

Weight bearing protocol for surgical and non-surgical musculoskeletal disorders of the lower limbs

Protocol de încărcare pentru afecțiunile musculoscheletale chirurgicale și non-chirurgicale ale membrelor inferioare

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Abstract

Admission of patients from the Orthopedic Surgery Department into the Physical Medicine and Rehabilitation departments is very frequent. Depending on the case, immobilization is followed by a gradual increase in the weight placed on the lower limbs. The weight bearing rhythm and the recommended walking aids must be selected on an individualized basis, depending on the primary orthopedic problem as well as a number of other factors: the patient's muscle strength in the upper and lower limbs, their ability to maintain their static and dynamic balance, the integrity of their auditory, visual and proprioception systems and any associated cardiovascular, metabolic and respiratory disorders.

The protocol below helps the Physical Medicine and Rehabilitation physician to establish the weight bearing rhythm for the lower limbs. It must be noted that the weight bearing program is selected on a strictly individualized basis and that there is no universally applicable protocol.

Key words: gait, gait rehabilitation, lower limbs, orthopedic surgery.

Rezumat

În serviciile de Reabilitare Medicală sunt frecvente situațiile în care ajung pacienți după intervenții chirurgicale ortopedice. În funcție de caz, după o imobilizare eventuală se începe treptat încărcarea membrelor inferioare. Ritmul de încărcare, dispozitivele de mers recomandate, trebuie individualizate în funcție de afecțiunea ortopedică primordială, dar și în funcție de alte situații: forța musculară în membrele inferioare, dar și superioare, capacitatea de a menține echilibrul static și dinamic, integritatea organelor pentru auz, vâz, propriocepție, boli asociate cardio-vasculare, metabolice sau respiratorii.

Protocolul de mai jos vine în ajutorul medicului de reabilitare în alegerea ritmului de încărcare a membrelor inferioare, cu precizarea că încărcarea membrelor inferioare se face strict individualizat și că nu există o schemă valabilă pentru toate situațiile.

Cuvinte cheie: mers, reabilitarea mersului, intervenții ortopedice, membre inferioare.

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Cemented total hip endoprosthesis

- immediate resumption of full support gait
- days 3-4 – resumption of orthostatism and gait
- 6 weeks – a walking frame may be recommended
- 4-6 months – a cane to be held in the hand opposite the prosthetic side may be recommended (Popescu & Trăistaru, 2007; Antonescu, 2008; Mont & Takersely, 1997; Sbenghe, 1981).

Cementless total hip endoprosthesis

- slow gradual increase in weight by approximately 5-10 kg/week
- partial resumption of gait after 4 weeks with bilateral walking aids
- patient resumes full support gait within approximately 2-3 months (Popescu & Trăistaru, 2007; Sbenghe, 1981).

Partial hip prosthesis

- day 3 - patient sits at the edge of the bed
- day 7 - crutch gait without support
- days 14-60 - partial weight bearing gait (crutches/frame)
- 2 months - cane gait (Sbenghe, 1981).

McMurray (intertrochanteric) osteotomy

- 8-10 days of immobilization in bed
- mobilization without support for a period of 3-4 months
- an additional period of 2-3 months in crutches without loading the operated lower limb
- partial support period extended to 6-7 months after the surgery (Sbenghe, 1981; Popescu & Trăistaru, 2007).

Hip osteotomy

- 6-8 weeks of immobilization
- 3 months without support on the lower limb
- gradual increase of the weight (Sbenghe, 1981; Popescu & Trăistaru, 2007).

Femoral neck fracture

Treatment by metallic osteosynthesis

- 3 months without support
- gradual increase of the weight placed on the operated lower limb, subsequent to the consolidation of the fracture with a load angulation of 30 degrees
- increase in the weight by 25% of body weight in bipodal position
- gradual increase of the angulation of the support plane

Smith-Petersen nail osteosynthesis

- support gait after a period of 4-5 months (Popescu & Trăistaru, 2007; Antonescu, 2008).

Acetabular fractures

- 2 months – non-weight bearing gait
- 4 months - gradual introduction of support

Acetabular fracture with posterior dislocation - surgical treatment

- pelvi-pedios plaster or continuous traction
- 45 days - crutch gait without support
- 3 months - gradual gait resumption (Sbenghe, 1981).

Femoral head fractures

Non-displaced fracture

- orthopedic reduction
- continuous transbone extension - 6-8 weeks
- resumption of support gait - 3-4 months after the accident

Fracture-dislocation with internal fixation

- extension - 6 weeks - no weight bearing on the operated lower limb is allowed for a period of 3 months
- postoperatively - resumption of support gait after a period of 6 weeks (Antonescu, 2008).

Trochanteric fractures

- surgical treatment (Ender's nails)
 - mobilization as timely as possible
 - support allowed starting 6 weeks after the surgery
- #### *Fractures of the greater trochanter*
- non-displaced
 - immobilization for a period of 21 days
 - gait after an additional period of 21-28 days
 - displaced
 - osteosynthesis
 - immobilization for a period of 14-21 days
 - full weight bearing is allowed after fracture consolidation – after approximately 6-8 weeks
- #### *Fractures of the lesser trochanter*
- immobilization in bed for a period of 21-28 days
 - no physical effort for a period of 5-6 weeks (Antonescu, 2008; Skinner, 2003).

Diaphyseal femoral fractures

- surgical treatment
- interlocking nails
- support on the operated limb after a period of 1-2 months
- Ender's elastic nails
- support after a period of 2-3 months (Antonescu, 2008).

Distal femoral fractures

Non-displaced fracture

- plaster cast - 6-8 weeks
- support within 3 months of the injury

Displaced fracture

- surgical treatment
- support within 3-4 months (Antonescu, 2008).

Condylar fractures

- isolated fractures of the medial or lateral condyle are rare
- treatment is surgical
- postoperatively - immobilization
- weight bearing is usually allowed within 3 months of the surgery (upon the radiographic consolidation of the fracture) (Skinner, 2003).

Hip dislocations

- 14 days - plaster cast
- 14 days - no mobilization
- 28 days later - gait with a 10% load (Sbenghe, 1981).

Quadriceps tendon rupture

- surgical treatment – suture
- knee pad for a period of 28 days
- patient resumes gait starting day 12 (Antonescu, 2008).

Anterior cruciate ligament (ACL) reconstruction

Slow protocol (ischiotibial graft)

- postoperative week 1 - gait with 2 axillary crutches with a load equivalent to 25% of the body weight (15 kg force)
- postoperative week 2 - gait with a gradual increase of the weight bearing (within the limits of pain)
- full weight bearing should be reached by post-operative week 4

Fast protocol (patellar tendon graft)

- postoperative week 1 - gait with a gradual increase of the weight bearing (within the limits of pain) until complete (van Grinsven et al., 2010; Maxey & Magnusson, 2007; Canale & Beaty, 2008; Manske, 2006).

Arthroscopic partial meniscectomy

- postoperative day 2 – full weight bearing gait with 2 crutches (Maxey & Magnusson, 2007; Canale & Beaty, 2008; Manske, 2006; Lucaciu et al., 2001)
- to be avoided: anterior slippage (in the event of tears of the posterior horn), external rotation (tears of the posterior horn of the internal meniscus)
- non-weight bearing proprioceptive workout (until day 30)
- resumption of physical activity after a period of 30 days (no jumps within a period shorter than 2 months) (Chanussot & Danowski, 2005).

Meniscal suture or open meniscectomy

- non-weight bearing flexion between 0-90° for a period of 6 weeks, no squatting for a period of 3 months
- *Slow protocol* (horizontal or radial lesions)
- postoperative week 1 – non-weight bearing gait with axillary crutches
- days 14-28 - partial weight bearing gait with axillary crutches (within the limits of pain)
- >day 28 – full weight bearing gait
- *Fast protocol* (vertical lesions)
- until weeks 4-6 – full weight bearing gait with the orthosis locked in extension
- >week 6 – full weight bearing, no orthosis (Maxey & Magnusson, 2007; Canale & Beaty, 2008; Manske, 2006; Lucaciu et al., 2001)
- in the event of meniscal suture, without flexion or extension forcing
- resumption of physical activity after a period of 30 days, no jumps within a period shorter than 6 months (Chanussot & Danowski, 2005).

Patella fracture

- non-weight bearing flexion<90° provided osteosynthesis stability is high enough
- weight bearing crutch gait within the limits of pain with the knee in full extension and locked/plaster orthosis for a period of 6 weeks
- full weight bearing gait with the knee in flexion

6-8 weeks after the surgery, depending on fracture consolidation (Maxey & Magnusson, 2007; Canale & Beaty, 2008; Lucaciu et al., 2001).

Patella dislocations

- *In the event the surgical procedure is unknown:*
- full weight bearing gait with the knee locked in extension is allowed
- flexion of the knee is increased gradually
- flexion associated with full weight bearing is to be avoided over a period of 6-12 weeks (Canale & Beaty, 2008; Kisner & Colby, 2002; Lucaciu et al., 2001).
- *Depending on the surgical procedure:*
- cartilage shaving – immediate weight bearing, +/- 2 crutches for a period of 48 hours, immediate flexion, prudence, extension workout, no genuflexing or lunging, exercise only after a period of 21 days
- Pridie's cartilage perforation – immediate weight bearing, +/- 2 crutches for a period of 48 hours, immediate but gradual flexion (for a period of 21 days), extension workout, no genuflexing or lunging earlier than day 45, exercise after a period of 6 months
- “spongification” of the subchondral bone – immediate weight bearing, +/- 2 crutches for a period of 7 days, immediate but gradual flexion (for a period of 21 days), extension workout, no genuflexing or lunging earlier than day 45, exercise after a period of 6 months
- sectioning of the collateral ligament – immediate weight bearing, +/- 2 crutches for a period of 48 hours, immediate flexion, exercise after day 21
- suture of the medial collateral ligament – immediate weight bearing, +/- 2 crutches for a period of 48 hours, prudent flexion, exercise after a period of 2 months
- medial collateral ligament ligamentoplasty – immediate weight bearing with 2 crutches for a period of 30 days, with splint until day 21, flexion<90° until day 21, flexion>90° after day 21, exercise after day 75
- Mansat technique 1, 2 – immediate weight bearing with 2 crutches for a period of 30 days, with splint until day 21, flexion<60° between day 1 and day 21, flexion<90° between day 21 and day 45, flexion>90° after day 45
- Mansat technique 3 – partial weight bearing until day 21, with splint until day 30 and 2 crutches until day 45, exercise after a period of 3 months
- Osteotomy of the anterior tibial tuberosity – partial weight bearing with splint until day 21 and 2 crutches until day 30, exercise after a period of 3 months (Chanussot & Danowski, 2005).

Total knee arthroplasty

- postoperative day 2 or 3 - patient resumes partial weight bearing frame or crutch gait (within the limits of pain)
- postoperative weeks 1-2 - patient can resume partial weight bearing gait with 2 crutches or 1 crutch within the limits of pain
- postoperative week 3 - patient resumes full weight bearing gait
- in the event of structural grafts, weight bearing will be partial until 3 months after the surgery, depending on graft incorporation

- in the event of extensive soft tissue release for severe valgus/varus deformities - partial weight bearing for a period of 6 weeks using a stabilizing orthosis (Maxey & Magnusson, 2007; Canale & Beaty, 2008).

Medial collateral ligament (MCL) injuries - grades 1 and 2 - conservative treatment

- knee orthosis (4-6 weeks)
- knee mobilization:
day 1-15: 0-60°
day 15-30: 0-90°
>day 30: no restrictions (Chanussot & Danowski, 2005)
- days 1-7 - weight bearing crutch gait within the limits of pain
- days 1-14 - full weight bearing gait without crutches (Canale & Beaty, 2008; Manske, 2006; Skinner, 2003)
- resumption of physical activity after a period of 3 months, contention in the first month (Chanussot & Danowski, 2005).

Medial collateral ligament (MCL) injuries – grade 3 - conservative or surgical treatment

- injury is isolated only rarely
- orthosis allows flexion between 30 and 120°
- partial weight bearing gait with crutches for a period of 6 weeks (Canale & Beaty, 2008; Manske, 2006; Skinner, 2003).

Lateral collateral ligament (LCL) injury – grade 3 - early conservative treatment

- orthosis locked depending on the stability of the ligament repair
- minimum load for a period of 6 weeks
- 6-8 weeks - full weight bearing gait with a stabilizing orthosis without flexion/extension limitations (Canale & Beaty, 2008; Manske, 2006; Skinner, 2003)
- athletes: resumption of practice after a period of 3 months and resumption of competitive activity after a period of 6, 8 or 12 months (depending on the sport – pivot sport or contact sport) (Chanussot & Danowski, 2005).

Quadriceps tendon rupture – surgical treatment

- days 1-14 - gait with axillary crutches and minimum load (only to feel the ground) with the orthosis locked at 0°
- the following 21 days - partial weight bearing gait with the orthosis locked in extension
- postoperative weeks 6-8 – full weight bearing gait with the orthosis locked in extension, non-weight bearing flexion<90°
- >3 months - full weight bearing with flexion (Canale & Beaty, 2008; Manske, 2006).

Patellar tendon rupture – surgical treatment

- postoperative weeks 1-2 - gait with axillary crutches and minimum load (only to feel the ground) with the orthosis locked at 0°
- postoperative weeks 3-5 - partial weight bearing gait with the orthosis locked in extension
- postoperative weeks 6-8 - full weight bearing gait with the orthosis locked in extension, non weight bearing flexion<90°

- >3 months - full weight bearing with flexion
- in the event of using solid wire or fiber wire cerclage to protect the suture, the rehabilitation periods are to be reduced by half (Canale & Beaty, 2008; Manske, 2006).

Achilles tendon rupture – surgical treatment

Slow protocol:

- weeks 1-2 – non-weight bearing gait (the ankle is immobilized in a plaster splint in plantar flexion)
- weeks 3-4 – non-weight bearing gait (the plaster splint is replaced and the ankle is immobilized in slight plantar flexion)
- weeks 5-6 - gait with a gradual increase of the weight bearing (the plaster splint is replaced and the ankle is immobilized in neutral position)
- week 7 - the plaster splint is removed

Fast protocol:

- weeks 1-2 - gait with weight bearing on the tiptoes within the limits of pain (the ankle is immobilized in a plaster splint in plantar flexion)
- weeks 3-4 - gait with a gradual increase of the weight bearing (the ankle is immobilized in neutral position)
- week 6 - the plaster splint is removed

Important: The progressive correction of the equinus increases the quality of the postoperative scar and reduces the risk of relapse (Van Dijk et al., 2008; Maxey & Magnusson, 2007; Canale & Beaty, 2008; DeLee & Drez, 2003).

Phase 1 (postoperative phase, days 1-45)

- 6 weeks - immobilization in plaster cast with a fenestrated patch, no weight bearing (3 weeks with the leg immobilized in gravity equinus, 3 weeks with the leg immobilized at a 90-degree angle)
- knee flexion in parallel with leg positioning (week 1 - flexion>90°, week 2 - flexion between 60 and 90°, week 3 - flexion between 30 and 60°, week 4 - flexion>90°, week 5 - flexion between 60 and 90°, week 6 - flexion between 30 and 60°)

Phase 2 (post-immobilization phase, days 45-74)

- progressive resumption of weight bearing over a period of 15 days
- plantar orthosis with an initial heel lift of 40 mm; restoration by 10 mm/week
- monopodal weight bearing is prohibited at this stage
- progressive rehabilitation of the knee extension associated with dorsal flexion

Phase 3 (functional re-education phase, >day 75)

- gait with plantar flexors for support (jogging wear) and tiptoe gait after a period of 3 months
- maximal voluntary contraction during extension is to be avoided within the first 3 months
- resumption of physical activity after a period of 6 months (Chanussot & Danowski, 2005).

Medial gastrocnemius rupture (“tennis leg”)

Partial disinsertion

- partial weight bearing gait with 2 crutches, rigid fixation in gravity equinus
- no total immobilization in repose position

Total disinsertion

- competitive athletes: surgical treatment, immobili-

zation of the leg in plaster cast in equinus for a period of 30 days followed by immobilization of the leg at a 90-degree angle for a period of 15 days

- leisure athletes: orthopedic treatment – immobilization of the leg in plaster cast in equinus for a period of 30 days followed by immobilization of the leg at a 90-degree angle for a period of 15 days) (Chanussot & Danowski, 2005).

Tibial plateau fractures

Rapid consolidation (within 6 weeks) with the slow recovery of structural integrity (within 3 months) is characteristic.

First 6 weeks

- non-weight bearing crutch gait or “touch down” weight bearing gait. Joint mobility will be restored during this period provided osteosynthesis allows it.

After 6 weeks

- Crutch gait with a gradual increase of the weight bearing, full support being allowed after a period of 3 months according to the radiographic evolution of the consolidation process (Canale & Beaty, 2008; Lucaciu et al., 2001; Skinner, 2003).

Calf fractures (tibial and peroneal fractures)

Minimum load (10-15 kg) crutch gait is allowed after **osteosynthesis with statically locked nails**. In the case of interfragmentary contact between intrinsically stable proximal and distal bone fragments, a gradual increase of the weight bearing is allowed over a period of 3 months after the surgery. In the case of an unstable fracture and intrinsically unstable proximal and distal bone fragments, minimum support is maintained until consolidation is complete or until the dynamization of the nails.

The dynamization of the nails: the advantage and disadvantage of osteosynthesis with statically locked nails consists in the blocked translation of the proximal and distal fragments. In the case of unstable fractures, it prevents the loss of the reduction obtained. In the case of stable fractures, it prevents the dynamic interfragmentary compression during gait, thus affecting bone consolidation. In this situation, interfragmentary compression can be obtained either through the subsequent dynamization of the nail or through second-generation locking nail osteosynthesis. The former involves the suppression of the locking screws at one of the ends of the nail following partial consolidation, which leads to an acceleration of the consolidation process. In the latter situation, interfragmentary compression is obtained, but the rotation of the bone fragments is blocked.

After *osteosynthesis with classic plates* - no or minimum weight bearing crutch gait is allowed until fracture consolidation.

After *LCP (“locking compression plates”)* *osteosynthesis* - the weight bearing progression is similar to that encountered in the case of locking nail osteosynthesis (Canale & Beaty, 2008; Lucaciu et al., 2001).

Corrective osteotomies

- minimum or progressive weight bearing may be allowed until fracture consolidation, depending on the stability of the osteotomy and the type of fixation (Canale & Beaty, 2008; Lucaciu et al., 2001).

Juvenile osteochondritis dissecans (Osgood Schlatter disease)

- spontaneous recovery can be achieved by reducing the weight bearing load; therefore, minimum weight bearing crutch gait may be recommended for a period of 3-6 months, depending on the evolution of the healing process. In the majority of cases, a reduced amount of physical effort or a change in the exercise routine is sufficient (Canale & Beaty, 2008; Lucaciu et al., 2001)

- **the acute phase:** rigid posterior orthosis in extension (3-5 weeks), total flexion of the knee must be avoided, rest for a period of 3-6 months (interruption of sporting activities in the event of pain) (Chanussot & Danowski, 2005).

Osteochondritis dissecans

- spontaneous recovery cannot be achieved
- following the reconstruction procedures (osteosynthesis, mosaicplasty) – depending on the defect and the mechanical load of the nails, full progressive weight bearing may be recommended until 6 weeks after the surgery or non-weight bearing crutch gait may be recommended until 3 months after the surgery (Canale & Beaty, 2008; Lucaciu et al., 2001).

Osteonecrosis

- the weight bearing progression does not influence the evolution of the condition for spontaneous recovery cannot be achieved (Canale & Beaty, 2008; Lucaciu et al., 2001).

Tibio-peroneal diastasis

- surgical treatment
- weight bearing is allowed after a period of 10-12 weeks
- fixation is removed after a period of 3 months from the operation, prior to the resumption of sporting activities.

Ankle dislocation

- associated with minor or major bone injury
- ankle dislocation without fracture is rare
- immobilization in plaster cast and no weight bearing for a period of 21 days
- walking cast for an additional period of 3-6 weeks
- semirigid orthosis until 6 months after the occurrence of the injury (DeLee & Drez, 2003).

The Tillaux fracture

- fracture of tibial epiphysis in teenagers
- immobilization in plaster cast for a period of 21 days – no weight bearing
- walking cast for a period of 21 days (DeLee & Drez, 2003).

Talocalcaneal sprain

- 3rd degree sprain
- immobilization in plaster cast without weight bearing for a period of 14-21 days
- semirigid orthosis with weight bearing for the following 3 weeks (DeLee & Drez, 2003).

Mid-tarsal sprain

- 3rd degree Lisfranc sprain
- percutaneous wire fixation

- no weight bearing for a period of 8-12 weeks (DeLee & Drez, 2003; DeLisa et al., 2005).

Charcot neuroarthropathy

- immobilization in plaster cast/orthosis and no weight bearing for a period of 3 months (DeLisa et al., 2005; Fryskberg, 1991).

Metatarsal fractures

- conservative treatment
- immobilization in plaster cast and no weight bearing for a period of 6 weeks
- Consolidation can last for a period of at least 3 months (DeLisa et al., 2005)
- *non-displaced fracture*
- treatment by functional strapping
- relative unloading for a period of 14-21 days
- *displaced fracture*
- surgical treatment and immobilization in a walking cast for a period of 6 weeks
- *recovery principles*
- prior to consolidation (6 weeks) - plantar support for unloading the forefoot, intrinsic muscle tonicization and short sessions of metatarsal mobilization
- after consolidation - retrocapital plantar support, forefoot joint mobilization and work on the propulsion phase of gait (Chanussot & Danowski, 2005).

Base of the 5th metatarsal fracture

Conservative treatment

- immobilization in plaster cast and no weight bearing for a period of 6-8 weeks
- surgical treatment is recommended in the event that there are no signs of bone healing within a period of 12 weeks

Surgical treatment

- no weight bearing for a period of 7 days
- progressive weight bearing starting day 15-21
- patient resumes physical activity 6-10 weeks after the surgery (Skinner, 2003).

Navicular fracture

- immobilization in plaster cast/orthosis and no weight bearing for a minimum period of 6 weeks
- comminuted fractures cannot be reduced anatomically (Skinner, 2003).

Navicular bone stress fractures

conservative treatment for type I and type II

- no weight bearing for a period of 6 weeks
- patient resumes physical activity after a period of 3 months

surgical treatment for type III

- patient resumes physical activity after a period of 6-8 months (Skinner, 2003).

Fractures of the talar neck

Type I fractures (non-displaced)

- immobilization in plaster cast
- no weight bearing for a period of 2-3 months (until radiographic healing signs are present) (Skinner, 2003)

- verticalization, starting day 10-45, no weight bearing
- the following gait recovery methods are to be used starting with the second month, depending on the loading:
- water immersion (e.g. water at the level of the knees
- 90% load, water at the level of the umbilicus - 50% load, water at the level of the sternal fork - 10% load)
- angulation of the verticalizer (e.g. 10% load at 6°, 30% load at 30°, 90% load at 65°)
- the use of technical aids - 2 or 3-point crutch gait with 2 Canadian crutches, 2-point alternate gait, alternate gait with 1 crutch, unassisted gait (Chanussot & Danowski, 2005).

Fracture of the lateral talar process

- conservative treatment
- immobilization in plaster cast and no weight bearing for a period of 4-6 weeks
- walking cast for an additional period of 6 weeks (Skinner, 2003).

Calcaneal fractures

Conservative treatment (non-displaced fractures)

- no weight bearing for a period of 4-8 weeks (until radiographic healing signs are present)
- Graftin plaster (walking) cast for a period of 6 weeks (Chanussot & Danowski, 2005)

Surgical treatment

- postoperative immobilization in plaster cast and no weight bearing for a minimum period of 8 weeks
- walking cast for an additional period of at least 1 month (Skinner, 2003; DeLee & Drez, 2003).

Flexor hallucis longus tendon injury

- surgical treatment is required in all young athletes: in the event the tendon ends are easy to identify, the tendon requires meticulous repair. Tendon repair is recommended because the adherence syndrome is a problem, especially when injury occurs at the head of the 1st metatarsal
- patients subjected to this type of treatment are immobilized in plaster cast with no weight bearing for a period of 5-6 weeks (DeLee & Drez, 2003; Frenette & Jackson, 1977).

Subluxation of peroneal tendons

- rare
- conservative treatment is required in all acute cases – immobilization in plaster cast and no weight bearing for a period of 5-6 weeks (DeLee & Drez, 2003; Stover & Bryan, 1962; Escales et al., 1980; McLennan, 1980; Scheller et al., 1980).

Plantar fasciitis

Treatment can consist in cortisone infiltrations or physiotherapy. In the event of immobilization, the following protocol is recommended:

- immobilization in plaster cast and no weight bearing for a period of 4-7 days
- progressive weight bearing over the next 14 days
- weight bearing is allowed after a period of 21 days
- jogging is allowed after a period of 6-12 weeks (DeLee & Drez, 2003).

Plantar fascia rupture

- immobilization in plaster cast and no weight bearing for a period of 21 days
- progressive weight bearing over the next 7-21 days using 2 crutches and an 8 contention
- the plaster cast can be removed when the patient no longer presents pain
- resumption of sporting activity after a period of 9+/- 6 weeks and resumption of competitive sporting activity after a period of 7-40 weeks (DeLee & Drez, 2003).

Tarsal tunnel syndrome – surgical treatment

- no weight bearing for a period of 21 days
- then, progressive weight bearing is allowed within the limits of pain
- activities requiring physical effort should be avoided for a minimum period of 2 months (DeLee & Drez, 2003).

Hallux valgus – surgical treatment through osteotomy

- corrective bandage is applied after the surgery
- immobilization in plaster cast and no weight bearing for a period of 28 days
- osteotomy heals within 6-8 weeks (DeLee & Drez, 2003).

Osteochondritis dissecans of the talus

- surgical treatment
- immobilization in plaster cast and no weight bearing for a period of 14 days
- replacement of the plaster cast with an orthosis for an additional period of 10 days
- resumption of normal activity is allowed after a period of
- in the event the surgical treatment consists in mosaicplasty (graft at the level of the ipsilateral knee)
- no weight bearing for a period of 4-6 weeks
- in the event of arthroscopic excision of the osteochondral lesion
- crutch gait within the limits of pain for a period of 7-10 days
- then, the support is removed (DeLee & Drez, 2003).

Fracture of the posterior process of the talus

- the majority of fractures are without or with minimal dislocation and can be treated conservatively
- immobilization in plaster cast and no weight bearing for a period of 4-6 weeks
- displaced fractures are treated surgically
- fractures of the lateral talar process are treated orthopedically if non-displaced and do not affect a large portion of the posterior talocalcaneal joint
- In situations where the CT scan indicates a dislocation below 3-4 mm and less than 10% of the articular surface is affected, the patient is immobilized in plaster cast for a period of 6 weeks and wears a walking cast for an additional 6 weeks.
- In situations where the CT scan indicates a dislocation over 3-4 mm, the patient is subjected to surgical treatment, which consists in the excision or fixation of the fragment (DeLee & Drez, 2003).

External malleolus and bimalleolar fractures

Non-displaced

- orthopedic treatment consisting of immobilization in a walking cast for a period of 21 days

Displaced and involving the internal lateral ligament

- surgical treatment, osteosynthesis of the malleolus and LLI suture
- walking cast for a period of 5 weeks

Recovery principles:

- prior to consolidation, passive mobilization of dorsal flexion >90° is to be avoided and the ankle must not be in valgus or varus
- the load is increased progressively after consolidation and the removal of the walking cast; tiptoe gait is resumed (Chanussot & Danowski, 2005).

Fracture of the astragalus

Fractures of the neck (forced dorsal flexion)

- orthopedic treatment consisting in immobilization in a walking cast for a period of 3 months

Fractures of the dome (grade III sprain)

- surgical treatment and immobilization in a walking cast for a period of 3 months

Recovery principles:

- very slow progressive weight bearing with leg joint mobility restoration and tonicization of the triceps surae
- particular attention is required because of the risk of bone necrosis and secondary arthrosis (Chanussot & Danowski, 2005).

Scaphoid fractures

Non-displaced avulsion fracture of the tubercle

- treatment by functional strapping
- relative unloading from day 8 to day 15 or orthopedic treatment consisting of immobilization in a walking cast for a period of 4 weeks

Displaced avulsion fracture of the tubercle

- surgical treatment and immobilization in a walking cast for a period of 1 month

Recovery principles:

- prior to consolidation (4 weeks), early sudden loading of the tibialis posterior muscle is to be avoided
- consolidation is followed by the passive mobilization of the astragaloscaphoid, astragalocuneiform and ankle joints; tiptoe gait and jumps are to be avoided if pain occurs upon the contraction of the tibialis posterior muscle (Chanussot & Danowski, 2005).

Freiberg's disease

- except for complicated cases, no immobilization is recommended
- surgical treatment is recommended if conservative treatment fails; the surgical procedure depends on the patient's symptoms and age and on the presence or absence of free bodies (DeLee & Drez, 2003).

Excision of the tibial sesamoid bone

- a plaster splint is maintained for a period of 5-7 days after the excision of the sesamoid bone; after that, mobility exercises follow
- toe rising, flexion and passive extension follow after

a period of 10-14 days

- physical activity can be resumed after a period of 6 weeks
- the Kirschner wire is removed 3 weeks after the excision of both sesamoid bones and no weight bearing is allowed for an additional period of 3 weeks
- athletic activity is not allowed for a period of 12 weeks (DeLee & Drez, 2003).

Leg ulcer

- gradual and progressive weight bearing is allowed in patients subjected to surgical treatment
- protocol starts with 15 min weight bearing sessions after which the tegmen is checked for erythema
- sessions are extended progressively depending on the patient's tolerance
- if the local postoperative evolution is slow or complications occur, weight bearing gait is allowed after a period of 6 weeks instead of 4 (Lee et al., 2001).

Articular cartilage lesions treated using the microfracture technique

- postoperative recovery can include continuous passive movements (CPM) for an improvement of the quality of the healing process
- no support gait is allowed for 6-8 weeks after the surgery (O'Connor et al., 2005).

Articular cartilage lesions treated by autologous chondrocyte transplantation

- postoperative recovery consists in the aggressive use of CPM
- no weight bearing is allowed for 6-8 weeks after the surgery
- the load is increased gradually until full weight bearing is reached between operative weeks 6 and 12 (O'Connor et al., 2005).

Cartilage lesion treatment by mosaicplasty

- early mobilization without weight bearing is allowed for a period of 2 weeks after the surgery, with a gradual increase of the weight bearing until full weight bearing is reached between weeks 2 and 6
- in the case of lesions larger than 2 cm², weight bearing is only allowed after a period of 6-12 weeks (O'Connor et al., 2005).

Stress fractures

- particular attention is required because of the slower healing process and a higher pseudarthrosis rate
- **navicular stress fractures**
- no weight bearing for a period of 6-8 weeks
- progressive weight bearing for an additional period of 6 weeks
- **5th metatarsal stress fracture**
- plaster mobilization without weight bearing for a period of 6-10 weeks
- **sesamoid bone stress fracture**
- no weight bearing for a period of 6 weeks (O'Connor et al., 2005).

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