

# **Perioperative preparation for an osteosynthesis of a shaft fracture**

## **Group discussion**

### **Acknowledgements**

#### **Contributors**

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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.

AO

## Reference list

Topic	Reference
Patient preparation	<b>Orson J, Rusell-Larson D.</b> Patient. In: Porteous M, Bäuerle S, eds. <i>Techniques and Principles for the Operating Room</i> . Stuttgart New York: Thieme; 2010:17–31.
Intramedullary techniques	<b>Wong M K.</b> Intramedullary techniques. In: Porteous M, Bäuerle S, eds. <i>Techniques and Principles for the Operating Room</i> . Stuttgart New York: Thieme; 2010:157–162.
Tibial shaft fractures	<b>Barbosa P.</b> Tibial shaft fractures. In: Porteous M, Bäuerle S, eds. <i>Techniques and Principles for the Operating Room</i> . Stuttgart New York: Thieme; 2010:628–657.
Diaphyseal fractures	<b>Dresing K.</b> Diaphyseal fractures. In: Porteous M, Bäuerle S, eds. <i>Techniques and Principles for the Operating Room</i> . Stuttgart New York: Thieme; 2010:170–175.
Diagnostic methods	<b>Guirguis R.</b> Diagnostic methods. In: Porteous M, Bäuerle S, eds. <i>Techniques and Principles for the Operating Room</i> . Stuttgart New York: Thieme; 2010:184–189.
Pre-operative planning	<b>Schelkun S.</b> Preoperative planning for ORP—the team approach. In: Porteous M, Bäuerle S, eds. <i>Techniques and Principles for the Operating Room</i> . Stuttgart New York: Thieme; 2010:190–197.
Reduction techniques	<b>Szypryt P.</b> Reduction techniquesI. In: Porteous M, Bäuerle S, eds. <i>Techniques and Principles for the Operating Room</i> . Stuttgart New York: Thieme; 2010:206–215.
Positioning, approach, reduction and other techniques	<b>Wolinsky P, Stephen D.</b> Femur, shaft. In: Rüedi T, Buckley R, Moran C, eds. <i>AO Principles of Fracture Management</i> , 2nd exp. Edition. Stuttgart New York: Thieme; 2007:767–785
Information WHO Surgical Safety Checklist on	<a href="http://www.who.int/patientsafety/safesurgery/ss_checklist/en/">http://www.who.int/patientsafety/safesurgery/ss_checklist/en/</a>

AO

## Learning outcomes

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

- Describe the fracture briefly
- Review the four AO principles of fracture fixation
- List nursing preparations for internal fixation of a closed tibial shaft fracture

AO

### 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 a reamed tibia nail is discussed.
  - Focus on peri-operative preparations for this particular treatment.

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



## Case presentation

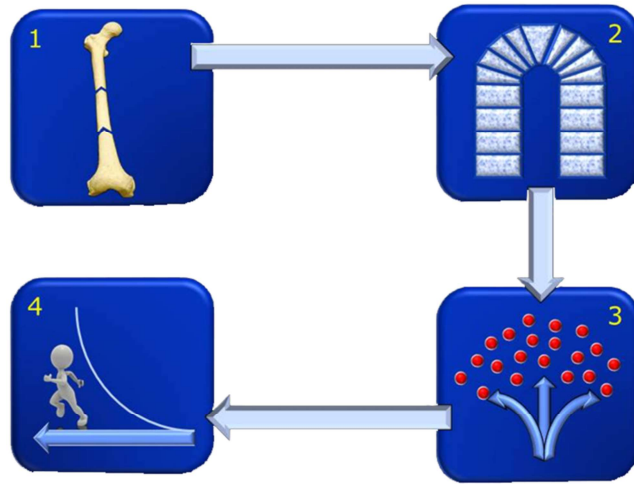
- High-energy trauma (41y-old man) due to ski accident
- Closed left tibial shaft fracture



Include (exclude) smoker according to your public.

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



AO

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 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	Tibia and fibula
Segment	Shaft (diaphyseal)
Fracture type	Wedge

AO

## Describe type of diaphyseal fracture

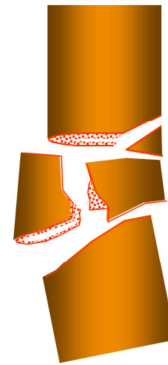
**A**  
Simple  
fracture



**B**  
Multifragmentary,  
wedge fracture



**C**  
Multifragmentary,  
complex fracture



AO

This slide can be included if wished.

**How would you reduce the fracture?**

**How would you stabilize the fracture?**



AO

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 tibial shaft fracture...



... a recommended treatment for this fracture type is **intramedullary nailing with interlocking**.

AO

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

Other items which can be discussed here are:

1. What is the function of the nail? Compression or splinting?
2. An endcap was used because the nail would have probably been too short. The nail could also have been inserted a little deeper.
3. Three proximal locking screws were used which might have been an “overkill”. Two would have been enough.
4. Locking techniques such as back slapping technique, difference of static, and dynamic interlocking can be explained.
5. The importance of providing complete sets of implants in order to ensure that situations where the correct nail size is not available can be avoided.

## Nursing preparations

Pre-, intra and post operative process

1. Planning
2. Instrument- and implant check
3. Procedure

AO

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. Planning
2. Instrument- and implant check
3. Procedure

AO

Starting with the planning process....

## What do you need to prepare?

- Instruments
- Implants
- Equipment

AO

...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



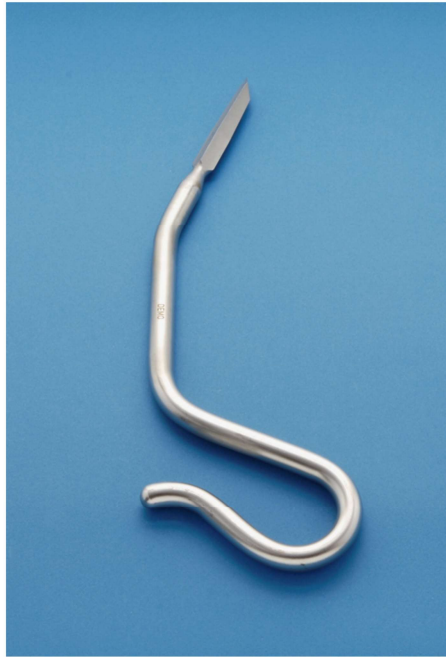
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**This slide shows only one set of instruments. The following hidden slides with instruments can be used if wished.**

**If available, use the workshop instruments set 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 use of instruments (eg, preparation of reduction tools: for fracture C2 where the disconnected middle fracture fragment can be rotated when reaming, a bone clamp should be provided to avoid spinning of the fragment).
3. Discuss care and maintenance of specific instruments.
4. Discuss which nail could be used (solid, hollow implant).
5. Discuss purpose of reaming.
6. Discuss relation of reamer head to diameter of nail.
7. Discuss length of nail and procedure to determine length.
8. Discuss why fibula does not need to be stabilized.

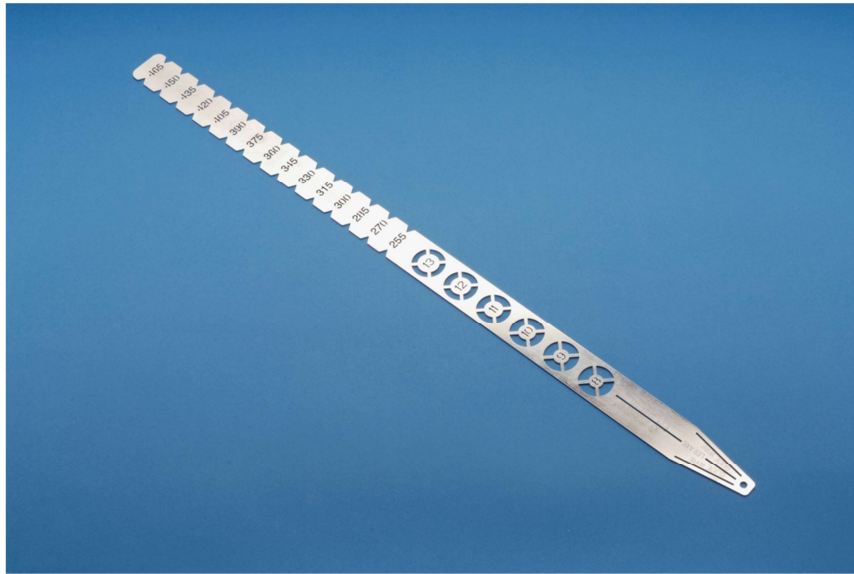
## Instruments



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## Instruments



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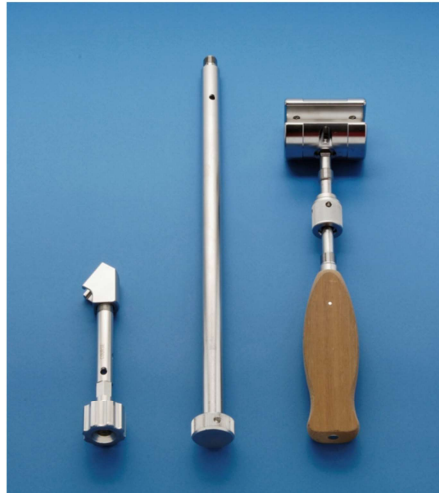
## Instruments



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## Instruments



AO

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## Instruments



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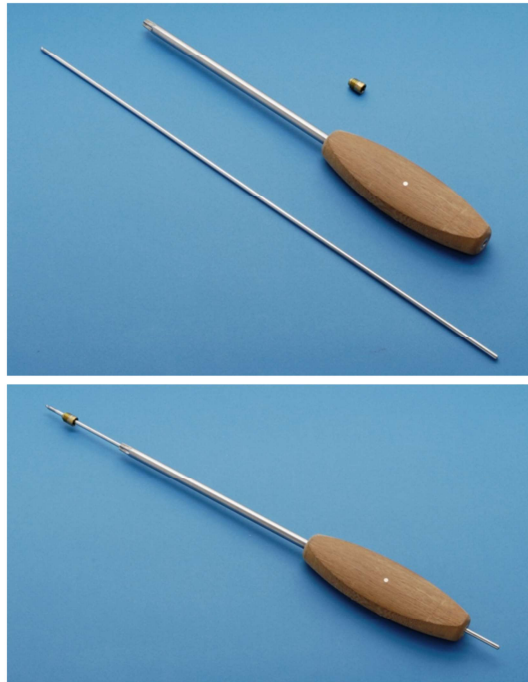
## Instruments



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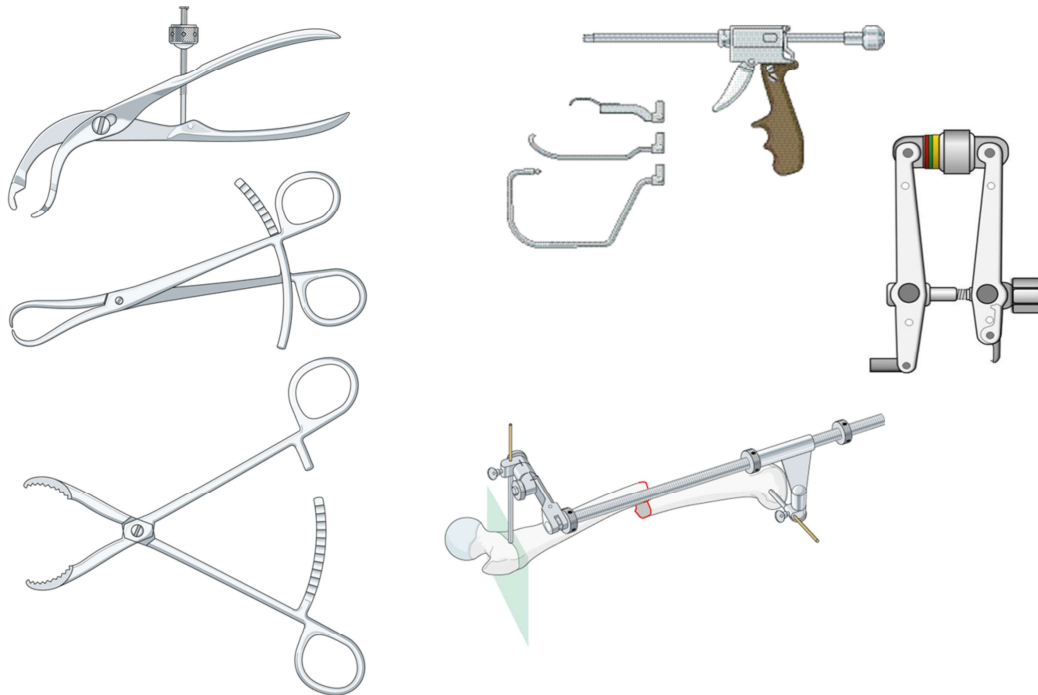
## Instruments



AO

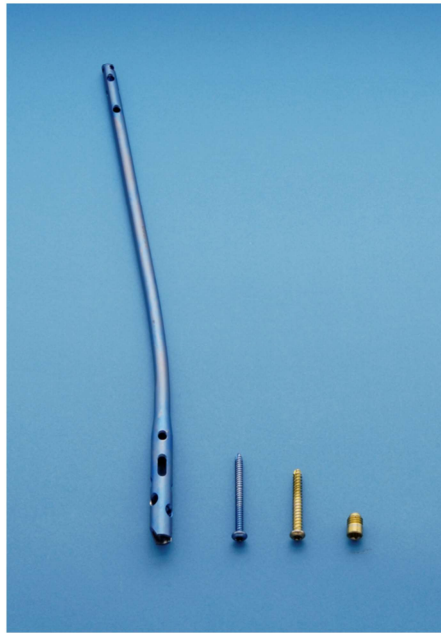
Use this slide only if wished.

## Reduction (distraction) tools



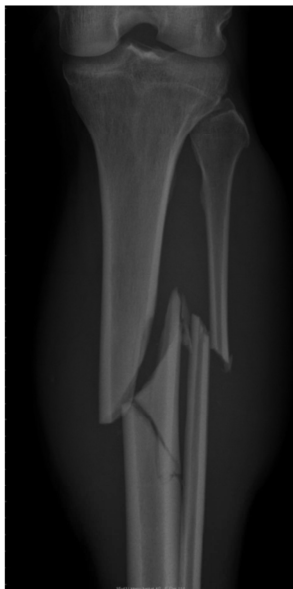
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# Implants



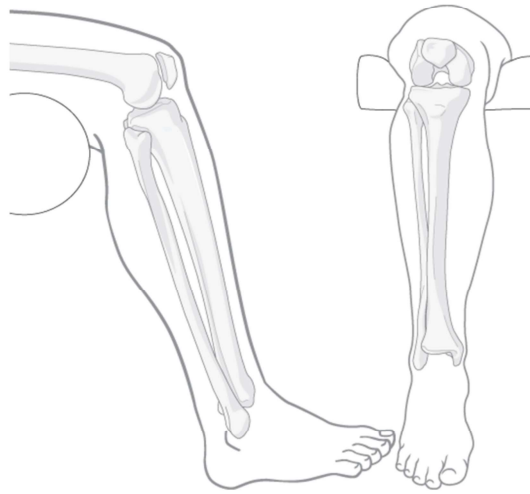
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**How would you position the patient?**



AO

## How would you position the patient?

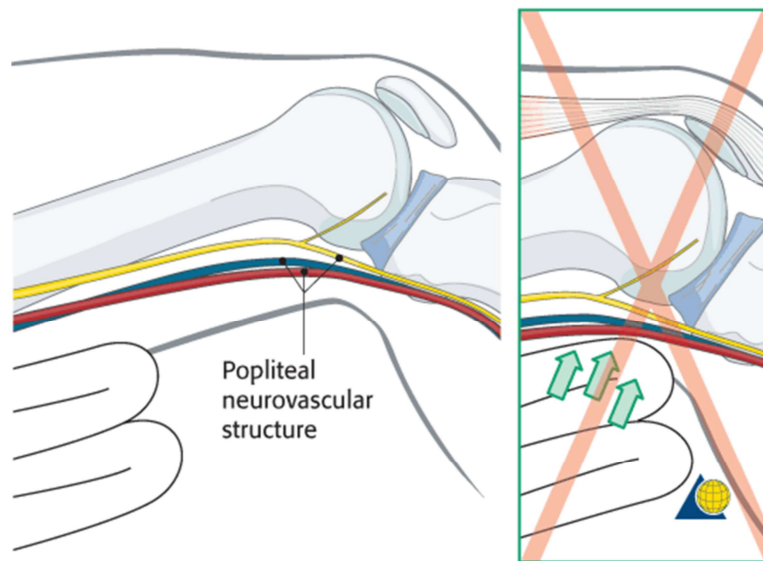


AO

Other items which can be discussed here are:

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

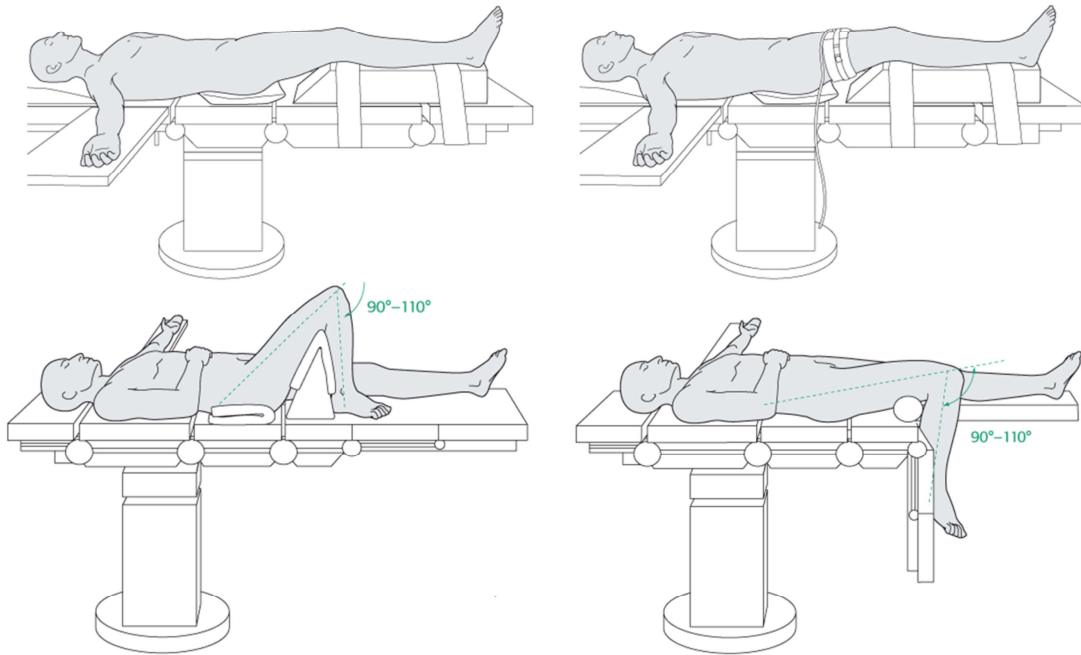
## Discuss complications and prevention



AO

Any support should be under the thigh and not press upon the popliteal fossa. This allows better knee flexion and avoids neurovascular compression.

## What about these possibilities?



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



**How would you drape for this case?**

AO

## Nursing preparations

Pre-, intra and post operative process

### 1. Planning

- Preparing (Equipment, instruments and implants)
- Positioning
- Draping

### 2. Instrument- and implant check

### 3. Procedure

AO

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


Questions which can be asked are:

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 <b>SURGICAL SAFETY CHECKLIST (FIRST EDITION)</b>		
Before induction of anaesthesia ▶▶▶▶▶▶▶▶ Before skin incision ▶▶▶▶▶▶▶▶▶▶▶▶ Before patient leaves operating room		
SIGN IN	TIME OUT	SIGN OUT
<input type="checkbox"/> PATIENT HAS CONFIRMED <ul style="list-style-type: none"> <li>• IDENTITY</li> <li>• SITE</li> <li>• PROCEDURE</li> <li>• CONSENT</li> </ul>	<input type="checkbox"/> CONFIRM ALL TEAM MEMBERS HAVE INTRODUCED THEMSELVES BY NAME AND ROLE	NURSE VERBALLY CONFIRMS WITH THE TEAM:
<input type="checkbox"/> SITE MARKED/NOT APPLICABLE	<input type="checkbox"/> SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE VERBALLY CONFIRM <ul style="list-style-type: none"> <li>• PATIENT</li> <li>• SITE</li> <li>• PROCEDURE</li> </ul>	<input type="checkbox"/> THE NAME OF THE PROCEDURE RECORDED
<input type="checkbox"/> ANAESTHESIA SAFETY CHECK COMPLETED		<input type="checkbox"/> THAT INSTRUMENT, SPONGE AND NEEDLE COUNTS ARE CORRECT (OR NOT APPLICABLE)
<input type="checkbox"/> PULSE OXIMETER ON PATIENT AND FUNCTIONING	ANTICIPATED CRITICAL EVENTS	<input type="checkbox"/> HOW THE SPECIMEN IS LABELLED (INCLUDING PATIENT NAME)
DID THE PATIENT HAVE A:	<input type="checkbox"/> SURGEON REVIEWS: WHAT ARE THE CRITICAL OR UNEXPECTED STEPS, OPERATIVE DURATION, ANTICIPATED BLOOD LOSS?	<input type="checkbox"/> WHETHER THERE ARE ANY EQUIPMENT PROBLEMS TO BE ADDRESSED
KNOWN ALLERGY?	<input type="checkbox"/> ANAESTHESIA TEAM REVIEWS: ARE THERE ANY PATIENT-SPECIFIC CONCERNS?	<input type="checkbox"/> SURGEON, ANAESTHESIA PROFESSIONAL AND NURSE REVIEW THE KEY CONCERNS FOR RECOVERY AND MANAGEMENT OF THIS PATIENT
<input type="checkbox"/> NO <input type="checkbox"/> YES	<input type="checkbox"/> NURSING TEAM REVIEWS: HAS STERILITY (INCLUDING INDICATOR RESULTS) BEEN CONFIRMED? ARE THERE EQUIPMENT ISSUES OR ANY CONCERNS?	
DIFFICULT AIRWAY/ASPIRATION RISK?	HAS ANTIBIOTIC PROPHYLAXIS BEEN GIVEN WITHIN THE LAST 60 MINUTES?	
<input type="checkbox"/> NO <input type="checkbox"/> YES, AND EQUIPMENT/ASSISTANCE AVAILABLE	<input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE	
RISK OF >500ML BLOOD LOSS (7ML/KG IN CHILDREN)?	IS ESSENTIAL IMAGING DISPLAYED?	
<input type="checkbox"/> NO <input type="checkbox"/> YES, AND ADEQUATE INTRAVENOUS ACCESS AND FLUIDS PLANNED	<input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE	

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

AO

Discuss the WHO checklist if wished.



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/guardian

**Known allergy/ies?**

☐ yes:

☐ no

**Antibiotics given?**

☐ yes:

☐ not applicable

**DVT prophylaxis?**

☐ yes:

☐ not applicable

**Surgeon's name**

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**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**


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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.

AOT\_Checklist\_0001.1

Checklist for Participants



Also AOTrauma has created a time-out checklist as example.  
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

AO

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

## What approach could be done?

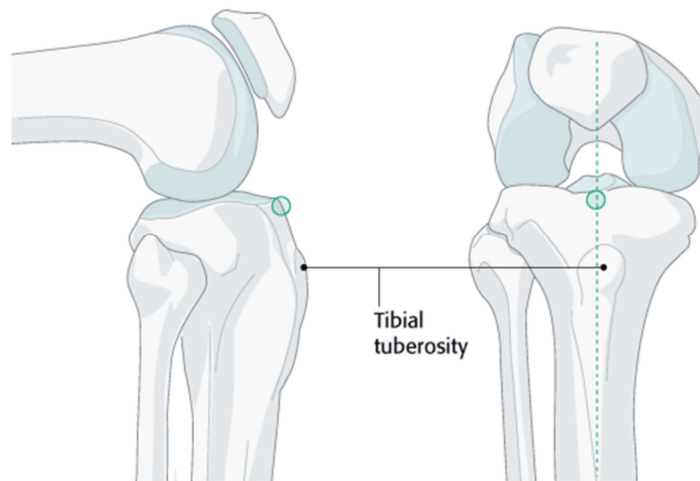


AO

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?



AO

## 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. Reduction
2. Opening of intramedullary canal
3. Insertion of nail (and reaming if required)
4. Locking of nail

AO

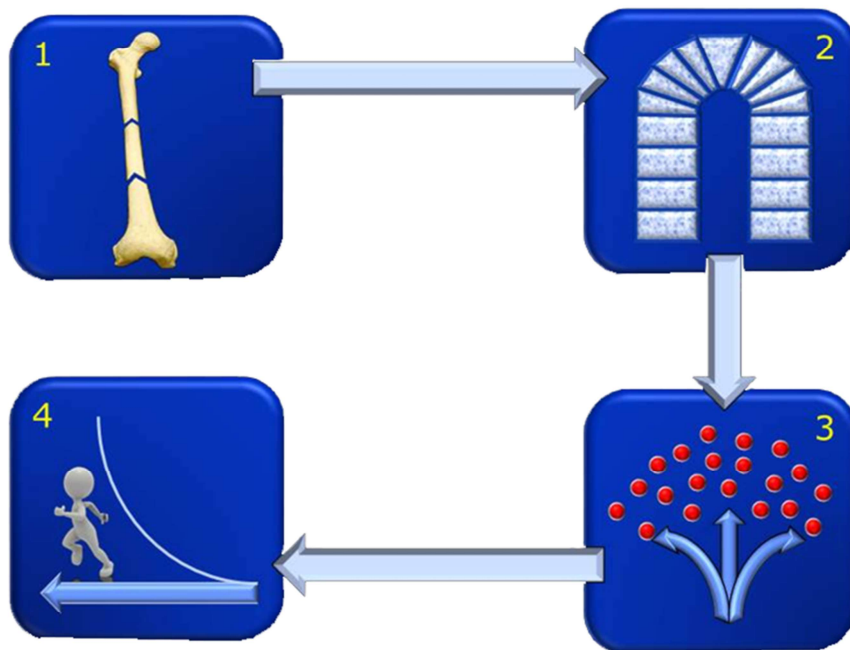
## What kind of mobilization after surgery is aimed for?

AO

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 smoking influence the healing process?

## Summary—The 4 AO principles



AO

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 41-year-old man with a closed tibial shaft fracture is treated with an interlocking IM nail
- Closed reduction is performed
- Nailing will provide relative stability and secondary bone healing
- The case is prepared following «P.I.P.».

AO