Rehabilitation guidelines for patients undergoing
Pes Cavus Correction

At the RNOH, our emphasis is patient specific, which encourages recognition of those who may progress slower than others. We also want to encourage clinical reasoning.

**Milestone driven**
These are milestone driven guidelines designed to provide an equitable rehabilitation service to all our patients. They will also limit unnecessary visits to the outpatient clinic at RNOH by helping the patient and therapist to identify which specialist review is required.

**Team contact details:**
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**Indications for surgery:**
- Pain and decreased function not responsive to conservative treatment
- Instability
- To prevent further deterioration / deformity

**Causes of pes cavus include:**
- Neurological
- Traumatic
- Idiopathic
- Residual Clubfoot

**Possible complications:**
- Infection
- Wound healing problems
- Persistent swelling
- Persistent / recurrent pain
- Non-union / mal-union / delayed union
- Bleeding
- Nerve damage
- Deep Vein Thrombosis
- Pulmonary Embolism
- Recurrent heel varus
- Callosities
- Contractures
Degenerative changes at other joints
Stiffness
May require subsequent revision surgery
If neurological cause for pes cavus, progression of neurological symptoms may limit outcome, e.g. progressive weakness

Surgical techniques
Commonly at RONH, the surgery includes:
- Calcaneal osteotomy
- 1st metatarsal osteotomy
- Peroneal tenodesis
- Tibialis posterior Z-lengthening

However, depending upon the clinical presentation of the patient, surgery may also include one or more of the following:
- Soft tissue releases
- Tendon transfers
- Other osteotomies
- Joint fusions

Expected outcome:
- Stable, plantargrade foot
- Improved function / mobility
- Improved pain relief
- Increased walking tolerance and improved gait pattern with decreased walking aid and orthotic requirement
- Decreased muscle imbalance
- Decreased callosities / pressure areas
- Maintenance / improvement of range of movement
- Return to low-impact sports may be possible but strenuous sport unlikely
- Full recovery may take up to twelve months

Pre-operatively
When practical the patient will be seen pre-operatively, and with consent, the following assessed:
- Current functional levels
- General health
- Social / work / hobbies
- Functional Range of Movement
- Gait / mobility, including walking aids and orthoses
- Post-operative expectations
- Patient information leaflet issued
Post-operatively:
Always check the operation notes, and the post-operative instructions. Discuss any deviation from routine guidelines with the team concerned. This is very important as the patient may have had a combination of techniques which may affect weight-bearing status and progressions.
Initial rehabilitation Phase: 0-6 weeks

Goals:
- To be safely and independently mobile with appropriate walking aid, adhering to weight bearing status
- To be independent with home exercise programme as appropriate
- To understand self management / monitoring, e.g. skin sensation, colour, swelling, temperature, circulation

Restrictions
Ensure that weight bearing restrictions are adhered to:

Standard RNOH pes cavus surgery:
- Full Plaster of Paris (POP) with ankle plantargrade for 2 weeks Non Weight Bearing (NWB)
- POP changed at 2 weeks. Progress to Full Weight Bearing (FWB) in POP
- POP removed at 6 weeks. May require aircast boot or other orthosis.

- If any other surgical techniques used ensure you check any restrictions with team as these may differ
- Elevation
- If sedentary employment, may be able to return to work from 4 weeks post-operatively, as long as provisions to elevate leg, and no complications

Treatment:
- Likely to be in POP
- Pain-relief: Ensure adequate analgesia
- Elevation: ensure elevating leg with foot higher than waist
- Exercises: teach circulatory exercises
- Education: teach how to monitor sensation, colour, circulation, temperature, swelling, and advise what to do if concerned
- Mobility: ensure patient independent with transfers and mobility, including stairs if necessary

On discharge from ward:
- Independent and safe mobilising, including stairs if appropriate
- Independent with transfers
- Independent and safe with home exercise programme / monitoring
Milestones to progress to next phase:

- Out of POP. Team to refer to physiotherapy at 6 weeks from clinic.
- Progression from NWB to FWB phase. Team to refer to physiotherapy if required to review safety of mobility / use of walking aids
- Adequate analgesia
Recovery rehabilitation phase: 6 weeks – 12 weeks

Goals:
- To be independently mobile out of aircast boot
- To achieve full range of movement
- To optimise normal movement

Restrictions:
- Ensure adherence to weight bearing status
- No strengthening against resistance until at least 3 months post-operatively of tenodesis / any tendon transfers if performed
- Do not stretch any tendon transfers / ligament reconstructions if performed. They will naturally lengthen over a 6 month period

Treatment:
- Pain relief
- Advice / Education
- Posture advice / education
- Mobility: ensure safely and independently mobile adhering to appropriate weight bearing restrictions. Progress off walking aids as able once reaches FWB stage
- Gait Re-education
- Wean out of aircast boot once advised to do so, and provision of plaster shoe as appropriate, if patient unable to get into normal footwear

Exercises:
- Passive range of movement (PROM)
- Active assisted range of movement (AAROM)
- Active range of movement (AROM)
- Strengthening exercises as appropriate
- Core stability work
- Balance / proprioception work once appropriate
- Stretches of tight structures as appropriate (e.g. Achilles Tendon), not of tendon transfers / ligament reconstructions if performed
- Review lower limb biomechanics. Address issues as appropriate
- If tendon transfer performed, encourage isolation of transfer activation without overuse of other muscles. Biofeedback likely to be useful
- Swelling Management
Manual therapy:

- Soft tissue techniques as appropriate
- Joint mobilisations as appropriate ensuring awareness of osteotomy sites and those joints which may be fused, and therefore not appropriate to mobilise
- **Monitor** sensation, swelling, colour, temperature, circulation
- **Orthotics** if required via surgical team
- **Hydrotherapy** if appropriate
- **Pacing advice** as appropriate

Milestones to progress to next phase:

- Full range of movement
- Independently mobilising out of aircast boot
- Neutral foot position when weight bearing / mobilising
- Tendon transfers activating if performed

Failure to meet milestones:

- Refer back to team / Discuss with team
- Continue with outpatient physiotherapy if still progressing
Intermediate Rehabilitation Phase
12 weeks – 6 months

Goals:
- Independently mobile unaided
- Wearing normal footwear
- Optimise normal movement
- Grade 4 or 5 muscle strength around ankle (NB. This may vary if neurological cause for pes cavus)

Treatment
Further progression of the above treatment:
- Pain relief
- Advice / Education
- Posture advice / education
- Mobility: Progression of mobility and function
- Gait Re-education

Exercises:
- Range of movement
- Strengthening exercises as appropriate
- Core stability work
- Balance / proprioception work
- Stretches of tight structures as appropriate (e.g. Achilles tendon), not of transfers / ligament reconstructions if performed.
- Review lower limb biomechanics. Address issues as appropriate
- If tendon transfer performed progress isolation of transfer activation without overuse of other muscles. Biofeedback likely to be useful
- Swelling Management

Manual therapy:
- Soft tissue techniques as appropriate
- Joint mobilisations as appropriate ensuring awareness of those which may be fused and therefore not appropriate to mobilise
- Monitor sensation, swelling, colour, temperature, circulation
- Orthotics if required via surgical team
- Hydrotherapy if appropriate
- Pacing advice as appropriate

Milestones to progress to next phase:
- Independently mobile unaided
- Wearing normal footwear
- Adequate analgesia
- Tendon transfers to be activating if performed
Failure to meet milestones:

- Refer back to team / Discuss with team
- Continue with outpatient physiotherapy if still progressing
Final rehabilitation phase
6 months – 1 year

Goals:
- Return to gentle low-impact sports
- Establish long term maintenance programme
- Grade 5 muscle strength around ankle and grade 4 or 5 of tendon transfers if performed (NB. This may vary if neurological cause for pes cavus)

Treatment:
- **Mobility / function**: Progression of mobility and function, increasing dynamic control with specific training to functional goals
- **Gait Re-education**

Exercises:
- Progression of exercises including range of movement, strengthening, transfer activation, balance and proprioception, core stability
- **Swelling Management**

Manual therapy
- Soft tissue techniques as appropriate
- Joint mobilisations as appropriate ensuring awareness of those which may be fused and therefore not appropriate to mobilise
- **Pacing advice**

Milestones for discharge
- Independently mobile unaided
- Appropriate patient-specific functional goals achieved
- Independent with long term maintenance programme
Failure to progress
If a patient is failing to progress, then consider the following:

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<thead>
<tr>
<th>POSSIBLE PROBLEM</th>
<th>ACTION</th>
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<tbody>
<tr>
<td>Swelling</td>
<td>Ensure elevating leg regularly Use ice as appropriate if normal skin sensation and no contraindications Decrease amount of time on feet Pacing Use walking aids Circulatory exercises If decreases overnight, monitor closely If does not decrease overnight, refer back to surgical team or to GP</td>
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<tr>
<td>Pain</td>
<td>Decrease activity Ensure adequate analgesia Elevate regularly Decrease weight bearing and use walking aids as appropriate Pacing Modify exercise programme as appropriate If persists, refer back to surgical team or to GP</td>
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<tr>
<td>Breakdown of wound e.g. inflammation, bleeding, infection</td>
<td>Refer to surgical team or to GP</td>
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<td>Transfer not activating</td>
<td>Start working in NWB gravity eliminated position with AAROM and then build up as able Biofeedback Ensure adequate analgesia as appropriate Ensure swelling under control as appropriate Ensure foot neutral when mobilising to avoid excessive shear. Consider orthotics referral via surgical team if unable to keep neutral Refer back to surgical team if no improvement</td>
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<tr>
<td>Numbness/altered sensation</td>
<td>Review immediate post-operative status if possible Ensure swelling under control If new onset or increasing refer back to surgical team or GP</td>
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If static, monitor closely, but inform surgical team and refer back if deteriorates or if concerned

Summary of evidence for physiotherapy guidelines

A comprehensive literature search was carried out to identify research relating to surgery for pes cavus and subsequent rehabilitation. After reviewing the articles and information, the physiotherapy guidelines were produced on the best available evidence.


October 2007 JB