

The purpose of this document is to provide information for physiotherapists of common medical and surgical interventions used by physicians in the management of lateral elbow tendinopathy strategies (see “Lateral Elbow Tendinopathy: Summary of the Evidence for Physical Therapy Interventions”).

**Pharmacological Approaches**

| Intervention  | Method                      | Proposed Mechanism   | Benefit: Pros/Cons   | Evidence   | Take Home Message Implications for Physiotherapy   |
|---------------|-----------------------------|--|--|--|--|
| <b>NSAIDs</b> | Oral or topical application | Interrupts the main pathway of inflammation by inhibiting the action of cyclooxygenases. | <p><i>PROS:</i></p> <ul style="list-style-type: none"> <li>Inexpensive, easily accessible.</li> </ul>  | <p>Weak evidence for temporary pain relief in lateral elbow tendinopathy.</p> <p>Insufficient evidence to make a recommendation</p> <p>Relative effectiveness of oral vs. topical application has not been examined.</p> | <p>General knowledge of commonly used NSAIDs is important for treatment planning. NSAIDs are not curative for this condition and there is no evidence of sustained benefit in the long term.</p> |
|               |                             |  | <p><i>CONS:</i></p> <ul style="list-style-type: none"> <li>Precautions and contra-indications that accompany specific medications.</li> <li>Increased risk of gastrointestinal complications.</li> </ul> |  |  |

**References:**  
 Green et al. Non-steroidal anti-inflammatory drugs (NSAIDs) for treating lateral elbow pain in adults. *Cochrane Database Syst Rev.* 2002;(2):CD003686.

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| <b>Corticosteroid (injection)</b> | Peritendinous injections | Applied locally to interrupt the inflammatory process. Reduces tendon blood flow and tissue thickening. | <p><i>PROS:</i></p> <ul style="list-style-type: none"> <li>Easily accessible.</li> <li>Careful administration outside the structure of the tendon is considered ‘safe’ i.e., in the paratendon sheath.</li> </ul>  | <p>There is high quality evidence that local corticosteroid injections are effective for short term pain relief, but are inferior to multimodal physiotherapy in the long term (6 and 12 months).</p> <p>Repeated injections (3-6 times in 18 months) has poorer outcome than a single injection on pain reduction.</p> <p>The benefit of early pain reduction to assist in return to activity may be counter-productive due to increased risk of recurrence.</p> | <p>Corticosteroid injections provide short-term relief but are associated with worse long-term outcomes with a high rate of recurrence.</p> |
|                                   |                          |   | <p><i>CONS:</i></p> <ul style="list-style-type: none"> <li>Worse long-term outcomes.</li> <li>Risk of infection (1%) ‘Universal precautions’ required.</li> <li>Destructive; impairs tissue repair mechanism.</li> <li>Intra-tendon injection may weaken tissue structure, with risk of tendon rupture.</li> <li>Skin depigmentation.</li> <li>Sub-cutaneous atrophy.</li> <li>Post injection pain.</li> </ul> |   |   |

**References:**  
 Coombes B et al. Efficiency and safety of corticosteroid injections and other injections for management of tendinopathy: a systematic review of RCTs. *LANCET.* 376(9754): 1751-67. Nov 2010.  
 Snyder K, Evans T. Effectiveness of corticosteroids in treatment of lateral epicondylitis. *Jour Sports Rehab.* 21(1): 83-88. Feb 2012.  
 Coombes B et al. Effect of corticosteroid injection, physiotherapy, or both on clinical outcomes in patients with unilateral lateral epicondylalgia: a randomized controlled trial. *JAMA.* 2013 Feb 6;309(5):461-9.  
 Krogh et al. Treatment of Lateral Epicondylitis With Platelet-Rich Plasma, Glucocorticoid, or Saline: A Randomized, Double-Blind, Placebo-Controlled Trial. *AJSM e-pub.* March 4, 2013.

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| <b>Glycerol Trinitrate (GTN)</b> | Nitro-glycerine patches (1.25mg/24 hrs) applied over tendon to enhance healing. | Nitric oxide may stimulate repair by enhancing collagen synthesis in tenocytes. | <b>PROS:</b> <ul style="list-style-type: none"> <li>• GTN + exercise improve outcomes compared to exercise alone.</li> <li>• Increased compliance because of ease of application. Self-applied.</li> <li>• Non-invasive.</li> </ul> | A small amount of RCT level evidence suggests that GTN patches combined with exercise achieve clinically significant benefits compared to exercise alone. | Use of GTN may enhance exercise outcomes. If prescribed by a physician, it may be applied by a physiotherapist and used in conjunction with a multimodal exercise program. |
|                                  |   |   | <b>CONS:</b> <ul style="list-style-type: none"> <li>• Requires repeated applications over 12 weeks.</li> <li>• Potential headache as a side-effect of nitro patch.</li> </ul>   |   |  |

**References:**

Paoloni et al. Randomised, double-blind, placebo-controlled clinical trial of a new topical glyceryl trinitrate patch for chronic lateral epicondylitis. *Br J Sports Med.* 2009;43:299-302

Paoloni et al. Topical nitric oxide application in the treatment of chronic extensor tendinosis at the elbow: a randomized double-blinded placebo controlled trail. *Am J Sports Med.* 31: 915-20. 2003

## Injection Therapies

| Intervention       | Method   | Proposed Mechanism   | Benefit: Pros/Cons   | Evidence  | Take Home Message Implications for Physiotherapy  |
|--------------------|--|--|--|---|---|
| <b>Polidocanol</b> | Originally developed as an anaesthetic and widely used as a sclerosing agent in the treatment of varicose veins. | Ablation of neurovascular proliferation in painful tendon. | <b>PROS:</b> <ul style="list-style-type: none"> <li>• May be less damaging than corticosteroid injections.</li> </ul> <b>CONS:</b> <ul style="list-style-type: none"> <li>• Evidence suggests lack of efficacy.</li> </ul> | 1 RCT: demonstrated no superiority to placebo (anaesthetic only). | PTs should have knowledge of various injection techniques to help to facilitate referral of patients to other procedures when conventional treatment fails to result in a sufficient positive response. |

**References:**

Zeisig et al. Pain relief after intratendinous injections in patients with tennis elbow: results of a randomised study. *Br J Sports Med.* 2008;42:267-271.

Krogh et al. Comparative Effectiveness of Injection Therapies in Lateral Epicondylitis: A Systematic Review and Network Meta-analysis of Randomized Controlled Trials. *Am J Sports Med. E pub.* 2012 Sep 12.

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|---------------------|--|---|--|--|---|
| <b>Prolotherapy</b> | Most common injectant is hyperosmolar dextrose with small amount of anaesthetic to induce a 'pro-inflammatory' proliferative cell response to assist in tissue repair. | New viable tissue is hypothesized to result from the local release of cell growth factors.<br><br>Medical dextrose also has a weak sclerosing effect on vessels | <b>PROS:</b> <ul style="list-style-type: none"> <li>• Non-surgical option.</li> <li>• Can be performed with or without US-guided localization. US-guided technique permits localization to a specific target site. However, injections without US imaging may also be effective, even in a sub-cutaneous approach superficial to the target tissue.</li> </ul> | A small amount of evidence demonstrates superiority to placebo injections. | Prolotherapy may enhance outcomes compared to using exercise alone. |
|                     |  |   | <b>CONS:</b> <ul style="list-style-type: none"> <li>• Not covered by medical plans (BC); usually requires a private fee that reflects the expertise of the practitioner.</li> <li>• Requires three or more repeated treatments, similar to other injection therapies.</li> <li>• Expensive sonography equipment requiring an experienced operator.</li> </ul>  |  |   |

**References:**

Scarpone et al. The efficacy of prolotherapy for lateral epicondylitis: a pilot study. *Clin J Sport Med.* 2008;18: 248-254.  
 Krogh et al. Comparative Effectiveness of Injection Therapies in Lateral Epicondylitis: A Systematic Review and Network Meta-analysis of Randomized Controlled Trials. *Am J Sports Med. E pub.* 2012 Sep 12.

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| <b>Platelet Rich Plasma (PRP)</b> | Centrifuge of autologous blood to collect a concentrate of the platelets and plasma. This is then injected back into the patient's tendon. | Cellular and humoral (blood) mediators promote healing in areas of tendon degeneration. | <b>PROS:</b> <ul style="list-style-type: none"> <li>• Non-surgical option.</li> </ul>  | A small amount of evidence suggests that PRP injection is no more effective than placebo.<br><br>Studies also suggest that PRP injections for lateral elbow tendinopathy are superior to corticosteroid outcomes at 1 year follow-up, due to the fact that corticosteroid injection leads to worse long-term outcomes. | General knowledge of PRP is important to assist patients in decision-making. |
|                                   |  |   | <b>CONS:</b> <ul style="list-style-type: none"> <li>• Requires expensive blood processing equipment and centrifuge. Also, it is a US-guided technique requiring sonography and an experienced operator.</li> </ul> |  |  |

**References:**

Krogh et al. Comparative Effectiveness of Injection Therapies in Lateral Epicondylitis: A Systematic Review and Network Meta-analysis of Randomized Controlled Trials. *Am J Sports Med. E pub.* 2012 Sep 12.  
 Creaney L et al. Growth factor-based therapies provide additional benefit beyond physical therapy in resistant elbow tendinopathy: a prospective, single-blind, randomised trial of autologous blood injections versus platelet-rich plasma injections. *Br J Sports Med.* 2011;45: 966-971.  
 Peerbooms JC et al. Positive effect of an autologous platelet concentrate in lateral epicondylitis in a double-blind randomized controlled trial: platelet-rich plasma versus corticosteroid injection with a 1-year follow-up. *Am J Sports Med.* 2010;38: 255-262.  
 Krogh et al. Treatment of Lateral Epicondylitis With Platelet-Rich Plasma, Glucocorticoid, or Saline: A Randomized, Double-Blind, Placebo-Controlled Trial. *AJSM e-pub.* March 4, 2013.

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|--|---|---|--|--|--|
| <b>Botox (Botulinum toxin A)</b>   | Injection of botox into the wrist extensors | Paralysis of the extensor muscles causes a period of unloading, reducing the irritation of injured tendon tissue and allowing healing to proceed. | <b>PROS:</b>   | A small amount of evidence suggests that Botox injection is superior to placebo. | Provides another treatment option when conservative treatment has been unsatisfactory. |
|  |   |   | <ul style="list-style-type: none"> <li>• Non-surgical option.</li> </ul>                               |  |  |
|  |   |   | <b>CONS:</b>   |  |  |
|  |   |   | <ul style="list-style-type: none"> <li>• Can cause paralysis with loss of finger extension.</li> </ul> |  |  |
| <b>References:</b>   |   |   |  |  |  |
| Lin YC et al. Comparison between botulinum toxin and corticosteroid injection in the treatment of acute and subacute tennis elbow a prospective, randomized, double-blind, active drug-controlled pilot study. <i>Am J Phys Med Rehabil.</i> 2010;89: 653-659. |   |   |  |  |  |
| Placzek R et al. Treatment of chronic radial epicondylitis with botulinum toxin A: a double-blind, placebo-controlled, randomized multicenter study. <i>J Bone Joint Surg Am.</i> 2007;89: 255-260.  |   |   |  |  |  |

## Surgical Approaches

| Intervention   | Method   | Proposed Mechanism  | Benefit: Pros/Cons  | Evidence  | Take Home Message Implications for Physiotherapy                    |
|--|--|---|---|---|---|
| <b>Denervation</b>   | Open incision and resection of posterior cutaneous nerve of the forearm.                               | Interrupts pain transmission and potential influence of nerves on failed healing response in the tendon (neurogenic inflammation) | <b>PROS:</b>  | Small amount of evidence (retrospective case series) indicates superiority to standard technique            | PT may be involved in the post-op rehabilitation following surgery. |
|  |  |   | <ul style="list-style-type: none"> <li>• Short recovery compared to more invasive surgery.</li> <li>• Faster return to work.</li> <li>• Improved pain relief compared to surgical debridement.</li> </ul> |   |   |
|  |  |   | <b>CONS:</b>  |   |   |
|  |  |   | <ul style="list-style-type: none"> <li>• Risk of infection.</li> </ul>  |   |   |
| <b>References:</b>   |  |   |   |   |   |
| Berry et al. Epicondylectomy versus denervation for lateral humeral epicondylitis. <i>Hand (N Y).</i> 2011 Jun;6(2): 174-8                       |  |   |   |   |   |
| <b>Surgical Debridement</b>  | Incision to expose the tendon, with excision of disorganized and fibrotic tendon tissue and adhesions. | Surgery creates granulation and repair, and removes fibrotic tissue.  | <b>PROS:</b>  | Open surgery may be a successful option for patients that have failed to respond to conservative treatment. | PT may be involved in the post-op rehabilitation following surgery. |
|  |  |   | <ul style="list-style-type: none"> <li>• High success rates reported by some centres.</li> </ul>  |   |   |
|  |  |   | <b>CONS:</b>  |   |   |
|  |  |   | <ul style="list-style-type: none"> <li>• Risk of infection.</li> <li>• Long post-op recovery of 3-6 months.</li> <li>• Limited data on outcomes with this procedure.</li> </ul>                           |   |   |
| <b>References:</b>   |  |   |   |   |   |
| Dunn et al. Ten- to 14-year follow-up of the Nirschl surgical technique for lateral epicondylitis. <i>Am J Sports Med.</i> 2008 Feb;36(2): 261-6 |  |   |   |   |   |