

NMTRG Guidelines for the assessment and rehabilitation of the Major Trauma patient

Discipline: Therapies (Physiotherapy, Occupational Therapy, Speech and language, Dietetics)

Guideline 1: Lower limb reconstruction for frame patients

The PT/OT should have a working knowledge of:

- Lower limb anatomy and biomechanics
- Fracture healing
- Lower limb nervous and vascular system
- Lower limb reconstruction surgery techniques including limb lengthening, bone transportation, & deformity correctional procedures
- Reconstruction surgery including plastics involvement e.g. grafts and flaps
- Rehabilitation expectations
- Spanning knee frames/ tibial frames/ tibial frames with footplate

And a knowledge of:

- Frame integrity and how it works
- Possible complications
- Frame adjustment
- Pain management
- Amputation versus Reconstruction
- Psychological effects of lower limb reconstruction

The PT/OT should be able to recognise;

- Neurovascular compromise
- Signs of infection
- Leg length discrepancy / alignment issues
- Complications and restrictions of mobilisation following split skin graft and flap reconstruction

The PT/OT is expected to complete the following assessments and interventions in each phase of rehabilitation

After limb-threatening injury, there may be an option to discuss limb reconstruction versus amputation for the patient

The PT/OT should discuss the implications of both options including

- rehabilitation pathways
- pain management
- recovery timescales
- long-term expectations
- impact on daily life, for example, work, hobbies, activities, education and play

Pre-operative phase:

- A pre-operative assessment is recommended for all frame reconstruction patients
- Pre-operative assessment should include assessment of the physical and psychological issues of lower limb reconstruction
- An initial interview including:
 - Social history
 - Pre admission status/ baseline mobility and functional level

- Psychosocial review including risk factors
- Social role including employment, hobbies, smoker status, alcohol and drug dependence, support network and driver status
- A physical assessment including:
 - Neurovascular status
 - Pain assessment
 - Bed mobility/ transfers as able
 - Be provided with an exercise programme for non-affected joints
- All patients should have subjective & objective outcome measures
- All patients should be provided with advice on:
 - How to cope with a frame
 - Post-operative expectations
 - Smoking Cessation as appropriate
 - Rehabilitation expectations
 - Clothing adaptations
 - Possible complications
 - Diet advice and education
 - Driving
- All patients should be provided with written information on lower limb reconstruction and pin site care

Inpatient phase:

- All patients should be seen Day 1 post operatively
- Patients should be seen twice daily
- Assessment should include review of the physiological, physical, psychological and neurological status of the patient
- From the above assessments a rehabilitation plan should be developed with the patients +/- relatives/ carers

- Assessment should include subjective and objective outcome measures
- Patients with a tibial frame should be routinely provided with an orthosis/ splinting to maintain ankle ROM
- Patients with a tibial frame extending to the foot should be fitted with an appropriate foot orthosis/ splint/ footplate to facilitate weight bearing. If a leg length discrepancy is noted an orthosis on the contralateral side to correct this should be prescribed.
- All patients must be taught a comprehensive home exercise programme including range of motion exercises, strengthening exercises and soft tissue stretches
- A functional assessment should be completed by the OT as appropriate including
 - Washing and dressing
 - For femoral frames consider toileting and equipment
 - Kitchen assessment and ADL's

- The objectives of treatment in this phase are to:
 - Maintain Joint Range of motion
 - Maintain muscle power
 - Maintain muscle length
 - Maintain functional independence

- Minimise contractures
- Ensure adequate analgesia – NO NSAIDS
- Be aware of psychological problems including body dysmorphia, and provide appropriate support
- Educate patients/ carers in a Home Exercise Programme
- Educate the patient on pin site/frame management

- The following techniques should be utilised to achieve the above objectives:
 - Active ROM exercises
 - Pain management
 - Swelling and oedema management
 - Active assisted ROM exercises
 - Passive ROM exercises
 - Weight-bearing exercises
 - Gait re-education
 - Goal setting
 - Soft tissue stretches including resting positions
 - Patient and carer/family education

- Before discharge from hospital patients should be
 - Independently mobile indoors +/- stairs
 - Able to weight bear as appropriate for the individuals' condition & post-operative instructions. Non weight bearing instructions in the medical notes should be clarified with the Consultant
 - Independent with their exercises
 - Understand the need for functional use of the limb
 - Understand pin site care and be able to recognise the signs of infection
 - Aware of who/when to ask for help
 - Signpost to support groups- see below

- All patients should be discharged with an ongoing rehabilitation plan and appropriate onward referral

Outpatient phase:

- Out-patient physiotherapy should start within 14 days of the patients discharge from hospital
- During the period of frame adjustment/ lengthening patients may need an increase in frequency of physiotherapy
- The following problems should be observed for and will require referral back to Lower Limb Reconstruction Clinic:
 - Joint subluxation
 - Deterioration in neurological function
 - Neurogenic pain
 - Pin/ wire breakage or problems with the frame
 - Sudden increase in pain on weight bearing
 - Severe pin site infection (minor pin site infections can be managed by the GP)
 - Tension blistering
 - Premature consolidation

- Lower limb reconstruction rehabilitation should include:
 - OT and PT
 - Gym programme to increase movement, strength, loading and proprioception
 - Functional activities
 - Group education sessions – smoking cessation/ activities of daily living/ diet/ coping with a frame/ how the frame works/ pain/ psychological support/ benefits/ relaxation and mindfulness
 - Peer support
 - Psychological screening and management, including appropriate onward referral
 - Goal setting
 - Social integration
 - Vocational rehabilitation
 - Optimal functional abilities should be encouraged using weight bearing activities and gait re-education, aiming for FWB with no aids
 - During the lengthening programme, the patient may need referral to orthotics for alteration of their shoe raise
 - Therapy should be current with evidence based practice, proactive in leading service improvement and audit projects, including patient engagement

- Driving education as per local centre guidelines

- The rehabilitation plan should be reviewed at key stages such as:
 - frame removal
 - weight-bearing status changes
 - when the patient starts to return to education, work or community activities
 - if the patient is readmitted because of complications or for further surgery

Consolidation phase/post removal of frame:

- During the consolidation phase the emphasis of treatment is on regaining any loss of range of movement and increasing functional activities
- During the consolidation phase of treatment patients should continue with progressive strengthening exercises using resistance, body weight and functional activities
- To aim to return to impact activities and contact sport after 3 months as guided by the physiotherapist
- During the consolidation phase activities should focus on the following areas:
 - Full weight-bearing activities
 - Single stance activities
 - Proprioception
 - Sport
 - Cardiovascular fitness
 - Increasing endurance
 - Return to driving and vocational rehabilitation

The OT/PT should have knowledge of additional services including.

- Citizens advice
- District nursing for pin site care
- Orthotics
- Dietetics as indicated for nutritional support/ fracture healing
- Signposting for smoking cessation
- Psychological support
- Pain management
- Local support groups for limb reconstruction +/- post trauma
- Hydrotherapy
- Falls prevention/community referral if appropriate
- Addiction services
- Legal advice
- Social services

Dietetics

Patients at risk of malnutrition should be referred to the dietitian. A nutritional screening tool such as the Malnutrition Universal Screening Tool (MUST) should be used to identify patients at risk of malnutrition. Please refer to local policies of when to refer to a dietitian. All patients receiving nutrition via a feeding tube e.g. NG or PEG should be under the care of a dietitian

References

- Babis, G., Evangelopoulos, D., Kontovazenitis, P., Nikolopoulos, K., Soucacos, P. (2011) High energy tibial plateau fractures treated with hybrid external fixation. *Journal of Orthopaedic Surgery and Research*. [Online] Volume 6. Available at: <https://josr-online.biomedcentral.com/articles/10.1186/1749-799X-6-35>
- Bakhsh, K., Rehman, AU., Faridullah, KZ., Mohammad, E., Ahmed, W., Saaq, M. (2019) Presentation and management outcome of tibial infected non-union with Ilizarov technique. *Pak J Med Sci*. [Online] Volume 35 (1) Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6408636/>
- Barker, K., Burns, M. (2000) Clinical Guidelines for the Physiotherapy Guidelines of the Ilizarov patient. *Smith and Nephew*
- Barker, K., Burns, M. (2001) Using consensus techniques to produce clinical guidelines for patients treated with the Ilizarov fixator. *Physiotherapy*. [Online] Volume 87 (6). Available at: [https://www.physiotherapyjournal.com/article/S0031-9406\(05\)60763-8/pdf](https://www.physiotherapyjournal.com/article/S0031-9406(05)60763-8/pdf)
- Blair J. A., Owens J. G., Saucedo J., Hsu J. R., (2013) Functional Rehabilitation With a Foot Plate Modification for Circular External Fixation. *Foot and Ankle International* . [Online] Volume 34 (6). Available at: <https://pubmed.ncbi.nlm.nih.gov/23564426/>
- Gray, C, Cole, M and Mein, G (2016) Occupational therapy : a vital role in rehabilitation with patients having a circular frame. In: *College of Occupational Therapists 40th Annual Conference & Exhibition; 28-30* [Online] Available at: <https://eprints.kingston.ac.uk/id/eprint/38970/>
- Hamada, T., Matsubara, H., Yoshida, Y., Ugaji, S., Tsuchiya, H. (2019) Comparison of treatment indices associated with the correction and lengthening of deformities along various lower limb frontal plane directions. *J Clin Orthop Trauma* [Online] Volume 10 (1) Available at: <https://pubmed.ncbi.nlm.nih.gov/31695261/>

Hasler, C., Krieg, A. (2012) Current concepts of leg lengthening. *J Child Orthop.* [Online] Volume 6 (2) Available at: <https://pubmed.ncbi.nlm.nih.gov/23730339/>

Hohmann, E., Birkoltz, F., Glatt, V., Tetsworth, K. (2017) The “Road to Union” protocol for the reconstruction of isolated complex high-energy tibial trauma. *Injury.* [Online] Volume 48 (6) Available at: <https://pubmed.ncbi.nlm.nih.gov/28351547/>

Konieczny, G., Morasiewicz, P., Kuciel, N. (2017) The effects of an early intrahospital rehabilitation on weight bearing during lower extremity lengthening with Ilizarov method. *Acta Bioeng Biomech.* [Online] Volume 19 (2) Available at: <https://pubmed.ncbi.nlm.nih.gov/28869634/>

Lovisetti, G., Rohilla, R., Siwach, K. (2019) Circular external fixation as definitive treatment for open or comminuted femoral fractures: Radiologic and functional outcomes. *Journal of Clinical Orthopaedics and Trauma.* [Online] Volume 10 (1) Available at: <https://www.sciencedirect.com/science/article/abs/pii/S097656621930061X>

Manner, HM., Huebl, M., Radler, C., Ganger, R., Petje, G., Grill, F. (2007) Accuracy of complex lower-limb deformity correction with external fixation: a comparison of the Taylor Spatial Frame with the Ilizarov ring fixator. *J Child Orthop.* [Online] Volume 1 (1) Available at: <https://pubmed.ncbi.nlm.nih.gov/19308507/>

Matsubara, H., Tsuchiya, H., Sakurakichi, K., Watanbe, K., Tomita, K. (2006) Deformity correction and lengthening of lower legs with an external fixator. *Int Orthop.* [Online] Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3172748/>

Modin, M., Ramos T., Stomberg, MW. (2009) Postoperative impact of daily life after primary treatment of proximal/distal tibia fracture with Ilizarov external fixation. *J Clin Nurs.* [Online] Volume 18 (24) Available at: <https://pubmed.ncbi.nlm.nih.gov/19732246/>

Nice Guideline (NG 211) Rehabilitation after traumatic injury 2022

