AO TRAUMA

Perioperative preparation for an osteosynthesis of a proximal femoral fracture

Group discussion

Acknowledgements
Contributors
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Review
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How to use this discussion?

Before the course

- Go through the presentation and make it your own. Add relevant pictures e.g. of drapes, material if you wish.
- Rehearse and make sure that the content is known.
- If you are two moderators (ORP and surgeon), decide on who will take the lead for which content.
- Some slides contain slide questions (titles).
- Other slides contain questions in the notes section which can be used.
- The hidden slides can be activated and discussed if wished.
- The reference list (slide 3) contains information for further reading.

During the course

- Lead the discussion by asking questions.
- Do not give another lecture!
- Motivate all participants to come up with the content.

Reference list

Topic	Reference
Patient preparation	**Orson J, Rusell-Larson D.** Patient. In: Porteous M, Bäuerle S, eds. *Techniques and Principles for the Operating Room.* Stuttgart New York: Thieme; 2010:17–31.
Screw fixation	**Saris D.** Screw techniques. In: Porteous M, Bäuerle S, eds. *Techniques and Principles for the Operating Room.* Stuttgart New York: Thieme; 2010:138–144.
Plate functions	**Hak D.** Plates and plate techniques. In: Porteous M, Bäuerle S, eds. *Techniques and Principles for the Operating Room.* Stuttgart New York: Thieme; 2010:145–152.
Proximal femoral fractures	**Smith M, Porteous M .** Proximal femoral fractures. In: Porteous M, Bäuerle S, eds. *Techniques and Principles for the Operating Room.* Stuttgart New York: Thieme; 2010:440–497.
Diagnostic methods	**Guirguis R.** Diagnostic methods. In: Porteous M, Bäuerle S, eds. *Techniques and Principles for the Operating Room.* Stuttgart New York: Thieme; 2010:184–189.
Pre-operative planning	**Schelkun S.** Preoperative planning for ORP—the team approach. In: Porteous M, Bäuerle S, eds. *Techniques and Principles for the Operating Room.* Stuttgart New York: Thieme; 2010:190–197.
Reduction techniques	**Szypryt P.** Reduction techniquesl. In: Porteous M, Bäuerle S, eds. *Techniques and Principles for the Operating Room.* Stuttgart New York: Thieme; 2010:206–215.
Positioning, approach, reduction and other techniques	**Wolinsky P, Stephen D.** Femur, shaft. In: Rüedi T, Buckley R, Moran C, eds. *AO Principles of Fracture Management*, 2nd exp. Edition. Stuttgart New York: Thieme; 2007:767–785
Information WHO Surgical Safety Checklist on	http://www.who.int/patientsafety/safesurgery/ss_checklist/en/

Learning outcomes

At the end of the discussion the participants should be able to:

- Describe the fracture briefly
- Review the 4 AO principles of fracture fixation
- List nursing preparations for internal fixation of a proximal femoral fracture

How to use the ppt?

- Focus on the 3 learning outcomes.
- The participants
    - Describe briefly the fracture.
    - Discuss possible treatment(s). In this discussion the treatment with DHS is discussed.
    - Focus on peri-operative preparations for this particular treatment.

If available, use the workshop instruments to allow hands on individual instruments and to discuss and/or try out functionality of instruments.

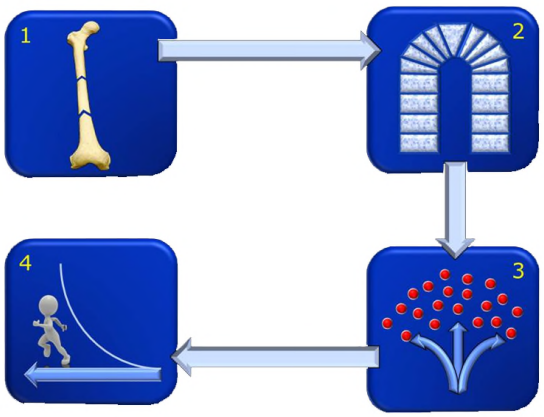
Case presentation

- 65-year-old woman fell from ladder
- Left proximal femur fracture

Include demention, obesity, diabetes type 2 as possible extra conditions for more advanced course participants. Adapt case and discussions accordingly.

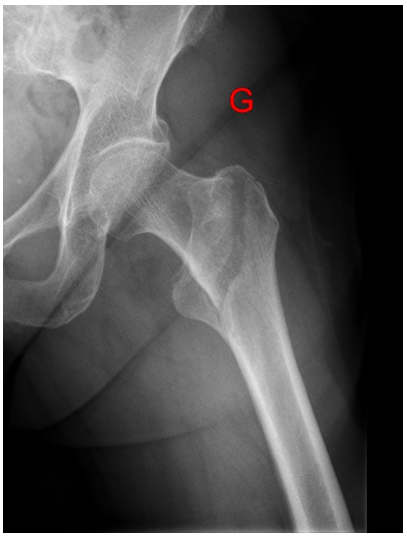
This slide can be printed for the participants in case you wish them to follow the case during the discussion.

4 Principles of fracture fixation—Review



Briefly review the four principles of fracture fixation (if required). The participants have learned about this in a previous lecture. Explain that the entire case including preparation, treatment and after-care is based on these four principles.

Describe the fracture



Bone
Segment
Fracture type

AO

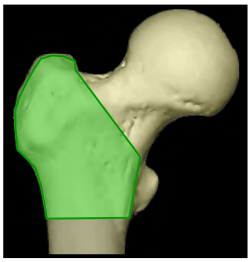
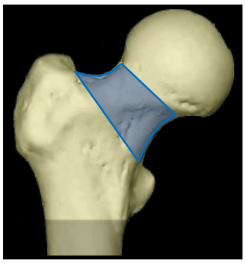
Other item(s) which can be discussed here is/are:

1. What x-rays, images are required? (Both x-ray views (lateral and AP) are needed. Both joints are checked.)
2. Which bone(s) is(are) broken?
3. Which segment is broken?
4. Which fracture type is this?
5. Is the fracture simple, wedge, or comminuted? What is the pattern of the fracture?
6. Is this fracture „stable“ or „unstable“?
7. Does the fracture go into the joint?
8. Is this an open fracture? (An open fracture is suspected when the bone sticks out, black bubbles are present (which indicates air) and/or dirt is visible (e.g. metal).

Describe the fracture

Bone	Femur
Segment	Proximal
Fracture type	Trochanteric

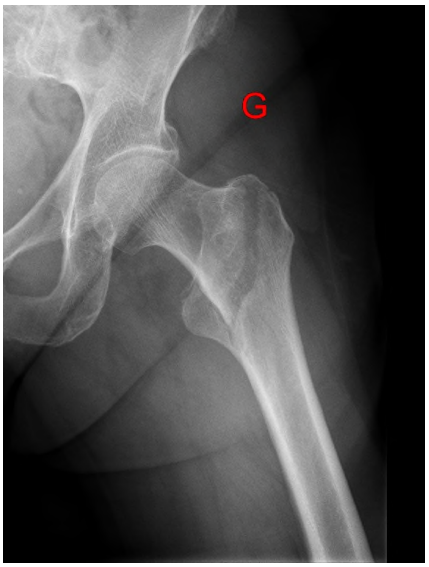
Describe type of proximal femoral fracture

A	B	C
Trochanter	Neck	Head
		
Extraarticular, trochanteric	Extraarticular, neck	Intraarticular, head

This slide can be included if wished.

How would you reduce the fracture?

How would you stabilize the fracture?



Other items which can be discussed here are:

1. What type of reduction will be performed? (direct or indirect, open or closed)
2. What are the principles of stabilization? (absolute or relative stability)
3. How could the fracture be fixed?
4. What healing is expected? (direct or indirect bone healing, primary or secondary bone healing)

For this proximal femoral fracture…

…a recommended treatment is

internal fixation with a Dynamic Hip Screw

This suggested treatment (see slide) will be discussed further in this discussion.

Other options, eg, PFNA….
Discuss difference between the two devices:
- PFNA load sharing allowing early weight bearing
- DHS load bearing, which usually does permit early weight bearing in an unstable fracture

This is an ideal indication for DHS; with anatomical reduction, correct screw position and good bony support which allows stable construct and immediate weightbearing.

For the stable A1 fractures there is consensus:

1. Extramedullary fixation: DHS, angle blade plates, etc
    - All do very well
    - Short surgery
    - Little blood loss
    - Economic
    - Early weight bearing
2. Intramedullary fixation: PFN, Gamma, etc

- Have no advantages
- More expensive

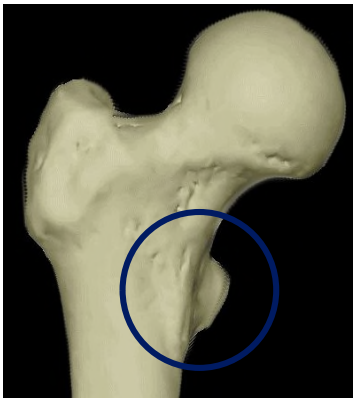
References:

Curtis MJ, Jinnah RH, Wilson V, et al. Proximal femoral fractures: a biomechanical study to compare intramedullary and extramedullary fixation. *Injury.* 1994 Mar;25(2):99–104.

Butt MS, Krikler SJ, Nafie S, et al. Comparison of dynamic hip screw and gamma nail: a prospective, randomized, controlled trial. *Injury.* 1995 Nov;26(9):615–618.

Hoffmann R, Schmidmaier G, Schulz R, et al. [Classic nail versus DHS. A prospective randomised study of fixation of trochanteric femur fractures]. *Unfallchirurg.* 1999 Mar;102(3):182–190. German

Stable or unstable fracture (1/3)



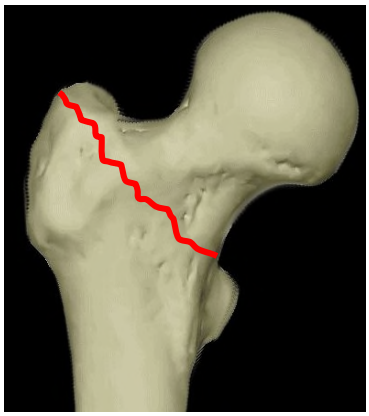
Include this slide if wished

A stable pertrochanteric fracture of the femur allows for an anatomical reduction especially of the medial buttress (calcar). If this has been achieved, the DHS is the ideal implant and allows immediate partial weight bearing. As soon as there is a fragmentation of the medial support, corresponding to an A2/3 type, the DHS risks to break due to fatigue.

Stable or unstable fracture (2/3)

Stable
after reduction

31 A.1



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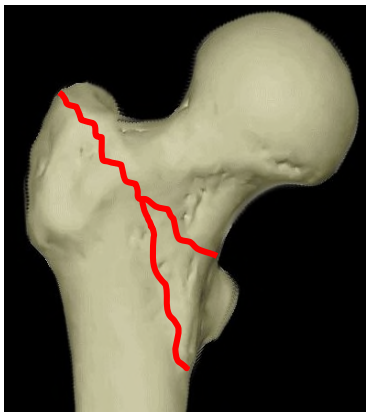
Stable or unstable fracture (3/3)

31 A.2/3



Unstable

Include this slide if wished

Nursing preparations

Pre-, intra and post operative process

1. **P**lanning
2. **I**nstrument- and implant check
3. **P**rocedure

Discuss the nursing preparations related to this case.
In the next slides the following will be discussed in more detail:

1. Planning (including positioning, preparing of equipment etc. and draping)
2. Instrument- and implant check (including WHO-checklist)
3. Procedure (including approach and technique)

We use «P.I.P.» to facilitate the three steps (PIP of Planning, Instruments and Procedure).

Nursing preparations

Pre-, intra and post operative process

1. **P**lanning
2. **I**nstrument- and implant check
3. **P**rocedure

Starting with the planning process….

What do you need to prepare?

- Instruments
- Implants
- Equipment

…what do you need to prepare?

Please discuss with your participants the following items. The participants should come up with items for each bullet point. The following slides are **some** illustrations of what should be prepared.
You are free to include more slides with pictures if deemed required.

Instruments

This slide shows only one set of instruments. The following hidden slides with instruments can be used if wished.

If available, use the workshop instruments to allow hands on individual instruments and to discuss and /or try out functionality of instruments.

1. Discuss material and equipment necessary for this type of intervention (Image intensifier, etc…).
2. Discuss specific instruments for fracture fixation with DHS. Note: This picture is not complete. Which instruments are missing?
3. Discuss plate fixation with corresponding instruments.
4. Discuss use and intra-operative care and maintenance of specific instruments.

Instruments

Use this slide only if wished.

Instruments

Use this slide only if wished.

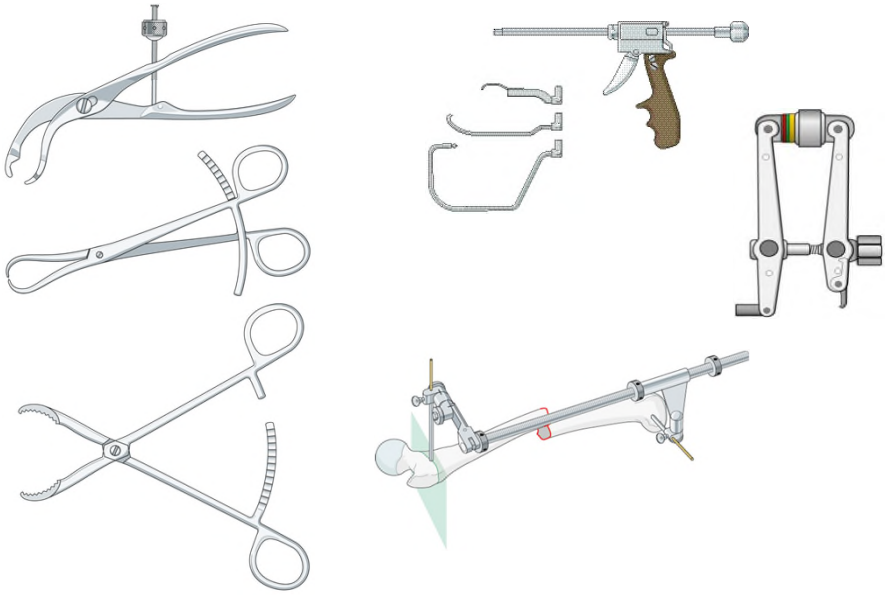
Instruments

Use this slide only if wished.

Instruments

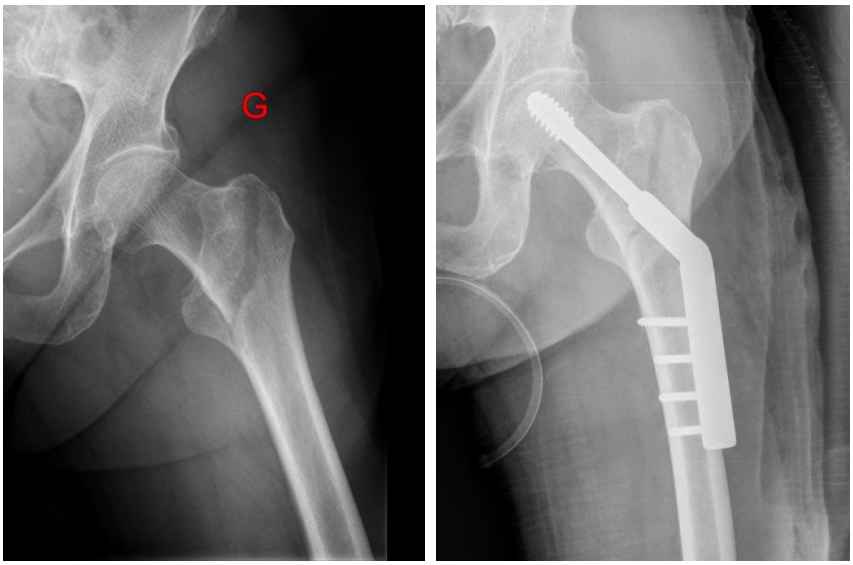
Use this slide only if wished.

Reduction (distraction) tools

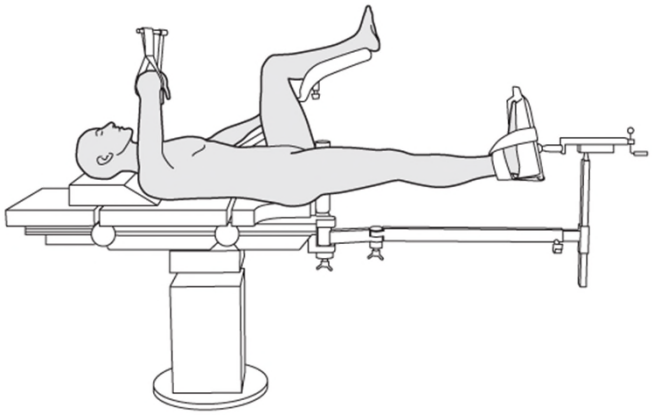


Implants

How would you position the patient?



How would you position the patient?

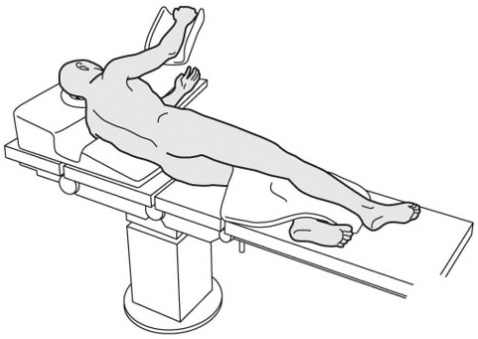


Other items which can be discussed here are:

1. Which possibilities for positioning exist?
2. Discuss safe positioning for the patient (accessories, OR-table, etc…).
3. Discuss tips and tricks.
4. Which complications might occur?
5. How can these complications be prevented?

Reference: https://www2.aofoundation.org/wps/portal/surgery

What about these possibilities?



Reference: https://www2.aofoundation.org/wps/portal/surgery

How would you drape for this case?

Nursing preparations

Pre-, intra and post operative process

1. Planning
   - Preparing (Equipment, instruments and implants)
   - Positioning
   - Draping
2. **Instrument- and implant check**
3. Procedure

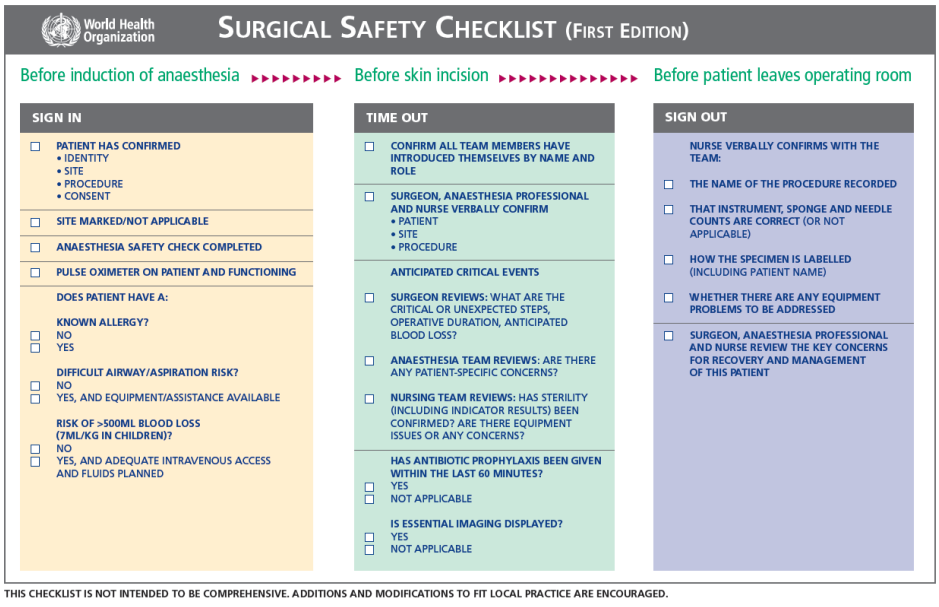
Only repeat this if deemed required. This subject is possibly already discussed in the previous discussion.

Questions which can be asked are:

Ask your participants:
1. What is the final check before skin incision? (refer to Surgical Safety Checklist, see next slides)
2. Who does this systemically?
3. What is exactly checked? (availability of instruments and implants or more)

Ask those participants who perform systematically a safety check:
1. If they use a checklist adapted to their hospital?
2. If they use a general type of list (see WHO-checklist, AOTrauma checklist)?

WHO-checklist



World Health Organization

SURGICAL SAFETY CHECKLIST (FIRST EDITION)

Before induction of anaesthesia ▸▸▸▸▸▸▸▸▸ Before skin incision ▸▸▸▸▸▸▸▸▸▸▸▸▸ Before patient leaves operating room

SIGN IN

- ☐ PATIENT HAS CONFIRMED
  - IDENTITY
  - SITE
  - PROCEDURE
  - CONSENT
- ☐ SITE MARKED/NOT APPLICABLE
- ☐ ANAESTHESIA SAFETY CHECK COMPLETED
- ☐ PULSE OXIMETER ON PATIENT AND FUNCTIONING
- DOES PATIENT HAVE A:
- KNOWN ALLERGY?
  - ☐ NO
  - ☐ YES
- DIFFICULT AIRWAY/ASPIRATION RISK?
  - ☐ NO
  - ☐ YES, AND EQUIPMENT/ASSISTANCE AVAILABLE
- RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)?
  - ☐ NO
  - ☐ YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED

TIME OUT

- ☐ CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE
- ☐ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM
  - PATIENT
  - SITE
  - PROCEDURE
- ANTICIPATED CRITICAL EVENTS
- ☐ SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS?
- ☐ ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS?
- ☐ NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS?
- HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES?
  - ☐ YES
  - ☐ NOT APPLICABLE
- IS ESSENTIAL IMAGING DISPLAYED?
  - ☐ YES
  - ☐ NOT APPLICABLE

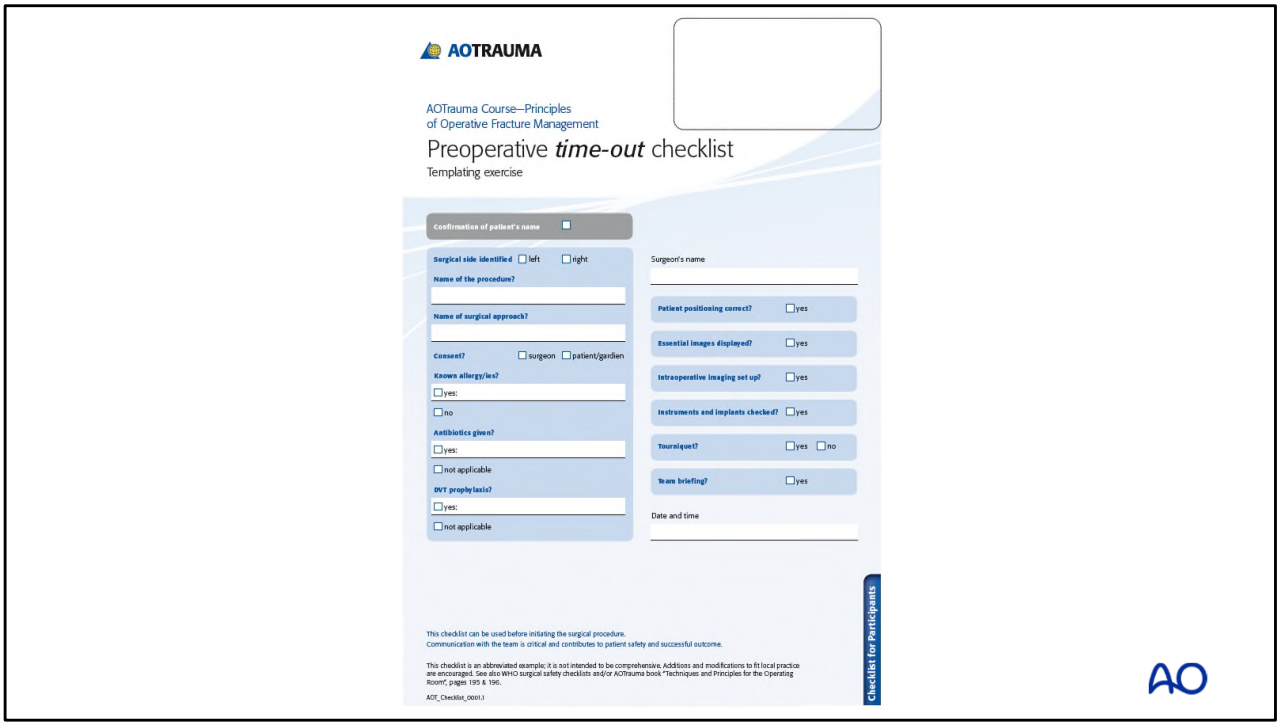
SIGN OUT

- NURSE VERBALLY CONFIRMS WITH THE TEAM:
- ☐ THE NAME OF THE PROCEDURE RECORDED
- ☐ THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE)
- ☐ HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME)
- ☐ WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED
- ☐ SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT

THIS CHECKLIST IS NOT INTENDED TO BE COMPREHENSIVE. ADDITIONS AND MODIFICATIONS TO FIT LOCAL PRACTICE ARE ENCOURAGED.

AO

This is probably discussed in previous discussions. Discuss this slide if wished and required.



AOTRAUMA

AOTrauma Course—Principles
of Operative Fracture Management

Preoperative *time-out* checklist

Templating exercise

Confirmation of patient's name ☐

Surgical side identified ☐ left ☐ right

Name of the procedure?

Name of surgical approach?

Consent? ☐ surgeon ☐ patient/gardien

Known allergy/ies?

☐ yes:

☐ no

Antibiotics given?

☐ yes:

☐ not applicable

DVT prophylaxis?

☐ yes:

☐ not applicable

Surgeon's name

Patient positioning correct? ☐ yes

Essential images displayed? ☐ yes

Intraoperative imaging set up? ☐ yes

Instruments and implants checked? ☐ yes

Tourniquet? ☐ yes ☐ no

Team briefing? ☐ yes

Date and time

Checklist for Participants

This checklist can be used before initiating the surgical procedure.
Communication with the team is critical and contributes to patient safety and successful outcome.

This checklist is an abbreviated example; it is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged. See also WHO surgical safety checklists and/or AOTrauma book "Techniques and Principles for the Operating Room", pages 195 & 196.

AOF_Checklist_0001.I

AO

This is probably discussed in previous discussions. Discuss this slide if wished and required.

Note that the time-out is only 1 part of the surgical safety checklist.

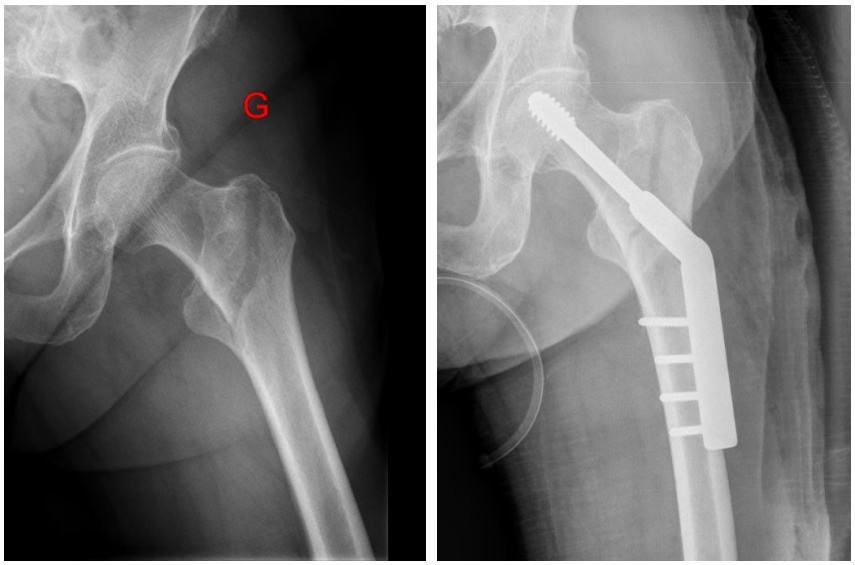
Nursing preparations

Pre-, intra and post operative process

1. Planning
   - Positioning
   - Preparing (Equipment, instruments and implants)
   - Draping
2. Instrument- and implant check
   - WHO-checklist/AOTrauma-checklist
3. **Procedure**
   - Approach
   - Technique

Discuss the procedure step-by-step starting with the approach.

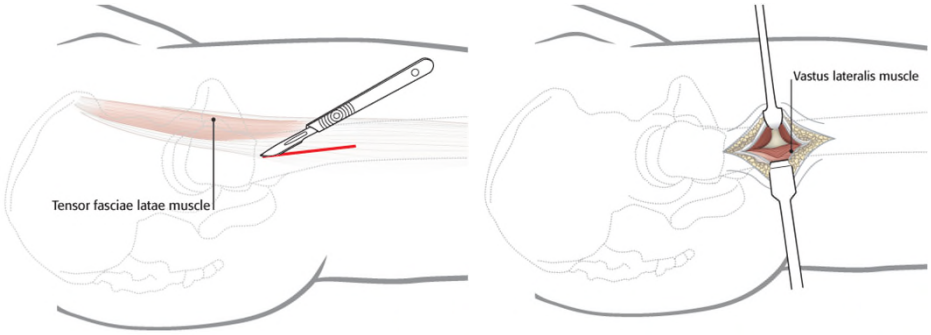
What approach could be done?



Other items which can be discussed here are:

1. Discuss the open, closed and/or minimally invasive approach.
2. What is the impact regarding the soft tissues?

What approach could be done?

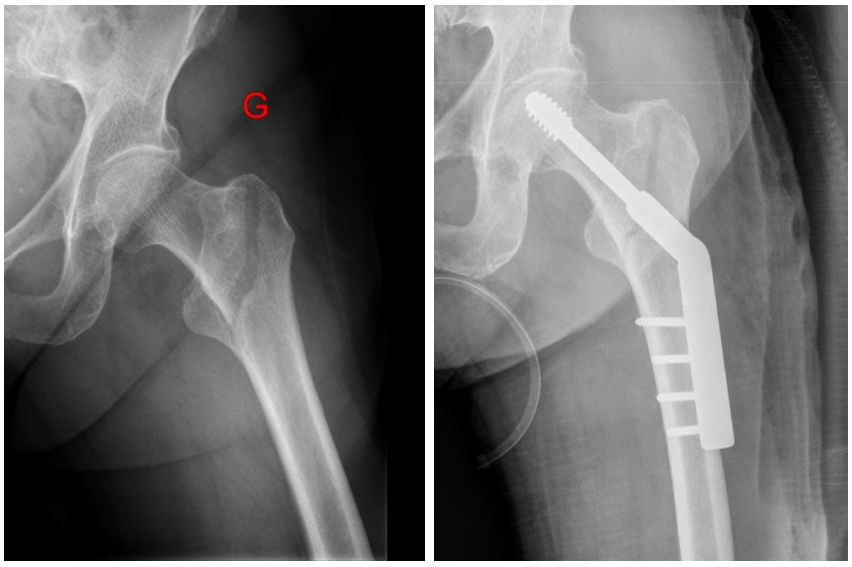


For insertion of multiple screws, the incision is centered over the femoral neck axis line, and slightly posterior to the palpable mid line of the trochanter.
For a sliding hip screw, the plate angle and length will affect the lateral incision. For example, for a two-hole 135º side plate, the incision usually begins a few centimeters beyond the palpable greater trochanter and extends 10 cm further distally, over the femoral shaft.
If the soft tissues are thick, the incision may need to be more distal or longer.

Use one or two small elevators to expose the femoral shaft, and place a Hohmann retractor anteriorly. Expose only enough lateral femoral surface for satisfactory hardware placement.

Reference: https://www2.aofoundation.org/wps/portal/surgery

What are the steps of procedure?



Participants come up with the steps of procedure. The next slide is a reminder and help which can be used once the participants have given their input.

What are the steps of procedure?

1. Closed reduction
2. Insertion of guide wire
3. Reaming, tapping, and insertion of DHS
4. Plate fixation

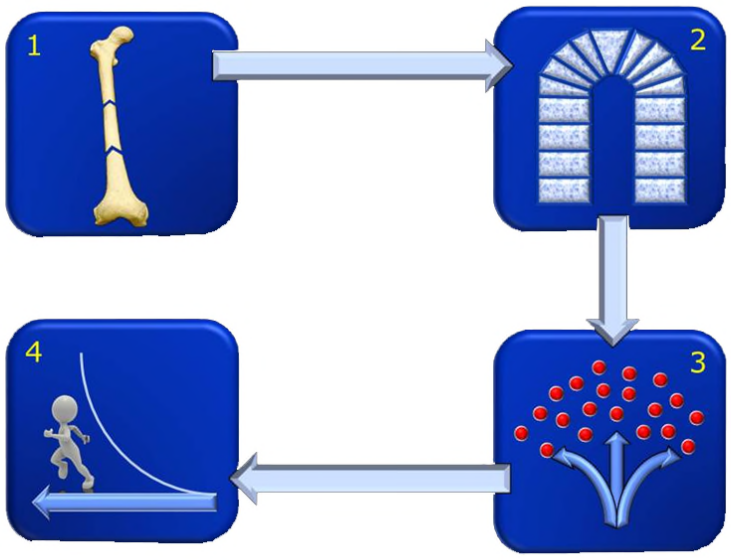
Participants come up with the steps of procedure. The next slide is a reminder and help which can be used once the participants have given their input.

What kind of mobilization after surgery is aimed for?

Other items which can be discussed here are:

1. Discuss the mobilization after surgery. (Movements of injured limb, weight bearing, …)
2. What are available community resources in your country to help mobilize the patient so that they get back home quicker?
3. How does the diabetes influence the healing process?

Summary—The 4 AO principles



Let a participant make a summary on hand of the four AO principles of fracture fixation. Relate/Refer to the case discussed!

1. Type of reduction (direct or indirect, open or closed)
2. Principles of stabilization and fixation (absolute or relative stability) with healing expected
3. Impact of soft tissue (approach)
4. Expected mobilization after surgery (limb, patient as a whole, weight bearing)

Conclusion

- The 65-year-old woman with a proximal femoral fracture is treated with DHS.
- Closed reduction is performed on a fracture table
- Internal fixation will provide relative stability and secondary bone healing.
- The case is prepared following «P.I.P.».