High Volume Image Guided Injections for Achilles Tendinopathy: A Systematic Review of the effects in comparison to other injection treatments

Poster No.: C-1501
Congress: ECR 2014
Type: Scientific Exhibit
Authors: H. Abdulhussein¹, D. Morrissey²; ¹Harrow/UK, ²London/UK
Keywords: Musculoskeletal soft tissue, Musculoskeletal system, Ultrasound-Power Doppler, Fluoroscopy, Ultrasound, Sclerosis, Treatment effects, Connective tissue disorders
DOI: 10.1594/ecr2014/C-1501

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org
Aims and objectives

The use of injections in the management of Achilles tendinopathy is a commonly used yet controversial aspect of management. It can be used for a treatment effect, or as a 'ticket to treatment', allowing patient to be pain free and able to freely undertake eccentric loading exercises, the gold standard treatment (1). Injections can be performed blind, with ultrasound guidance, or fluoroscopically guided. The site injection often varies too, intratendinous against paritendinous injections is widely debated, and some simply inject direct sites of tenderness.

Injection types include corticosteroid, plasma rich protein, blood constituents, aprotinin, sclerosing therapies such as polidocanol and dextrose. High volume image guided injections, a relatively new treatment, is used increasingly in Achilles tendinopathy. It is believed to work mechanically, by causing neo-vessels to stretch, break or occlude, as well as having a chemical effect through the presence of local anaesthetic and a small amount of steroid (2).

The objective of this review was to provide qualitative and quantitative comparison of HVIGI effects to other injection types.

The literature was assessed for patient related outcome measures (PROMs), safety, radiological changes, and practical considerations, in order to guide clinical decisions and inform future research.

Methods and materials

A computerised literature search of PubMed, Medline, Embase and Web of Knowledge was carried out from conception in October 2013.

The search had specific inclusion and exclusion criteria as outlined below:

Inclusion Criteria

- Studies on human adults
- Patients with Achilles Tendinopathy
- Use of injection intervention
- English papers only
- Studies in which an intervention was compared with an alternative or there was a before and after assessment of the intervention
**Exclusion Criteria**

- Studies looking at any other areas of Tendinopathy other than Achilles, unless results data is provided for Achilles patients separately
- Cadaveric Studies
- In vitro studies
- Case reports
- Literature Reviews

The search was also limited to literature from journals.

Reference lists, and cited articles were searched for any additional articles.

All papers were given a level of evidence based on their methodology using the Oxford Centre for Evidence Based Medicine, Levels of Evidence. Using the same criteria, a Grade of Recommendation was given for each type of injection therapy based on the scale outlined in the table below (3):

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Consistent Level 1 Studies</td>
</tr>
<tr>
<td>B</td>
<td>Consistent level 2 or 3 studies or extrapolations from level 1 studies</td>
</tr>
<tr>
<td>C</td>
<td>Level 4 studies or extrapolations from level 2 or 3 studies</td>
</tr>
<tr>
<td>D</td>
<td>Level 5 evidence or troublingly incoisistent or inconclusive studies of any level</td>
</tr>
</tbody>
</table>

**Grade of Recommendation Criteria**

**Results**

A PRISMA flow diagram can be found outlining the search strategy (Figure 1).

All studies included patients with symptomatic Achilles tendinopathy, however terminology differed with tendinosis/tendinitis often used in studies suggesting an inflammatory component to the disease process. The majority of the studies included patients that had previously tried numerous conservative methods of treatment, with participants mostly having some sort of athletic activity from recreational to elite level. In the majority of cases, the Victorian Institute of Sports Assessment - Achilles (VISA-A) or the Visual Analogue Scale (VAS) was used as the primary outcome measure, with other
measures being the foot and ankle outcome score and the American Orthopaedic Foot and Ankle Society Scale (AOFAS). Ultrasonographic outcomes were also commonplace amongst most studies, however two studies used MRI as an alternative. Follow ups ranged from 2 weeks up till 3.5 years across studies, injection techniques included blind, US guided and fluoroscopically guided and injections were mostly peritendinous but some studies injected intratendinously.

Graphs showing mean VAS scores for pain (Figure 2), and mean VISA-A scores (Figure 3), pre and post injection across studies and injection types (where available).

**High Volume Image Guided Injections**

Research showed HVI's can significantly improve patient pain and function, as well as imaging components for patients with tendinopathy at the main body of the Achilles, regardless of previous symptom level. This suggests ultrasound guided high volume injection is safe and inexpensive, with the potential to be an alternative to surgery and afford a quicker return to sporting activity (4). The studies do however have significant limitations. All studies are case series, and therefore do not have a control group matched for age, sex and other potential confounders. This limits impact, and makes it difficult to determine the true effect of the injection itself. Furthermore inclusion of eccentric exercise programme may overshadow the effects of the HVI contributing to the changes seen.

**Platelet Rich Plasma/Autologous Blood**

In comparison to HVIGI's, findings are inconsistent, but research is increasingly diverse, with stronger patient cohorts, longer follow ups, and better methodology. However, some findings may indirectly show support for use of HVIGI's. Gaweda et al. (5) de Vos et al. (6) both suggested improvements shown in cohorts may be down to fluid being injected around the tendon, possibly causing the mechanical effect hypothesised in implementation of HVI's, although findings on tendon neovascularisation at ultrasound follow ups may contradict this theory. When comparing HVIGI's and PRP's, it is also important to consider that PRP alone can cost between $200 to $300 (5), HVIGI's use mostly saline and require less preparation making them pointedly cheaper. HVIGI's may also be safer, as PRP caused post injection flares and worsened symptoms in some individuals. A randomised controlled trial comparing PRP's with HVI's both sonographically delivered would explore this relationship further.

**Polidocanol**
The main difference between HVI's and Sclerosing injections is that the latter usually require multiple injections, weeks apart. Clementson et al. used up to 6 injections in some patients (7). Whereas the studies conducted on High Volumes have only used one injection to show a similar effect. The two injections have similar biological plausibility, both thought to target neovessels. Although Alfredson et al. proposed an alternative theory more in line with the role of PRP injections where intratendinous blood flow may increase resulting in aggregation of growth factors, metalloproteinases and other enzymes leading to tissue remodelling (8). HVI's are safer than sclerosing injections as the latter carry a risk of thrombosis, especially if the substance were to enter normal circulation. At this point in time, for HVI's to have the same clinical research standing as sclerosing injections, high impact studies are necessary.

**Prolotherapy/Dextrose**

In comparison to HVIGI's, Prolotherapy treatment requires more injections, and since injections are painful, this is a disadvantage. Also Prolotherapy is linked to hypoechoic regions on ultrasound rather than neovascularisation. Evidence shows both treatments are safe and cost effective. Both treatments show promise.

**Corticosteroid**

High Volume Injections typically contain the steroid hydrocortisone acetate. As mentioned earlier, the proposed role of steroid is to suppress an inflammatory reaction to the injection. However the findings from Koenig et al. may suggest the role of the steroid may be more potent than this. The evidence surrounding High Volumes is more consistent and of better quality than the research on steroid injections.

**Aprotinin**

High volume injections with a small amount of Aprotinin showed positive results, however Mafulli et al. added this showed HVI's have a local mechanical effect on neovessels rather than the Aprotinin having a potent role in treatment (9). Aprotinin similarly to corticosteroids has documented risks and contradictory research, and therefore high volumes equate better outcomes.

| High Volume Image Guided Injections | C |
| Platelet Rich Plasma | D |
| Polidocanol | A |
| Prolotherapy | B |
Corticosteroid D
Aprotinin D
Grade of Recommendation

Images for this section:

Fig. 1: PRISMA Diagram Outlining Search Strategy
**Fig. 2:** Graph showing pre and post injection VAS scores across injection types (where data available)

**Fig. 3:** Graph showing VISA-A scores pre and post injection across injection types (where data available)
Conclusion

The strongest evidence exists for sclerosing injections with Polidocanol or dextrose administration. HVIGI compared similarly to these injections in safety profile, clinical improvements based upon patient recorded outcome measures and radiological changes particularly in neovascularisation and tendon thickness. Findings for HVIGI’s are promising, with the treatment being a more practical option requiring less injections for a similar response in comparison to other injections, and being safe and inexpensive. Implications for future research are determined, with the need for a placebo controlled comparison between high volumes and another injection type (preferably Polidocanol or Dextrose) with validated methodology and both short term and long term follow ups.

Personal information

Hatim Abdulhussein BSc (Hons), 4th Year Medical Student, Barts and the London School of Medicine and Dentistry, London

ha09215@qmul.ac.uk

References


6. de Vos R, Weir A, Tol J et al. No effects of PRP on ultrasonographic tendon structure and neovascularisation in chronic midportion Achilles tendinopathy (C) 2011 BMJ Publishing Group Ltd and British Association of Sport and Exercise Medicine: (1)Department of Orthopaedic Surgery, Erasmus Medical Centre, Rotterdam, The Netherlands

