Corticosteroid injections in foot and ankle surgery: is there any benefit?

Corticosteroid use for symptomatic relief in arthritis and for the management of inflammatory conditions is commonplace in orthopaedic practice. Advocates argue that they are not only cost effective when therapeutic, but can be diagnostic if there is no long-term gain. The difficulty of course is that for many injection sites the efficacy is far from proven. Foot and ankle practice in many clinics and hospitals includes prolific joint injection, both x-ray guided and clinical. There is, however, not the best of evidence to support this practice. We were delighted to see this report from **London (UK)** of a retrospective study reporting the outcomes of 365 injections, with the aim of analysing the efficacy of corticosteroid injections in their foot and ankle patients.[1] The authors included all corticosteroid injections performed around the foot and ankle during a one-year period (n = 365). Injections were all performed by a consultant musculoskeletal radiologist using image guidance with ultrasound or x-ray. A retrospective review of notes and a telephone questionnaire were performed at a minimum follow-up of two years. The injections were administered for a representative range of conditions including ankle impingement (30%), hindfoot and midfoot arthritis (16%), Morton's neuroma (15%), plantar fasciitis (8%), hallux rigidus (5%), retrocalcaneal bursitis (4%) and lesser toe synovitis (4%). Overall, 314 of 365 (80%) reported a significant improvement in their symptoms, and 242 patients (66%) reported a complete resolution of their pain. A total of 29% remained asymptomatic at two-year follow-up. If the pain recurred, the most common time of recurrence was at three months. There were 51 patients (14%) who underwent a further injection and 88 (24%) who underwent operative intervention. Steroid injection had the greatest benefit for the treatment of ankle synovitis, with 74% of cases reporting complete relief of symptoms, and 44% remaining symptom-free at two years. For Morton's neuroma, 87% reported a significant benefit from the injection, with 31% remaining asymptomatic at two years and 28% going on to require surgery. There were only short-term benefits to be found with injection when used for arthritic conditions. In the hindfoot and midfoot, although 82% of patients had significant symptom relief initially, only 32% remained improved at six months and only 12% at two years. For hallux rigidus, 92% of patients experienced an initial benefit from injection, but only in three patients (14%) was it effective beyond three months. Injection was also found to be of little assistance with plantar fasciitis, with only three patients (8%) gaining more than three months' benefit. Only two patients (6%) had relief at two years and there was a single patient who reported worsened pain following the injection. Overall, however, there were few disadvantages to injection reported in this series, with complication rates remaining low (1.3%) and included pain, steroid flare and plantar plate rupture. There were no infections. This study provides useful patient-reported outcome data from a large cohort of patients with a variety of conditions in the foot and ankle. There is heterogeneity in the cohort reflecting clinical practice, which is both the strength and weakness of a study like this. There does appear to be a role for therapeutic steroid injection for certain pathologies within the foot and ankle. Surgery can be avoided in a large number of cases when injection is used for certain specific pathologies. While there is a particularly good response to injections in conditions such as ankle impingement, there is less efficacy for the treatment of plantar fasciitis and hallux rigidus.

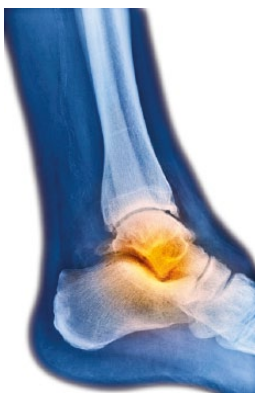
Botulinum toxin injection: an effective treatment for plantar fasciitis?

Having established with the previously reported paper that steroid injections really don't help in the treatment of plantar fasciitis, this leaves us with a bit of a problem. Plantar fasciitis is a common condition in the foot and ankle, resulting in plantar heel pain that can be severe and long-lasting in some patients. Patients often complain bitterly of a persistent and disabling pain. First-line treatment is usually conservative, with a multimodal approach including stretching exercises, anti-inflammatories, walker boots, splints and in-shoe orthotics. Surgery for this condition does not have good reported outcomes and is certainly not without risk. The most common complications reported include infection and wound healing issues, nerve injury and long-term worsening pain. Some authors have advocated injection therapy, with platelet-rich plasma and corticosteroid used in some centres. In one of the few excellent methodological papers on plantar fasciitis, we were delighted to read this paper from **Philadelphia, Pennsylvania (USA)** where investigators performed a randomised, double-blinded, placebo-controlled study to examine the effectiveness of botulinum toxin in patients with plantar fasciitis to test the hypothesis that this may improve pain perception.[2] This neurotoxin derived from the bacterium *Clostridium botulinum* causes a reversible inhibition to the presynaptic release of neurotransmitters at the neuromuscular junction. Interestingly, the plantar fascia does not contain any muscle and, as such, contains no neuromuscular junction. The effects of botulinum toxin are postulated, therefore, to result from the paralysis of the adjacent flexor digitorum muscle and also from the anti-inflammatory properties it exerts on the local soft-tissues due to its inhibitory effects on certain chemical mediators. The study reported the outcomes of 50 patients, all of whom had a diagnosis of plantar fasciitis and had been treated non-operatively for a mean of 18.8 weeks (6 to 40). There were no differences reported in baseline characteristics between groups, both for demographics and severity of plantar fasciitis based only on an MRI grading system. The study protocol involved randomisation to receive a single injection of botulinum toxin or saline, with both patient and clinician blinding. The injection protocol stipulated the use of an EMG to locate the injection to within the FDB muscle, just adjacent to the insertion of the plantar fascia. The post injection rehabilitation protocol was prescriptive and involved a period of at least six weeks of physiotherapy and the use of an off-the-shelf orthotic with an arch support. Outcomes were reported primarily with a visual analogue pain score, along with the foot and ankle ability measures score for function (exact details of this scoring system were not provided). Patients were seen for outcome scoring at six and 12 months. Results were of no statistically significant difference in either score for the placebo patients at six or 12 months. In the study group, however, improvements were seen in both pain and function scores after injection that were statistically significant when compared with pre-injection scores, and also when compared with placebo. There were no complications reported in either group. The study population

reported here is relatively small and the follow-up is relatively short given the natural history of the disease. However, this study does show some interesting results, with apparent benefit of botulinum toxin injection for pain and function associated with this condition. Clearly, more studies will be needed to help validate these results in the longer term and in a larger population. The possible link between the plantar fascia and the FDB muscle is also of interest, with the botulinum toxin being injected into the muscle belly of the FDB, adjacent to the plantar fascia, with pain-relieving effects seeming to come from a reduction in FBD activity and also via a local anti-inflammatory effect.

Does gap size affect outcome in Achilles tendon rupture? x-ref

The debate continues regarding the best treatment for acute rupture of the Achilles tendon. Many surgeons now elect to treat the majority of their cases non-operatively on the basis of more recent randomised evidence. One consideration when making this decision could in fact be the size of the gap between the tendon ends. Perhaps the most convincing argument for advocating a surgical treatment of these injuries is that it provides the most reliable method of restoring the normal anatomical length of the injured musculotendinous unit, which in turn may have a potential benefit in restoring the pre-injury strength and function to the triceps surae. In an interesting study by a group from **Cambridge (UK)**, the size of the gap seen on ultrasound imaging after acute Achilles tendon rupture was compared with ankle plantar flexion strength and functional outcome after a conservative treatment protocol.[3] A prospective cohort of 38 patients (with the sample size determined after power analysis) presenting with an acute (less than two weeks) rupture of the Achilles tendon was included. Patients underwent an ultrasound assessment of the Achilles rupture with the ankle in a neutral and then maximal plantar flexed position. This was done with the knee in full extension and also in 90° of flexion, and the size of the gap between the tendon ends was recorded. A non-operative treatment regime of sequential plaster casting over an eight-week period was then initiated in all patients. Dynamometric testing was performed to measure peak torque values on the uninjured side at the time of initial presentation, and then repeated on the injured side six months after completion of a specific Achilles rupture rehabilitation programme. The Achilles tendon Total Rupture Score (ATRS) was used to measure clinical outcome at the same post-injury time point. The results showed that there was no statistically significant correlation between the peak torque deficit and tendon gap size in any position. There was, however, a statistically significant difference between peak torque deficits in those patients with a tendon gap of less than 10 mm and those of 10 mm and greater, with the knee extended and the ankle in the neutral position. The findings were similar for the ATRS between the larger and smaller tendon gap size groups. However, there was no correlation between peak torque deficit and ATRS. Analysing the results from this study, it does appear to show that there is a threshold gap distance after Achilles rupture beyond which there is a clear difference in the plantar flexion strength following this particular non-operative treatment regime. What is not yet clear is how clinically significant this difference is. In this cohort, there was no difference in the ATRS when comparing both groups. The value of gap size measurement as a predictor of overall functional outcome is therefore unclear. It may be that a larger series with subgroup analysis would clarify the potential uses for this measurement as an indicator for poorer functional outcome in certain subgroups of patients. This could help in the decision-making process when faced with this injury. One limitation of this study is the treatment protocol used. The use of sequential casting for conservative management of Achilles tendon rupture has largely been superseded by early weight-bearing using functional orthotics. This treatment protocol has been shown to improve outcomes after this injury and therefore translating results from this particular study into current practice is difficult.



Predicting poor outcome after Achilles tendon rupture x-ref

Many recent papers have focused on the best form of treatment for rupture of the Achilles tendon; conservative treatment or surgical repair, plaster cast immobilisation or functional bracing with early weight bearing. One of the potential difficulties with all of these issues is identification of those who will do well, and those who will not, with any particular treatment option. However, in a paper from **Stockholm (Sweden)** the emphasis was not on the type of treatment offered but on identifying additional independent outcome predictors in patients undergoing surgical repair of an Achilles tendon rupture.[4] This study is based around the results of a large cohort of 111 patients who were prospectively enrolled in the study and whose outcomes were collated prospectively after surgical treatment of their Achilles tendon rupture. The study team undertook prospective follow-up to one year post-operatively using their Achilles Combined Outcome Score (ACOS). In addition, the authors collated a variety of demographic variables, along with three validated outcome measures (Achilles tendon Total Rupture Score, heel-rise height test, and limb symmetry heel-rise height which were used as the basis of the ACOS measure) that were combined to form a dichotomised outcome score at one year post surgery. The authors identified three variables that were predictive of the dichotomised ACOS outcome score. In this series, being over the age of 40 years, male and developing a DVT were shown to be independent negative predictors of outcome in surgically treated Achilles ruptures. These data are clearly important in the joint decision-making process between patient and surgeon while discussing the treatment options for this injury. For those patients for whom surgery seems an attractive option, the risks of poor outcome can be further evaluated with the data from this paper.

What to do with the modern syndesmosis screw?

The humble syndesmosis continues to provoke debate in trauma and orthopaedic circles. While few disagree that fixation of the syndesmosis in the presence of an injury is essential, there are some circumstances in which there are few universal agreements beyond this. There is debate surrounding screw *versus* tightrope fixation, and the number of tightropes and screws. And for those using screws, the discussion continues: offer routine removal or leave the screws in?; one or two screws?; three or four cortices? Given the simplicity of the injury and its relative frequency, the lack of agreement in the debate is remarkable. A review team in **Boston, Massachusetts (USA)** set out to establish what is and what is not known for certain about the syndesmosis screw and, in particular, to resolve the issue of whether or not they should be removed.[5] The authors undertook

a thorough literature review and were able to identify nine studies reporting the outcomes of removal or retention of a syndesmosis screw. Their systematic review was based on the reports of one randomised and eight retrospective cohort studies. There were no differences ascertainable between clinical and radiographic outcomes with either treatment modality. However, the authors were able to identify a higher rate of secondary diastasis if the screws were removed between six and eight weeks following surgery. There was also a higher rate of infective complications with syndesmosis screws that were removed without prophylactic antibiotics. At the moment, this question seems to be one to which there is no clear answer – the authors propose having an honest discussion with the patients as this really is a choice between two potentially equally effective treatment strategies.

Functional recovery not apparently related to PROMS

There is no getting away from it, PROMS are high fashion at the moment, and, on the face of it, asking the patient how they think things went is a sensible position from which to start assessment of functional outcome. After all – it's not important really how we as surgeons think things went, but how successful our treatments are from the patient's perspective. One of the difficulties with such an issue is that patients are often unable to contextualise their outcome, and for that reason it is ideal to use well validated PROMS with known MCIDs. In a rather interesting study from **Blacksburg, Virginia (USA)**, investigators used the model of total ankle replacement to establish what the patient-reported outcomes were for this patient cohort and how these equated to more objective measures of function.[6] The authors included 140 patients in their study of outcomes following total ankle replacement. Each patient underwent a combination of outcome measures pre-operatively, and at 12 and 24 months following surgery. A complete set of PROMS, including the Visual Analog Scale, Foot and Ankle Disability Index, American Orthopaedic Foot & Ankle Society, Short Musculoskeletal Function Assessment, and Short-Form 36 scores were collected, as were two functional scores: the Four-Square Step Test and Short Physical Performance Battery. While the cohort as a whole appeared to make improvements with both PROMS and functional scores, with all bar a single score recording significant improvement at 12 and 24 months post-operatively when compared with the pre-operative measure, there was relatively little correlation between the two types of scores. It is not terribly heartening to find that accepted functional and PROMS scores do not really correlate. It would suggest that, given that the instruments used are widely tested, reported and in most cases validated, they are measuring different aspects of recovery and ankle performance, and that these sadly do not correlate very well with each other. This paper further serves to define the differences between cases, with the selection of outcome measure again proving crucial as to the actual outcome of the paper.

The supramalleolar osteotomy x-ref

A staple of exam answers, but in all honesty not commonly performed in many practices, the supramalleolar osteotomy offers the surgeon and patient the option of re-alignment of the hindfoot, either following post-traumatic deformity or as the result of hindfoot arthritis. The procedure is supported by some short-term results and case series, but the longer-term outcome of re-alignment of the hindfoot is relatively poorly described. Surgeons in **Liestal** and **Basel (Switzerland)** have reported their series of 298 ankles, all of whom underwent realignment surgery over a 14-year period.[7] The authors are able to report outcomes to a mean of five years' follow-up. The headline result is a five-year Kaplan-Meier survival rate of 88% with the outcome of re-operation. Those patients (12.9%) who did undergo further surgery either ended up with ankle replacements (n = 30) or arthrodesis (n = 8). It is heartening to see that so many of the 'failed' supramalleolar osteotomies were suitable for ankle replacements, as a key argument espoused by fans of the supramalleolar osteotomy is that dealing with the malalignment may not only improve symptoms dramatically but it allows for secondary ankle arthroplasty as the correction of the mechanical axis moves patients into the indicated group. The only really useful identified risk factors were those of age and grade of arthritis, and so the authors were able to conclude that, in their large series, supramalleolar osteotomy out to mid-term follow-up has reasonable and reliable results, and perhaps should be indicated in young and physically active patients with early to mid-stage arthritis.

Custom ankle arthroplasty for talar bone loss

One of the arguments against total ankle replacement is that when it fails there can be large bone defects left which essentially compromise the outcomes from total ankle replacement. There are few potential effective salvage options in the case of major talar bone loss as fusion can be difficult to effect, often requiring inclusion of the subtalar joint. These authors from **Liestal (Switzerland)** report an innovative option to address the potential problems of talar bone loss.[8] Their series of just 12 ankles with major bone defects reports on the option of revising them to a custom-made talar prosthesis; certainly many times more expensive and complex than a simple fusion. The authors report the outcomes of their small series of 12 patients to a mean follow-up of seven years. They were able to report that revision with a custom talar component was not only technically possible, but that at final follow-up 11 ankles were stable with no evidence of radiological loosening. Functional outcomes were a mixed bag, with 17% reporting poor levels of satisfaction, however, given the complexity of the presentations this should be seen as a good result. It certainly appears that while still a long way from being a mature technology, the option to manufacture custom talar components to address bone stock issues is certainly an avenue worth pursuing in those patients where other options would not be suitable.

REFERENCES

1. **Grice J, Marsland D, Smith G, Calder J.** Efficacy of Foot and Ankle Corticosteroid Injections. *Foot Ankle Int* 2017;38:8-13.
2. **Ahmad J, Ahmad SH, Jones K.** Treatment of Plantar Fasciitis With Botulinum Toxin. *Foot Ankle Int* 2017;38:1-7.
3. **Lawrence JE, Nasr P, Fountain DM, Berman L, Robinson AH.** Functional outcomes of conservatively managed acute ruptures of the Achilles tendon. *Bone Joint J* 2017;99-B:87-93.
4. **Arverud ED, Anundsson P, Hardell E, et al.** Ageing, deep vein thrombosis and male gender predict poor outcome after acute Achilles tendon rupture. *Bone Joint J* 2016;98-B:1635-1641.
5. **Walley KC, Hofmann KJ, Velasco BT, Kwon JY.** Removal of Hardware After Syndesmotic Screw Fixation. *Foot Ankle Spec* 2016 (Epub ahead of print) PMID: 28027655.
6. **McConnell EP, Queen RM.** Correlation of Physical Performance and Patient-Reported Outcomes Following Total Ankle Arthroplasty. *Foot Ankle Int* 2017;38:115-123.
7. **Krähenbühl N, Zwicky L, Bolliger L, et al.** Mid- to Long-term Results of Supramalleolar Osteotomy. *Foot Ankle Int* 2017;38:124-132.
8. **Wagener J, Gross CE, Schweizer C, Lang TH, Hintermann B.** Custom-made total ankle arthroplasty for the salvage of major talar bone loss. *Bone Joint J* 2017;99-B:231-236.