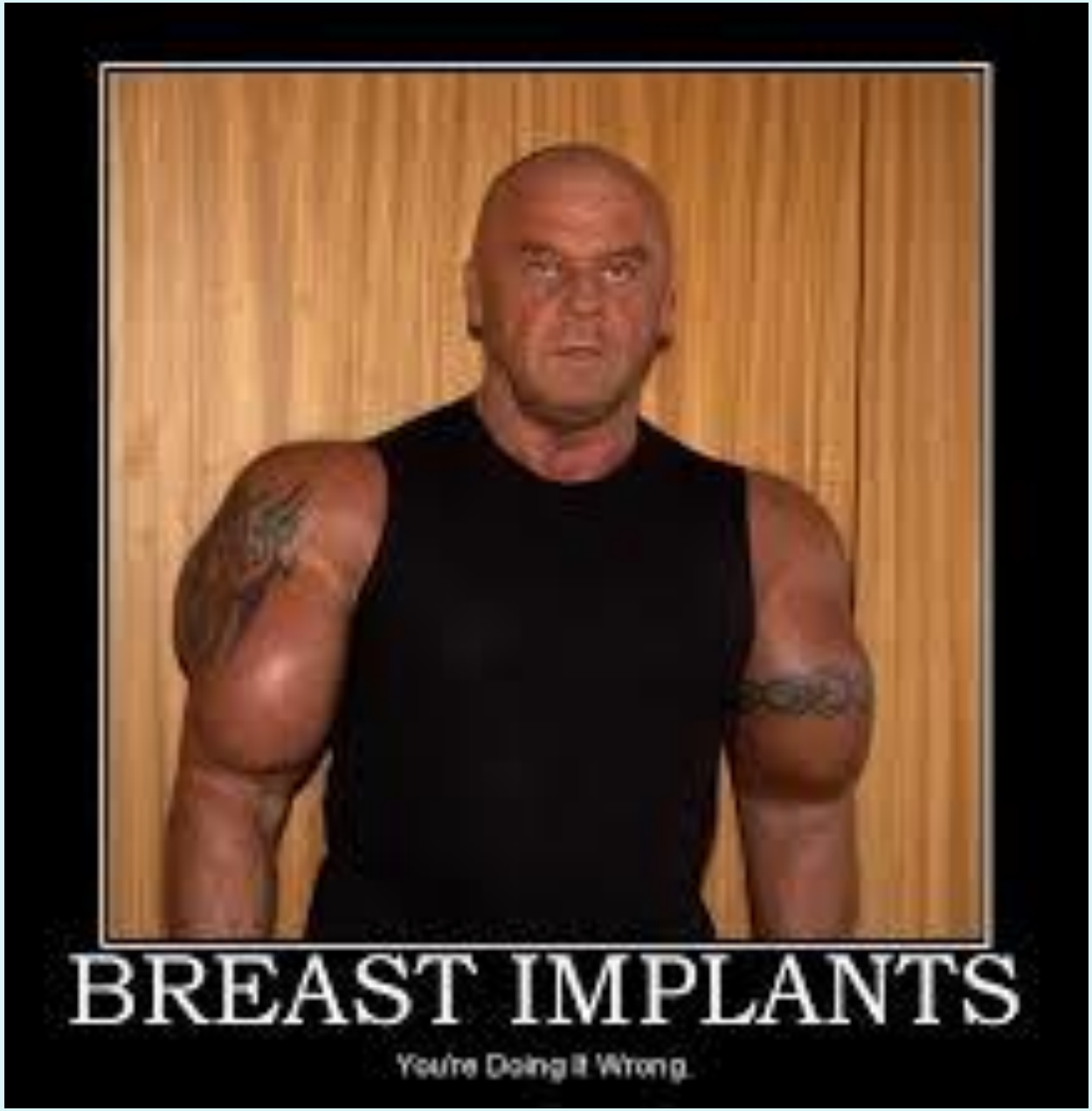
- ***Trauma***:

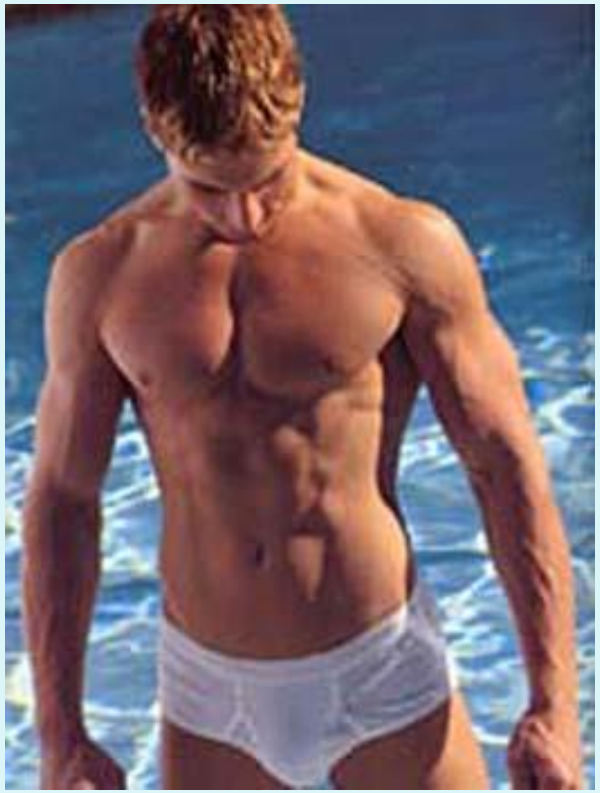





THAT'S ALL
FOLKS !


thankyou


BREAST IMPLANTS
You're Doing It Wrong.

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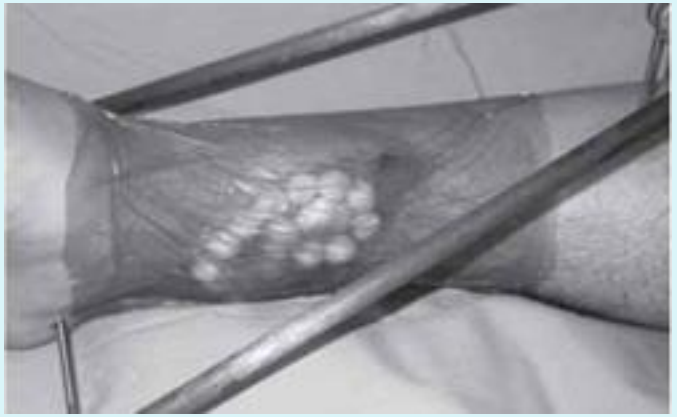


a
b