### Oberlin nerve transfer

This surgery involves transferring fascicles from a functioning ulnar (and/or median) nerve to the motor branch of the biceps muscle (and brachialis in the case of a double Oberlin procedure). The fascicles that innervate the wrist and finger flexors are usually used (see individual operation note for full details). The aim of surgery is to re-innervate the biceps muscle to allow a level of elbow flexion that is strong enough to overcome gravity and perform light lifting. This movement will initially be instigated by a coupled movement of wrist/finger flexion and elbow flexion.

**Please note:** This procedure involves a direct nerve repair very close to the muscle. It may take up to 6 months to see a flicker of activity within the biceps muscle. With any nerve transfer surgery activation of the intended muscle is variable and often unique to the individual patient. Consequently, a definitive timescale of recovery is not possible to predict. This protocol therefore follows a phased format; whereby a patient is to be progressed to the next level once they reach the relevant milestone. Common complications and their suggested management strategies are outlined overleaf.

| Phase 1: PROTECTION  
Milestone: 0-6 weeks | Phase 2: MUSCLE ACTIVATION  
Milestone: 6 weeks onwards | PHASE 3: PROGRESS LOADING and NORMAL MOVEMENT  
Milestone: Grade 3 muscle activation in Biceps |
|---|---|---|
| **Advice**  
- Lancaster sling 6/52.  
- Strip wash with the use of Collar and Cuff and use wipe for axilla hygiene.  
- Scar management can begin at 2/52 after wound check.  
- Neuropathic pain relief as appropriate.  
- Encourage good posture.  
- Keep as active as possible e.g. walking, recumbent bike. | **Advice**  
- Wean off sling – starting in the home. Could try 1 hour on/off. Decrease as comfort allows.  
- May consider actimove sling or an elbow locking splint.  
- Pace activities throughout day.  
- Encourage good posture with an emphasis on normal movement.  
- Continue scar management programme.  
- May return to work.  
- The individual may return to driving when they decide that they are safe to do so. May need DSA assessment.  
- If patient showing signs of psychological trauma please consider referral to local psychology/talking therapies team.  
- Progress gym activities as appropriate e.g. cross trainer and bike. | **Advice**  
- Integrate arm into normal function.  
- Encourage good posture with emphasis on normal movement.  
- Avoid excessive wrist/hand flexion preventing grasp release.  
- Ensure that patient specific goals are set and treatments are holistic.  
- Continued education regarding timescales of recovery and importance of continuing with rehabilitation programme. |
| **Exercises (SHOULD NOT EXACERBATE PAIN)**  
- No Gleno-humeral joint movement  
- No AROM or PROM of elbow or forearm.  
- Maintain AROM and PROM wrist and hand. | **Exercises (SHOULD NOT EXACERBATE PAIN)**  
- Start full upper limb PROM programme.  
- Begin donor muscle activation programme of coupled movement; wrist/finger flexion with (passive) elbow flexion.  
- Integrate HEP into functional activities e.g. assisted elbow flexion bringing cup/glass to mouth.  
- Once MRC Grade 1 muscle activation seen in biceps consider electrical stimulation +/- biofeedback to assist muscle activation.  
- Consider gravity neutral positions to encourage elbow flexion at first signs of re-innervation.  
- Consider water based exercises. | **Exercises**  
- Continue to focus on active functional movements such as hand to mouth and to back of head.  
- Begin light resistance exercises as appropriate (related to the patient’s level of muscle activation).  
- Attempt to retrain muscle patterning to uncouple wrist and elbow flexion if required. |
This is a guideline of rehabilitation; any limitations and restrictions recorded in the patients’ operation note should take precedence. These guidelines should be used in conjunction with your assessment of the patient. Your treatment should be clinically reasoned and adapted to the individual patient’s needs. Time frames are approximate; progress as clinically indicated, only moving onto the next phase once the patient can comfortably achieve phase appropriate exercises and tasks, unless the operation note specifies otherwise.

The exercises offer ideas rather than being a prescription.

Therapists who are not experienced in treating patients who have undergone nerve transfer surgery may find the following references useful:

- Sturma et al. (2019) Structured Motor Rehabilitation after selected nerve transfers. Journal of Visualized Experiments e59840
- https://www.rnoh.nhs.uk/services/rehabilitation-guidelines

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<table>
<thead>
<tr>
<th>Possible complications:</th>
<th>Symptoms:</th>
<th>Action:</th>
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<tbody>
<tr>
<td>Infection</td>
<td>Pain, fever, redness, wound oozing, rash, itching, general feeling of malaise.</td>
<td>Contact RNOH CNS, surgical team +/- GP.</td>
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<tr>
<td>Seroma</td>
<td>Palpable and visible pain free lump or swelling, close to surgical site.</td>
<td>Contact RNOH CNS, surgical team +/- GP.</td>
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<tr>
<td>Neuropathic pain</td>
<td>Pain felt in the forearm or hand; burning stinging or shooting in nature.</td>
<td>Ensure regular analgesia is being taken (Paracetamol) to distinguish between post operative pain. Contact RNOH CNS, surgical team +/- GP.</td>
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<tr>
<td>Numbness in the hand or fingers</td>
<td>Tingling or lack of feeling in the fingers or hand which is not painful.</td>
<td>Discuss with RNOH surgical team +/- therapy team at next routine appointment</td>
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<tr>
<td>Failure to progress through phases</td>
<td>Lack of palpable or visible biceps muscle contraction at 6 months post op. Failure to increase strength of biceps despite strengthening programme. Poor motivation to continue with rehabilitation.</td>
<td>Discuss with RNOH surgical team +/- therapy team at next routine appointment. Ensure that patient has an understanding of the slow nature of recovery in order to keep their motivation to rehabilitate.</td>
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<tr>
<td>Co-contraction</td>
<td>Activation of both agonist and antagonist muscle groups preventing movement through range. Abnormal movement patterning.</td>
<td>Discuss with RNOH surgical team +/- therapy team at next routine appointment</td>
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<tr>
<td>Scar adhesions/tethering</td>
<td>Tight cord or band of scar tissue. Overgrowth of scar beyond normal boundaries. Skin adhered to deeper layers of tissue noticeable of palpation of scar site.</td>
<td>Reinforce scar massage and ensure good technique. Consider other treatment modalities such as silicone gels. Discuss with RNOH therapy team if needed.</td>
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