

Clinica Ortopedica e Traumatologica  
Università degli Studi di Pavia

Fondazione IRCCS Policlinico San Matteo

Chairman: Prof. F. Benazzo



Postoperative courses: Prevention and Rehab

F. Benazzo, S.M.P Rossi

### Postoperative courses

Goals:

- Faster and easier recovery
- Avoid joint stiffness and pain
- Avoid complications



### Postoperative courses

Different steps:

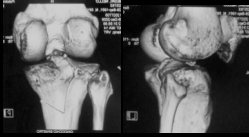
1. Wound management
2. DVT prophylaxis
3. Prevention of Infections
4. Range of Motion recovery
5. Muscle strength recovery
6. Weight Bearing



### Postoperative courses

Factors influencing post-op care

- Type of fracture
- Soft tissue injury
- Joint involvement
- Patient's characteristics



### Postoperative courses

Factors influencing post-op care

Soft tissue injury

*Soft tissue injuries accompanying closed fractures are especially troublesome and often are insufficiently appreciated on account of their occult nature. Even a simple skin contusion over a closed fracture can pose a more complex range of therapeutic and prognostic problems than skin which has been broken by a fractured bone.*

Oestern and Tscheme

### Postoperative courses

1. Wound management:

Soft tissue damage influence the post-op care


Tscheme classification of closed fractures and soft-tissue injury.

Grade C0: Little or no soft-tissue injury.

Grade C1: Superficial abrasion (shaded area) and mild to moderately severe fracture configuration.

Grade C2: Deep, contaminated abrasion with local contusional damage to skin or muscle (shaded area) and moderately severe fracture configuration.

Grade C3: Extensive skin contusion or crushing or muscle destruction (shaded area) and severe fracture



Type C2 and C3 fractures have high risk of suffrance

## Postoperative courses

### 1. Wound management:

Wounds with higher risk of sufrage:

- Sharp angled incisions
- Double incisions
- Incisions going more postero-lateral or postero-medial
- Arthroscopic assisted ORIF (compartment syndrome!!!)
- Early or late surgery
- Any high energy Trauma
- Long tourniquet time

## Postoperative courses

### 2. DVT prophylaxis

- Risk evaluation in the pre-op phase
- Concomitant risk factors
- Predisposing conditions
- Patient's clinical records and history
- Experience with peculiar situations: Haemophilia, Diabetes, RA, Heart or Vascular conditions
- Knowledge of the possible solutions

## Postoperative courses

### 2. DVT Prophylaxis

- LMWH 4000 IU/day until full weight bearing in any patient below 90 kg
- LMWH 6000 IU/day until full weight bearing in any patient over 90 kg

DVT Prophylaxis should start at the day of the trauma and not be suspended until the end of the treatment (full weight bearing)

If any risk factor or doubt don't hesitate to consult :

- Vascular surgeon
- Haematologist
- Angiologist

## Postoperative courses

### 3. Prevention of infections

2 essential steps in the prevention of infection:

- early administration of intravenous (IV) antibiotics
- Proper surgical management of fractures.

Consider:

- Diabetes
- Age
- RA or Haemophilia
- Immune status
- ...



## Postoperative courses

### 3. Prevention of infections

Early administration of intravenous (IV) antibiotics

Closed fractures:

- First-generation cephalosporin 30 minutes before surgery
- 2 g Cephazolin in the OR then 1 gr every 6 h for 3 administrations
- Not necessary to continue prophylaxis for more than 24 hours

## Postoperative courses

### 3. Prevention of infections

Open fractures:

- Grade I: First-generation cephalosporin (Ancef, 2 g IV loading dose, 1 g IV every 8 hours for 3 doses)
- Grade II and III: Third-generation cephalosporin (ticarcillin clavulanate, 3.1 g IV every 8 hours) or *first generation* cephalosporin plus aminoglycoside (gentamicin or tobramycin)
- Add penicillin for injuries contaminated by soil.
- Add tetanus prophylaxis if history of tetanus immunization is not known.

Our protocol:

Amoxicilline-Clavulonate 2,2 g x 3/day  
+ gentamicin 240 mg x 1/day

## Postoperative courses

### 4. Range of Motion recovery

First goal in rehab program is to avoid joint stiffness

Any fracture with ORIF/CRIF:

- Out of the OR with the knee in flexion
- CPM from day 0 :  
0-90° for the first 7-15 days  
0-120° and full ROM recovery within first month

Same protocol if no contra-indications with EF



## Postoperative courses

### 4. Range of Motion recovery

Exceptions:

Associated fractures or ligament injuries requiring immobilisation

- Floating knee
- Some External Fixations
- MCL e LCL II or III degree lesions
- Patellar fracture
- Patellar or Quadriceps tendon avulsion
- ....

## Postoperative courses

### 4. Range of Motion recovery

Particular case:

Anterior cruciate ligament insertion avulsion:

- Conservative treatment: 30 days with knee in full extension than ROM  
progressive recovery with CPM 0-30° for 7-10 days than increase of 30° every 7 days
- Surgical treatment: 15 days of immobilisation in full extension than CPM 0-30° for 7 days and increase of 30° every 7 days



## Postoperative courses

### 5. Muscle strength recovery

Any fracture:

*Isometric exercises for quad VMO hamstrings and gluteal muscles (biceps) strengthening from day 2 post-op with knee in extension*

Stable ORIF/CRIF

- Isotonic exercises for quad and VMO from day 25 post-op with progressive weight
- Swimming: crawl and/or backstroke from day 20 if no wound problems
- Cyclette from day 30 post-op
- Eccentric muscle strengthening starting from day 45

## Postoperative courses

### 5. Muscle strength recovery

Anterior cruciate ligament insertion avulsion:

If surgical treatment

- Swimming: crawl and/or backstroke from day 30
- Isotonic exercises for quad and VMO from day 45 post-op with progressive weight
- Cyclette from day 60
- Eccentric muscle strengthening starting from day 60

If conservative treatment

- Same program but add 7-10 days

External Fixation:

- custom-made rehab program

## Postoperative courses

### 6. Weight Bearing

Factors conditioning:

- Type of fracture
- Stability of the fixation
- Joint involvement

In general:

*A stronger and more stable fixation has to be preferred in order to gain time in the post-operative rehabilitation program*

### Postoperative courses

6. Weight Bearing

AO type B1 and B2 fractures with stable ORIF/CRIF

- Feel the ground from first days post-op
- Partial Weight Bearing from day 45 post-op
- Progressive Weight bearing from day 60
- Full Weight bearing from day 75

### Postoperative courses

5. Weight Bearing

AO type B3 and all C fractures with stable ORIF/CRIF

- Feel the ground from first days post-op
- Partial Weight Bearing from day 60 post-op
- Progressive Weight bearing from day 75
- Full Weight bearing from day 90

### Postoperative courses

Tip:

Use of pulsed electromagnetic fields (PEMFs) can be helpful to reduce inflammation and accelerate the rehabilitation program

*Benazzo et al KSSTA 2008*

- Not for all patients
- Can be an option in particular cases

### Conclusions

- Soft tissues care is fundamental
- Know your patient and evaluate all his possible risk factors
- Avoid stiffness and recover ROM must be the main goal of the rehab program
- A full weight bearing shouldn't be given before 2 months in any of these fractures