ROUNDUP360

Wrist & Hand

Botox is not just for Hollywood

The applications of botulinum toxin (botox) are growing day by day and this is the second botox paper included in *360* this month. The medical applications, particularly in spasticity and tendonitis, are becoming more and more widespread, and as the applications grow so does the evidence base. Researchers in **Winston-Salem (USA)** have, however, spotted a gap in what is known about botox and set up a randomised controlled trial (Level 1 evidence) to explore the application of botulinum toxin A (botox-A) in children with upper limb spasticity secondary to cerebral palsy (CP). All patients included had spasticity in the upper limb and were aged between three and 18 years. Upper limb function was classified using the House classification and participants were randomised to either botox-A or placebo injection at baseline, eight and 20 weeks (if required). The primary outcomes were assessed using the Melbourne assessment tool for upper limb function at a wide range of time points to 26 weeks. The study enrolled 73 participants with a range of House scores (< 2 n=10; 3 to 5 n=54; 6 to 8 n=9). The majority of patients underwent three injections and due to the study's pragmatic design and wide inclusion criteria, each injection was individualised to the child's spasticity pattern. The authors demonstrated no difference in the range, frequency or severity of post-injection events between the two groups. They did, however, show a statistically significant improvement between the two groups in favour of the botox-A intervention group.[1] Not all RCTs are equal. When designing our own RCTs here at *360* we find that it is always challenging to balance the level of control (the strict application of inclusion criteria, treatment and follow-up protocols) and pragmatism. At its simplest, a well-controlled trial has more chance of showing a difference, particularly in trials with small numbers but at the trade-off that this limits the study making it only applicable to that tight group of patients. The designers of this trial have conducted a fantastic balancing act. They demonstrated a significant difference in favour of botox-A for all children aged three to 18 with all grades of upper limb spasticity. We take our hats off to them.

Supercharging nerve repairs

Improving outcomes for surgical repair of damaged peripheral nerves is an area where there is potential for much improvement. 'Supercharged' nerve repair is a novel technique that involves an enhanced method of nerve repair in incomplete lesions. In addition to the natural recovery, a supplemental end-to-side repair, the 'supercharge' is performed. To our knowledge, at *360* HQ, although the concept has been previously described there is no convincing evidence to support its use. A surgical team in **Washington (USA)** devised an ingenious rat model study to examine the potential for supercharging nerve repair in incomplete sciatic nerve injuries. They used 54 Lewis rats in a proof of concept animal study. There were two models of treatment: 1) the incomplete recovery model (IRM), which consisted of a tibial transection and immediate repair with fresh tibial isograft to ensure some, but incomplete, repair and 2) the supercharged nerve repair (SETS) treatment, which consisted of a peroneal nerve end-to-side augmentation. The rats were divided into three groups: IRM, IRM + SETS, and SETS alone. The investigators established the outcomes of the study using a range of physiological (muscle force testing) and histological techniques (retrograde labelling, histomorphometry and electron microscopy). The rats undergoing SETS + IRM outperformed the other groups significantly, with higher myelinated axonal counts (histomorphometry) and motor neurone counts (established with a retrograde labelling technique). By eight weeks there was a significant difference in functional recovery (as measured by muscle force measurements) in the SETS + IRM compared with the SETS group alone.[2] This is a very encouraging animal study establishing the ability to augment partial nerve recovery in incomplete lesions. The difficulty in translating this into clinical practice will be selecting those patients who are likely to develop incomplete lesion at the time of their injury. We look forward to seeing the first human studies of this technique.

YouTube research?

To our knowledge this is the first paper to rely solely on YouTube for all its data collection. We are not exactly sure how we feel about that, here at *360*, but the researchers have certainly been able to gather some interesting data. Noting the rise in 'how I hurt myself' videos appearing on YouTube, researchers from **New York (USA)** reasoned that there was a rich resource of video footage capturing people's injuries as they occurred. The research team reasoned that for some injuries, such as elbow dislocations, the mechanism of injury is not completely understood and they attempted to shed some light onto the mechanism by using YouTube rather than PubMed. They identified 62 videos available on YouTube with clear videographic evidence of elbow dislocation and carefully evaluated the arm position at the time of injury in an attempt to better understand the progression of soft-tissue injury leading to dislocation. The videos were analysed by three different senior elbow surgeons to establish the position of the arm at impact and estimate the deforming and resultant forces. The videos analysed yielded some surprising similarities in the pattern of injury. The overwhelming majority dislocated near full extension most commonly with the forearm in pronation (68%), shoulder forward flexed (63%) and abducted (97%). Typical elbow deforming forces were felt to be a valgus moment (89%), axial load (90%), and progressive supination (94%). The authors argue that their videographic

findings have identified a valgus load in full extension and (presumably) subsequent damage to the medial collateral ligament. The authors conclude that they have identified a new group of dislocations distinct from cadaveric studies and this should be used to guide treatment decisions.[3] While we were taken with the novel idea of using YouTube in medical research, we were less carried away by the results, here at *360*, than the authors appear to have been. We are uncertain how the research team know for sure the elbows were dislocated and not fractured? While using YouTube is innovative, it must introduce some significant selection bias being often the preserve of skateboard and BMX injuries. We won't yet be changing our views on how elbow dislocations occur or basing our treatment decisions on them.

Any option for Keinbock's disease?

Keinbock's disease can cause significant disability and be refractory to surgical or conservative treatments, leaving surgeons and patients alike sometimes dismayed by their results. Like many hard to treat conditions there are many described interventions but scarcely any comparative literature to support the choice of one intervention over another. Some light has been shed on this tricky subject by surgeons in **Urmia (Iran)** who have designed and reported a long-term comparative review (Level III evidence) of two different surgical options for early (Lichtman stage 1 and 2) Keinbock's disease: radial shortening osteotomy and vascularised bone graft. The authors included 16 patients in their study; nine shortening osteotomies and seven vascularised bone grafts. Outcomes were assessed using a combination of Cooney wrist score and Nakamura grading, along with a range of functional assessment (grip strength, pain and functional assessment) and thorough radiological review. Follow-up was similar at 6.5 years and there were no differences in age, gender distribution, Lichtman stage or operated side between the groups. The authors were unable to establish any significant differences in pain, range of movement, grip strength or radiological results between the two groups at final follow-up.[4] It appears that both interventions have similar results at long-term follow-up than is normally reported in this kind of study. With around 70% of patients with satisfactory results it does seem that both are safe treatment options

for this condition. It did occur to us, however, that Keinbock's is one of those unusual diseases where the natural history is not understood. Perhaps the same results would have been achieved with a conservative regime. After all, the patient group was early Keinbock's and the results only 70% successful. A similar comparative series is required with a conservatively managed control arm.

The same bang for less buck? Volar plates revisited

The use of volar locking plates is becoming ever more popular. Despite literature suggesting that complication rates are higher than widely quoted and a large number of randomised controlled trials failing to demonstrate improved outcomes with volar locked plates, they are here to stay. Irrespective of which side of the volar locking plates fence you sit on, there are some things everyone agrees on. They offer the ability to get the patient's rehabilitation started earlier yet carry more complications and cost more than conservative treatment options. Much of the cost of these plates is due to the expensive locked screws or pegs, and with many holes in each plate, one attractive option is not to fill all the screw holes. The risk in doing this is that it may compromise the stability of fixation. Researchers from **Boston (USA)** conducted a retrospective case-matched study (Level III evidence) to test the null hypothesis: there is no difference in the change in volar tilt of the articular surface of the distal radius on lateral radiographs obtained before suture removal and three months or more after surgical fracture fixation whether one or two rows of screws are used in the distal part of a volar locked plate. To this end the study team wanted to establish which of two operative strategies, either a single or dual row of screws, was most effective. The primary outcome measure was loss of reduction measured on post-operative radiographs. The authors performed manual case matching on a pool of 364 consecutive patients with a distal radial fracture. The cases were matched for gender, AO fracture type, dorsal comminution, ulnar fracture, mechanism of injury and age. They matched 68 patients into 34 pairs, with final radiographs available at three months post-operatively. They were unable to establish any significant difference in the loss of reduction in the single screw (-1.2°) and double row screw (0.9°) groups. Similarly, no differences could be identified with the secondary outcomes of radial inclination and ulnar variance.[5] We were fascinated to read this paper, here at *360*. If only a single row of interlocked screws is required for the majority of fracture types then one of the strongest arguments against the use of volar locking plates, that of implant cost, carries less weight. We would love to see a further analysis of the health economic costs for single row locked plates *versus* other options. Perhaps this would clarify the health economic arguments.

A sticky wicket: driving and plasters

There are many difficult to answer simple questions one can be asked in a clinic room without much evidence to support the answers. The one we find most difficult to justify to our patients is the question: can I drive in a plaster cast? The lack of evidence and conflicting advice from government agencies (or complete lack of advice in some cases) is difficult to explain to a patient who wants to return to driving. Researchers in **Wigan (UK)** have attempted to unpick this deceptively simple question for plastered upper limb injuries. They identified six volunteers who each undertook a formal driving assessment in a variety of upper limb plasters. The assessment consisted of a formal driving test conducted by a driving standards examiner and an assessment by a trained mobility occupational therapist. The participants all took the same test in an above-elbow, below-elbow and below-elbow Bennett's cast on both limbs. Of the 36 tests taken, the participants passed 31 (86%). The study demonstrated that driving in a left (gearshift side, as this is a UK paper) above-elbow plaster was unsafe where other varieties of immobilisation were safe.[6] We find it slightly surprising that healthy volunteers managed to pass their driving test with a door side above-elbow plaster, but no surprise that the gearshift side plaster was not safe. While applicable to manual cars this would suggest that based on the findings of this UK study, over the pond the majority of continental Americans with automatic cars would be safe driving even with an above-elbow plaster. We will certainly be using this helpful paper in our practice.

What constitutes symptomatic radial malunion?

Despite having undergone much study, the enigmatic beast of symptomatic radial malunion still defies clear definition. We know that intra-articular step offs lead to radiological arthrosis, but this is often asymptomatic. Current literature suggests

that the trio of ulnar positive variance, loss of dorsal angulation and radial inclination increases the probability of a malunion, but not the certainty of symptoms. Management has swung from conservative treatment to aggressive intervention with volar locking plates, without agreed tools of patient rated outcome measures and consistent long-term follow-up studies. Even the AAOS put forward only tentative recommendations based on published evidence (2011). Researchers in **Trondheim (Norway)** sought to establish which of the commonly sighted determinants of outcomes in distal radial fractures were responsible for poor clinical outcomes at mid-term follow-up. They included 260 non-operatively treated distal radial fractures evaluated at a mean of 6.3 years (2.5 to 12.7) post injury. Radiology and clinical outcome scores were reviewed for all patients. Those who had sustained subsequent ipsilateral limb injuries were excluded from the study. The initial bivariate analysis (which simply establishes a relationship) confirmed the findings of previous studies: there is a relationship between radiological displacement and clinical outcomes. However, although found to be highly significant, the correlation coefficients varied between 0.14 and 0.30. A more detailed multiple regression analysis was designed to establish the strength of the relationships and exclude confounders. This analysis established that the independent variables only accounted for 23% of the variability in clinical outcomes and combination of dorsal angulation, ulnar variance and radial inclination; the most commonly evaluated variables in the fracture clinic accounted for only 11% of variability in outcomes.[7] This is a fascinating study which seeks to quantify the contribution of radiological outcome on the treatment of distal radial fractures. This paper is extremely thought provoking and raises more questions than it answers. If, as suggested here, the most commonly evaluated determinants of outcome (dorsal angulation, etc.) only account for 11% of outcomes, what determines the remaining 89%? Although the authors only managed to achieve a 50% follow-up rate, their findings may in part explain the difficulties in finding a clear answer as to which fractures do well with operative and which with non-operative treatment.

MRI and acute scaphoid fractures

Despite all the developments associated with Western medicine the troublesome scaphoid continues to draw attention to itself, and in particular the difficulties with diagnosis of acute fractures. Most orthopaedic clinicians (but not necessarily radiologists or insurers) are convinced of the benefit of MRI in early diagnosis of acute scaphoid injuries. Research conducted by clinicians in **Malmö (Sweden)** sought to quantify the benefit of an acute MRI scan. They evaluated 300 wrists presenting with acute injuries with radial-sided pain. All underwent MRI, resulting in 224 diagnoses of fracture (42% scaphoid). The sensitivity of a plain radiograph for scaphoid fractures in those with an MRI diagnosing a scaphoid fracture was found to be 70%. This paper mirrors several that have been previously published. What caught our attention, however, was the commentary by David Ring. He eloquently argues that overtreatment and misuse of resources contributes greater net harm to the patient population than a small percentage of missed scaphoid fractures. He points out that there is a thin line between scaphoid bone bruise and undisplaced fracture, and asks if these additional fractures are important to discover. Many bone bruises detected by MRI may be best left undiscovered. If diagnosis is not going to result in treatment does medicalising a patient's pain improve their outcomes? Dr Ring certainly feels not. This is a very valid point of view, but there is another side to the argument; the true negatives. Often a clear MRI can be helpful in avoiding patients being unnecessarily immobilised while waiting to clinically exclude a scaphoid fracture. This is certainly an argument with many sides and we would agree with Dr Ring that medicalising minor ailments with an abnormal scan may not be in that patient's interest. The counter argument also deserves some thought. A clear scan helps demedicalise a patient. This is an area in which we are sure there will be ongoing debate, with as many viewpoints as papers discussing it. We would commend both the paper and the commentary to *360* readers.[8]

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