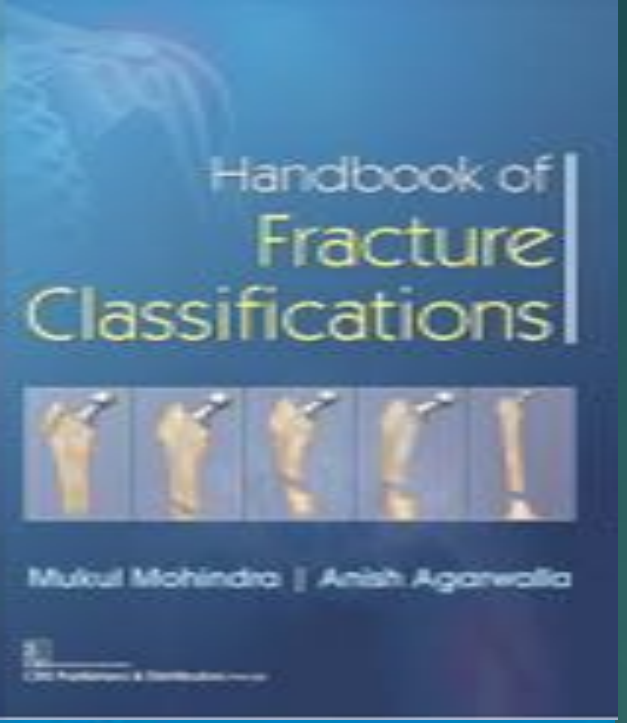

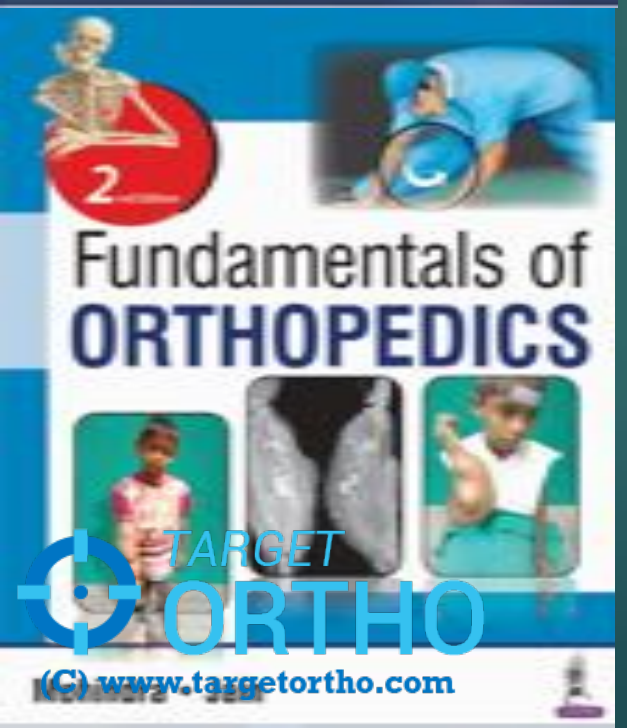

TOTAL HIP ARTHROPLASTY

Managing Complications
and
Getting Limb Length Right

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MORTALITY

American College of Surgeons

PRIMARY THR

1% mortality at 90 days

REVISION THR

2.5% mortality at 90 days

Bleeding

Gluteus medius split

Know your anatomy

Drain ???

- Near transverse acetabular ligament, or removing inferior acetabular osteophytes: branches of the obturator vessels at risk
- Deep to the gluteus maximus insertion: the first perforating branch of the Profunda Femoris artery is at risk
- Penetration of the medial wall of the acetabulum: branches of iliac vessels are at risk

Thromboembolism

4/5 days to 3 weeks

DVT

70%

PE

02%

Thromboprophylaxis (4-6 weeks)

Caution !!!

- Obese aged sedentary patients
- H/o DVT
- H/o Cardiac disease or Stroke
- H/o Previous surgery
- Hypercoagulable state
- THR being done for fracture cases

Neurological Injury

Osteoarthritis

↓

Hip dysplasia

↓

Revision cases

Sciatic nerve

? Explore

Posterior Approach

↓

Limb lengthening

Cemented Vs Cementless fixation

Dislocation in the post operative period is an independent risk factor!!

Dislocation

The unstable total hip arthroplasty

Gösta Ullmark

EFORT Open Rev. 2016 Apr; 1(4): 83–88.
Published online 2016 Apr 20. doi: 10.1302/2058-5241.1.000022

Compared with degenerative arthritis, the dislocation rate is doubled for avascular necrosis and multiplied by three times for congenital dislocation, four for fracture, five for nonunion, malunion or a failed hip arthroplasty, and eleven times after surgery for prosthetic instability.

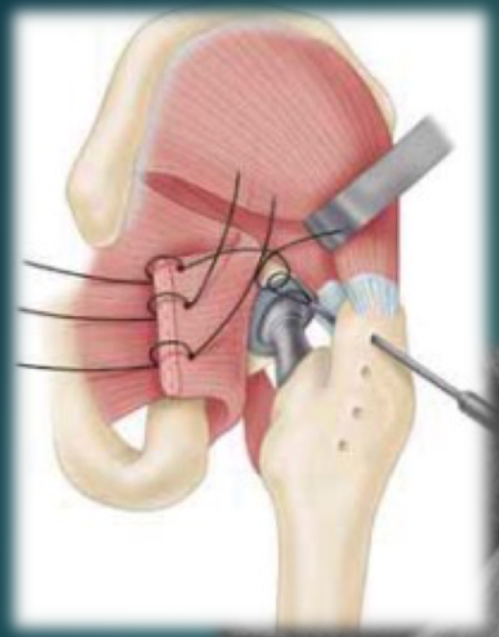
Dislocation

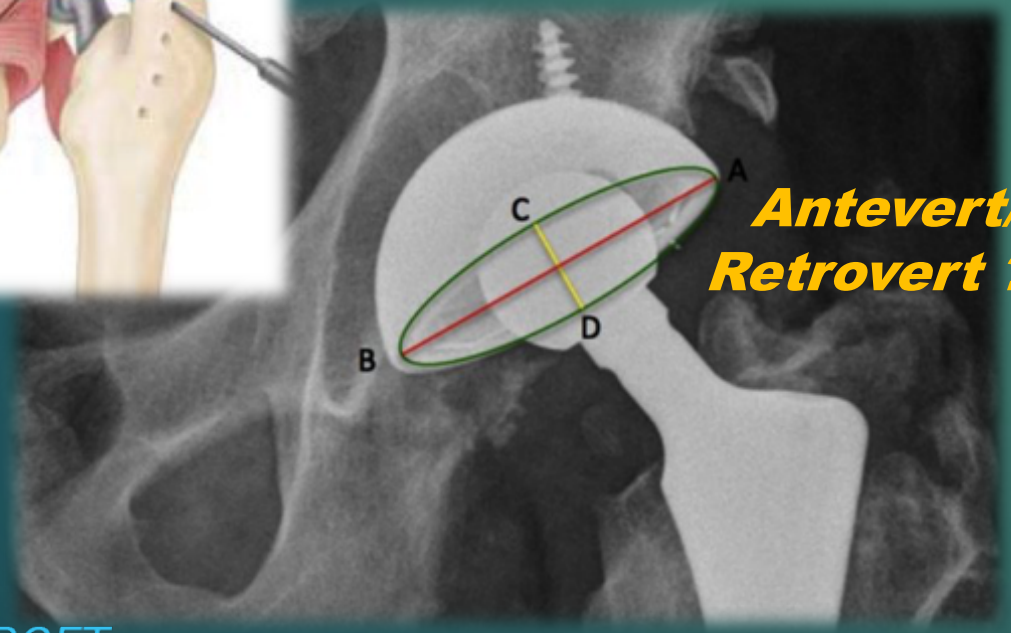
Late → Recurrent

3 % & 3 months

Cup inclination of 40° ± 10° *and*
Anteversion of 15° ± 10°

Lewinnek Safe Zone [1978]



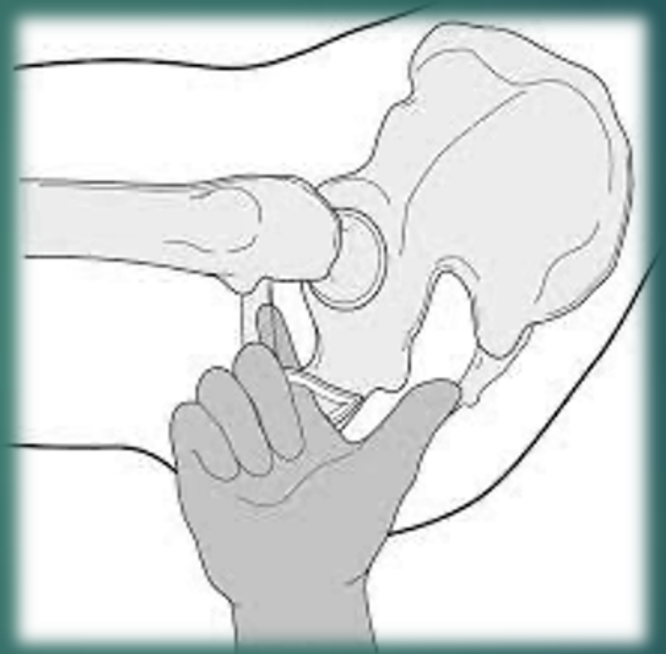


Antevert/ Retrovert ??

- Component malposition
- Small head size
- Posterior approach
- Inadequate soft tissue tension
- Abductor muscle weakness
- Laxity/ NM disease/ Contractures
- Previous HIP surgery (Revision cases)

ANGLE OF ANTEVERSION

$AV = \sin^{-1}(CD/AB)$



Coplanar test
of Ranawat

Wera et al. algorithm

Type I: acetabular component malposition
Type II: femoral component malposition
Type III: *abductor deficiency* M/C
Type IV: impingement
Type V: late wear
Type VI: unresolved

If no source is identifiable, distal advancement of the greater trochanter was recommended to improve soft-tissue tension.

Wera GD, Ting NT, Moric M, et al. Classification and management of the unstable total hip arthroplasty. *J Arthroplasty* 2012;27:710-5.

What to do !!!

Types I and II are treated by revision of the malpositioned component(s).

Abductor deficiency and those without known etiology for dislocation (**types III** and VI) are revised to constrained acetabular liners.

When impingement is the causative factor (**type IV**), sources of impingement are removed, offset is restored, and head size is increased.

Late wear (**type V**) associated with instability requires modular head and liner exchange, including a larger femoral head.

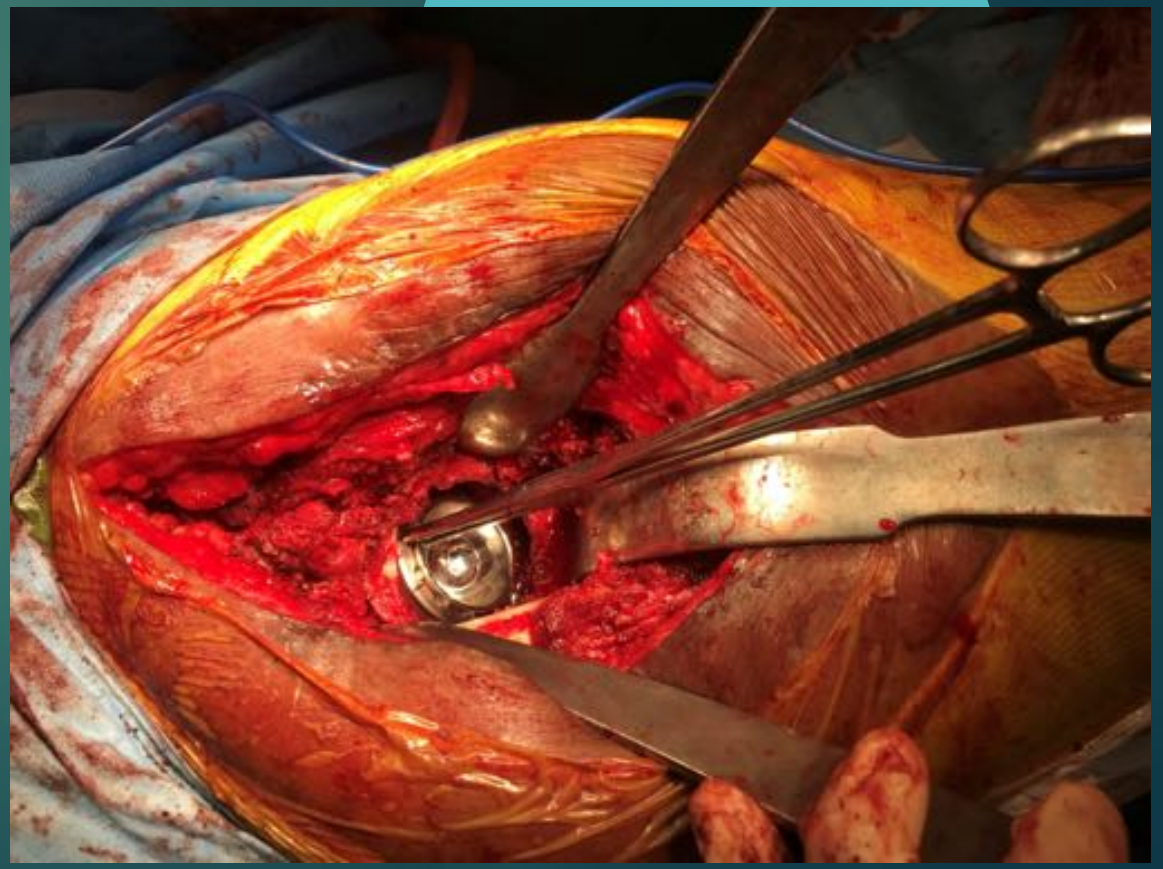
Implant factors

A study comparing neutral liners with 10° elevated-rim liners[28] reported respective probabilities of dislocation of 3.85% and 2.19% (p = 0.001). A disadvantage of the design, however, is increased impingement against the rim in extension and external rotation. Liner rim impingement may lead to liner wear, osteolysis and loosening.

Cobb TK, Morrey BF, Ilstrup DM. The elevated-rim acetabular liner in total hip arthroplasty: relationship to postoperative dislocation. *J Bone Joint Surg [Am]* 1996;78-A:80-6.

DUAL MOBILITY CUPS

High lift-off distance



A disadvantage can be large articulating polyethylene (PE) surfaces, including one which is convex with potency for increased wear.

Another disadvantage is the risk for dissociation between the inner and outer heads.

Infection

Charnley reported infection in 6.8% of the first 683 procedures.

Currently, 1-2% (Camphbell)

Risk Factors

- ❑ Diabetes
- ❑ Rheumatologic disease
- ❑ Obesity
- ❑ Coagulopathy
- ❑ Preoperative anemia, or sickle cell disease
- ❑ Prolonged operative time
- ❑ Previous hip surgery
- ❑ Postoperative hematoma

Start up to 60 min before incision:
Cefazolin, Cefuroxime, Clindamycin
10 min before tourniquet

AAOS

Infection

Could be

- Direct contamination

- Hematogenous spread

- Latent infection reactivation

ACUTE

CHRONIC

SUSPECT CHRONIC ???

Pain unrelieved by a seemingly well-functioning arthroplasty may be a clue towards *chronic* infection.

100 x 95

Alpha defensin-1, a synovial fluid peptide produced by neutrophils

Bone scan

ACUTE

HIP Aspiration

(2 weeks after discontinuation of antibiotic therapy)

ESR greater than 30 mm/h
CRP greater than 10

BEST and EARLIEST: I.L-6

According to Schinsky et al., if the aspirate WBC count is greater than 4200 leukocytes/ mL with greater than 85% polymorphonuclear leukocytes, infection should be suspected. The most accurate scenario for the diagnosis of infection occurs when abnormal ESR and CRP are found in combination with an aspirate WBC count greater than 3000 leukocytes/ml.

The diagnostic criteria for such infections:

- Two positive periprosthetic cultures with phenotypically identical organisms, or
- A sinus track communicating with the joint, or
- Having three of the following minor criteria:
  - Elevated serum C-reactive protein (CRP) *and* erythrocyte sedimentation rate (ESR)
  - Elevated synovial fluid white blood cell (WBC) count *or* ++change on leukocyte esterase test strip
  - Elevated synovial fluid polymorphonuclear neutrophil percentage (PMN%)
  - Positive histologic analysis of periprosthetic tissue
  - A single positive culture

International Consensus on Periprosthetic Infection convened in August 2013

Tsukayama classified periprosthetic infections into 4 categories:

1. Early postoperative infection: onset within the first month after surgery

2. Late chronic infection: onset more than 1 month after surgery, insidious onset of symptoms

3. Acute hematogenous infection—onset more than 1 month after surgery, acute onset of symptoms in previously well functioning prosthesis, distant source of infection

4. Positive intraoperative cultures: positive cultures obtained at the time of revision for supposedly aseptic conditions

EARLY POST OP INFECTIONS

Debridement, Antibiotic lavage, PE Exchange, Component retention!

Tsukayama et al. reported a 71% success rate in patients with early postoperative infection treated with debridement and component retention. Failures occurred primarily in the setting of uncemented prostheses. Other negative risk factors include duration of symptoms of more than 5 days, infection with methicillin-resistant staphylococci, and obesity.

LATE CHRONIC INFECTIONS

Two Stage

The femoral and acetabular components and any other foreign material, including cement, cement restrictors, cables, or wires, are removed to eliminate all surfaces that could harbour bacteria

SPACERS PLACED

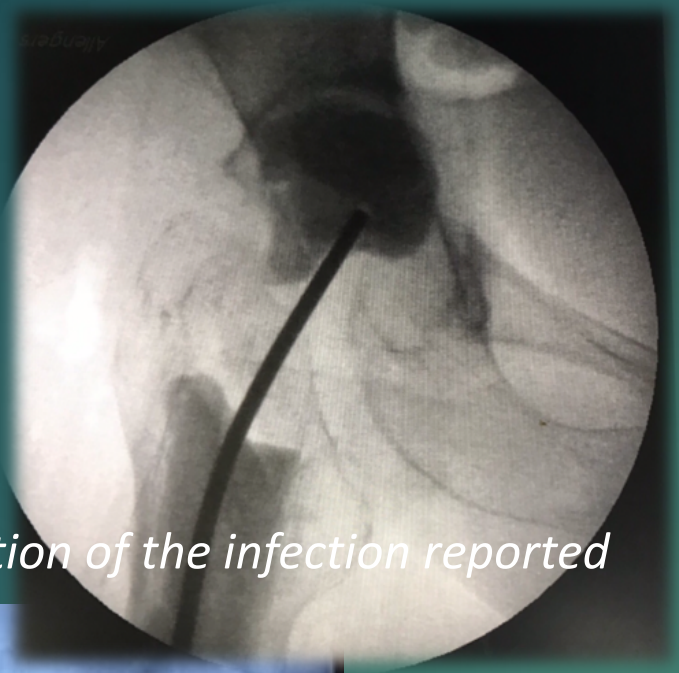
REVISION THR

If antibiotic-containing beads or spacers have been placed, some authors have recommended that drains not be used to maintain a high concentration of antibiotic in the wound.

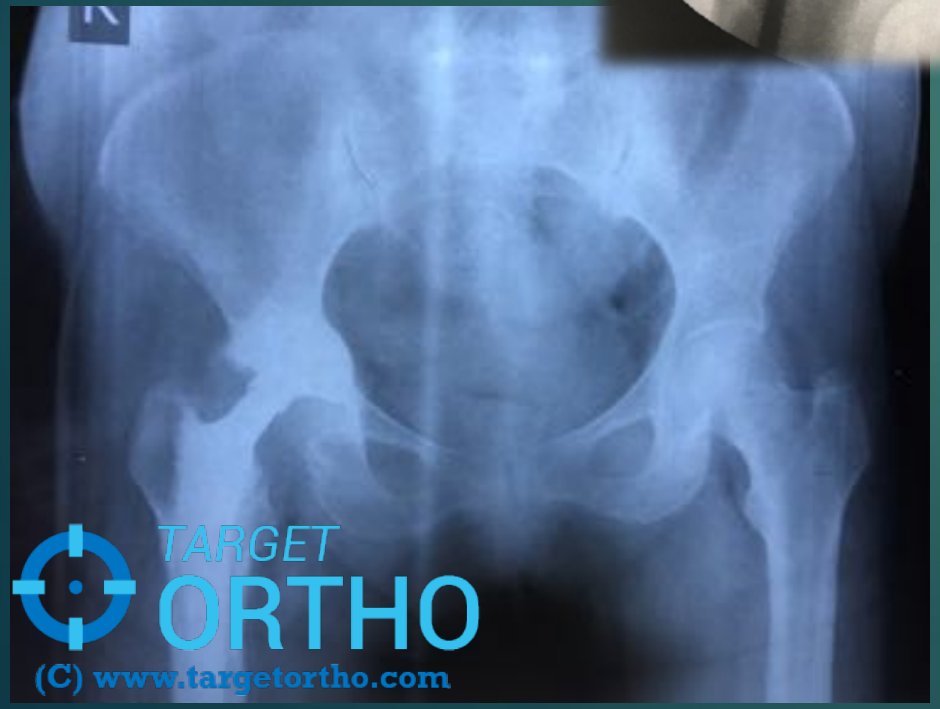
PROSTALAC

Duncan and Beauchamp

A prosthesis of antibiotic loaded acrylic cement



77% to 100% eradication of the infection reported



The prosthesis is constructed intraoperatively by moulding antibiotic-laden cement around a simplistic femoral component and an all-polyethylene acetabular component; implanted with an interference fit

When to reimplant ?

The optimal timing for reimplantation of another prosthesis has not been determined.

Numerous authors have reported series of patients in whom reimplantation was undertaken in periods of less than 1 year, with an incidence of recurrent infection similar to that in patients in whom reconstruction was delayed.

Currently, most authors say that continue *parenteral antibiotics for 6 weeks*. *Reconstruction is performed at approximately 3 months* if the ESR and CRP are improving, and repeat aspiration of the hip is negative.

LATE ACUTE INFECTIONS

Predominantly dental procedures

Debridement and component retention may be attempted !

Single stage options

complete removal of components and immediate reimplantation with primary cementless components.

Hansen et al.

The acceptable amount of time between onset of symptoms and debridement is controversial, ranging from 5 days to 3 months.

Relative contraindications to single-stage treatment include lack of preoperative identification of the infecting organism, presence of sinus track(s), and soft-tissue compromise possibly requiring flap coverage.

Delayed reconstruction is associated with lower rates of recurrent infection in most studies !!

Recurrence of infection after two-stage reimplantation of an infected total hip is a particularly difficult situation and seldom results in a satisfactory outcome.

Resection arthroplasty is more effective in resolving the infection but is associated with poor function and residual pain

Treatment of the infection takes precedence over reconstruction of the hip.

THR IN TB HIP

THR in "Active" TB Hip (Stage 3 and 4)

- ❑"Active" - Diagnosed but not on ATT / still on ATT
- ❑ Previously considered contraindication in active stage
- ❑ Fear of Reactivation and Failure

Harding's Recommendation

No draining sinus for at least 20 years
/ OR /
Ankylosis for more than 10 years.

MYCOBACTERIUM TUBERCULOSIS

- Different from Pyogenic Bacteria
- Rarely adheres to Metal Surface
- Little or no Biofilm formation
- Rifampicin - Intracellular / Can enter Biofilm

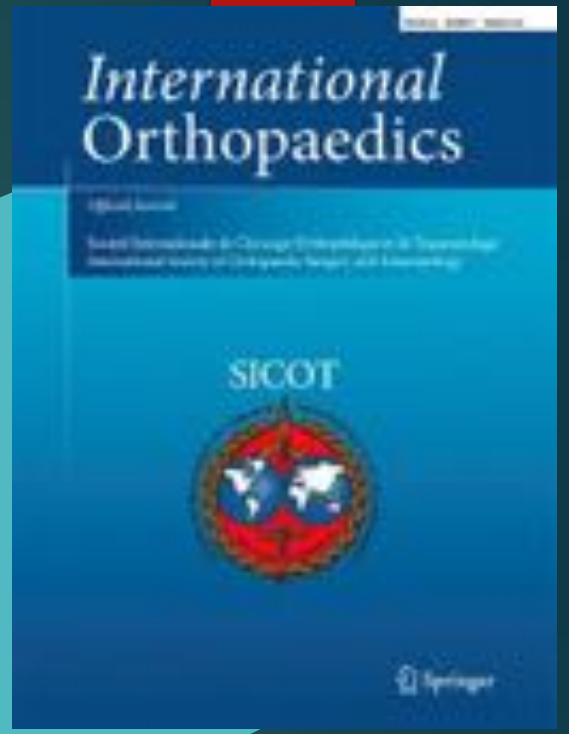
Clin Orthop Relat Res (2010) 468:605–612
DOI 10.1007/s11999-009-0957-9

CLINICAL RESEARCH

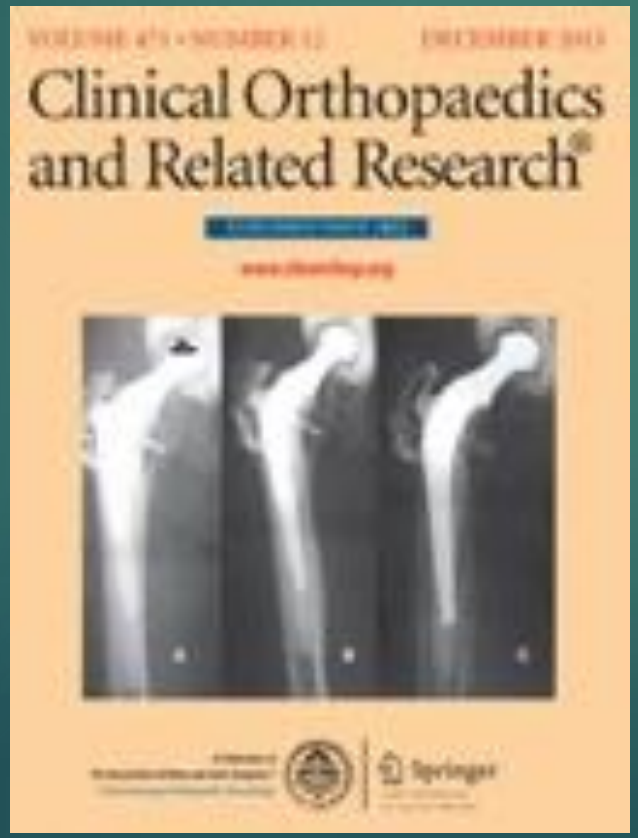
Total Hip Arthroplasty in Patients with Active Tuberculosis of the Hip with Advanced Arthritis

Devdatta Suhas Neogi MS (Ortho), DNB, MCh.Orth, MRCSEd,
Chandra Shekhar Yadav MS (Ortho),
Ashok Kumar MS (Ortho), Shah Alam Khan MS (Ortho), DNB, MCh.Orth (Liv), FRCS (Glasg),
Shishir Rastogi MS (Ortho), DNB

2 weeks preop ATT



4 weeks preop ATT



International Orthopaedics (SICOT) (2010) 34:1111–1114
DOI 10.1007/s00264-009-0854-6

ORIGINAL PAPER

Total hip arthroplasty for active tuberculosis of the hip

Yongqing Wang · Jingsheng Wang · Zhanmin Xu ·
Yuan Li · Huimin Wang

RESEARCH ARTICLE | OPEN ACCESS

Two-stage total hip arthroplasty for patients with advanced active tuberculosis of the hip

Liangjun Li, Ke Chou, Jianliang Deng, Feng Shen, Zhiyong He, Shuguang Gao, Yusheng Li and Guanghua Lei

Journal of Orthopaedic Surgery and Research 2016 11:38 | DOI: 10.1186/s13018-016-0364-3 | © Li et al. 2016

Received: 30 October 2015 | Accepted: 5 March 2016 | Published: 30 March 2016

Stage 1

- The inflamed soft tissues, necrotic bones, cold abscesses, and sinus tracts were debrided
- The femoral heads of four patients were excised and antibiotic-loaded cement spacers
- All patients were treated by ATT for a minimum of 3 months prior to the second operation

Stage 2

- If ATT was effective and the tuberculosis was controlled, hip prosthesis could be implanted.
- For typical cases, the ESR and CRP were normal, the wound was healed well,
- After the second operation, ATT was continued for 6–9 months, and the total duration of ATT was a minimum of 12 months after the first operation

HOW EARLY CAN ONE OPERATE ?

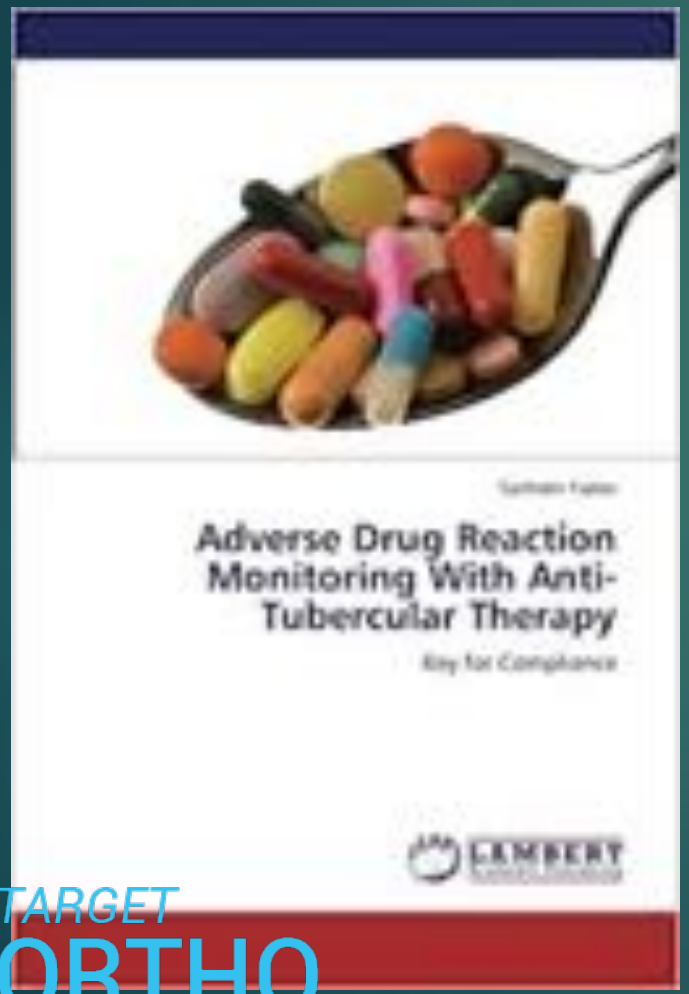
- Don't have to wait for complete healing of disease.
- If draining sinus : hold on !!!! TWO STAGES
- Give preoperative chemotherapy (2-3 months)
- Assess Local Milieu and General Health
- Obtain pus samples if possible (MDR)
- Preoperative CT and MRI : Bone Stock etc

CEMENTED OR CEMENTLESS ??

- Both work well
- No influence on rate of reactivation
- Femur : Bone quality is deciding factor
- Acetabulum : Uncemented preferred by majority of authors.

Can do grafting of cavities.

ATT IN CEMENT ??



- Little Information
- Isoniazid, Rifampicin and Ethambutol are Heat Stable
- Risk of toxicity and poor elution currently preclude their use.

To be taken up

LOOSENING

FRACTURES

? MOST COMMON

LIMB LENGTH DISCREPANCY

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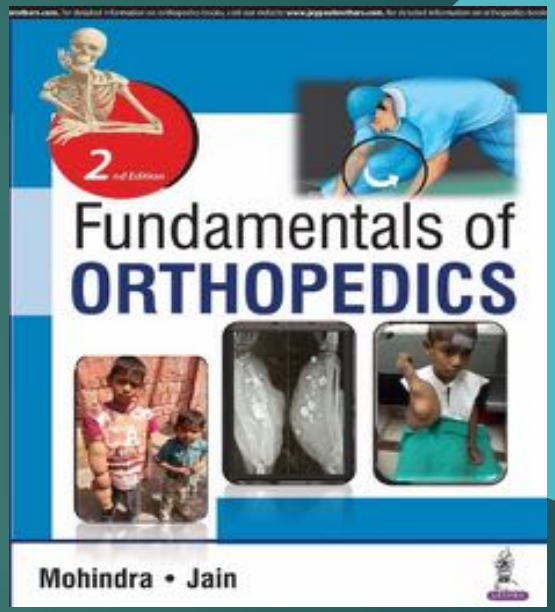

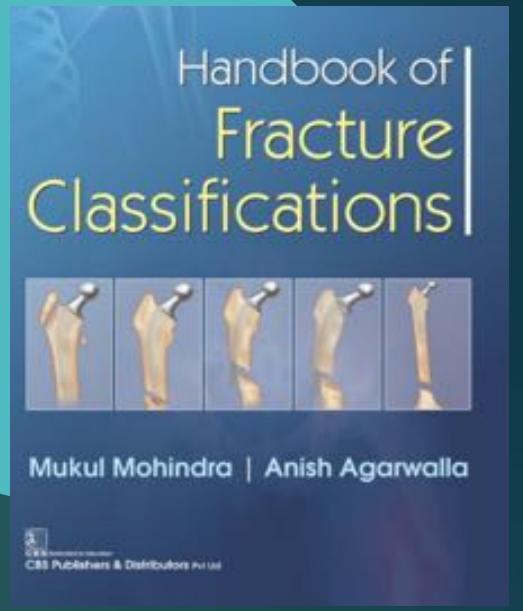

CREDITS

THR: The difficult scenarios

Osteolysis and Revision THR
THR in DDH
THR in Protrusio
THR in Ankylosis
THR in Bone defects
Periprosthetic fractures
THR in proximal femur deformity