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## Patient controlled regional anaesthesia for severe hand pain

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## The use of a self-assembled aseptic splint for minor wrist injuries

Dear Sir,

A wrist splint is often used as a conservative treatment for minor musculoskeletal injuries. However, a splint worn by a member of the surgical team must be removed at the time of surgery in order to adhere to strict aseptic principles, and this may lead to an exacerbation of discomfort during the operation.

We report a simple and cost-effective splintage system that can be applied easily under aseptic conditions. A malleable metal craniofacial retractor is taped to the wrist with adhesive surgical barrier tape to provide support for the hand or wrist during the operation.

There are four simple steps to follow.

*Step 1.* Scrub hands, then don theatre gown and place sterile gloves on both hands.

*Step 2.* Open a sterile malleable craniofacial retractor set and contour one of the retractors to the affected area (Figure 1) to create a metal splint similar to a Futuro™ splint (3M United Kingdom PLC, Bracknell, UK).

*Step 3.* Once the splint has been moulded to the palmar surface of the wrist, sterile adhesive surgical barrier tape is used to secure it. Three strips are usually required: one strip proximally around the forearm, one strip at the level of the distal radioulnar joint and one distally at the level of the distal palmar crease.

*Step 4.* Once the malleable craniofacial retractor is secured a second sterile glove is worn on the affected hand (Figure 2).



**Figure 1.** A sterile malleable craniofacial retractor contoured onto the palmar aspect of the wrist. The surgeon demonstrating the splint has an allergy to the gown cuffs, hence the first glove is worn under the gown.



**Figure 2.** A second sterile glove is placed over the assembled splint.

This straightforward procedure takes approximately 5 min. It provides support for an injured area, allowing the surgeon to operate with greater comfort after minor injuries.

### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## Patient controlled regional anaesthesia for severe hand pain: a case series

Dear Sir,

Following hand surgery some patients may experience marked pain. This typically settles with oral analgesia, elevation and possibly splinting. In rare cases severe uncontrolled pain persists. We have successfully treated three such cases with local anaesthetic instilled through an indwelling catheter.

*Case 1.* A 56-year-old woman presented with marked pain, probably due to complex regional pain syndrome (CRPS) and an extensor lag in the distal interphalangeal joint of her middle finger 2 months after a closed tendinous mallet injury treated with a splint. We considered treating the pain with one or more digital nerve blocks. However, we thought that repetitive injections might damage the neurovascular bundles or worsen the CRPS. Therefore we inserted a perineural catheter for patient-controlled anaesthesia



**Figure 1.** Epidural catheter placed in the carpal tunnel for providing analgesia in case of persisting pain following hand surgery in selected patients.

into her carpal tunnel under direct vision following opening of the carpal tunnel (Figure 1). The catheter is connected to a 20 ml syringe filled with ropivacaine 7.5 mg/ml. A total of 1 ml of liquid is instilled every 4 hours by the patient herself by administering the prescribed amount from the attached syringe. We have found through experience that the concentration can be lowered to 2 mg/ml in the following days in combination with decreasing the infusion rate. The patient visited the outpatients clinic every 2 to 3 days to monitor pain and look for signs of infection. Over 13 days she had a total use of 30 ml ropivacaine. Her pain remained resolved after stopping the infusion; the catheter and the sutures were removed. Longer term she remained completely pain free without needing any other medication. Her extensor lag was subsequently treated successfully with a tenodesis under local anaesthetic with no recurrence of her CRPS.

**Case 2.** A 23-year-old man presented with pain due to de Quervain's syndrome and superficial radial nerve neuropathy 2 months after tenosynovectomy for tendinitis of the flexor carpi radialis and removal of an exostosis of the distal radius because of a distal radius fracture 8 months earlier. A first extensor compartment release and neurolysis of the superficial radial nerve were performed. Since our patient had already developed disuse of his hand due to pain, a local anaesthetic catheter was placed next to the superficial sensory branches of the radial nerve in order to optimize use of his hand postoperatively. He injected the ropivacaine in the same way as the first patient and visited the outpatient clinic twice in order to receive a new syringe with ropivacaine. He received a total use of 48 ml ropivacaine. As the pain remained resolved after phasing out the infusion of ropivacaine, the catheter was removed after 12 days; there was no recurrence of pain.

**Case 3.** A 83-year-old woman presented with unbearable 'reinnervation' pain in her right hand 2 days after a revision carpal tunnel release (CTR).

She was distraught because of the pain and lack of sleep, despite maximum doses of oral analgesics including paracetamol, diclofenac, tramadol and morphine. After a test injection of lignocaine into the carpal tunnel resolved the pain, a perineural anaesthetic catheter was placed in her carpal tunnel for a local anaesthetic infusion of ropivacaine. The infusion rate was already reduced after a week. After 10 days, just as the 20 ml syringe of ropivacaine was empty, the catheter and sutures were removed without recurrence of marked pain. Although placing an indwelling catheter for pain 2 days after (revision) CTR seems an early excessive intervention, we think that the ease of removing only one stitch and inserting a perineural catheter should be considered in rare cases of untenable pain unresponsive to conventional painkillers. In our view, the beneficial result on pain relief and recovery outweighed the potential risks associated with the intervention.

Gupta et al. (2011) already demonstrated that self-administration of ropivacaine after CTR via an perineural elastometric pump resulted in a significantly greater difference in summed pain intensity, fewer requests for supplementary analgesics and higher patient satisfaction. Fenten et al. (2015) found high satisfaction scores, low pain scores and a shortening of hospital stay by 2–3 days in patients with a peripheral nerve catheter after ankle arthrodesis or arthroplasty and major foot surgery. In general, peripheral nerve blocks have shown effective (Saporito et al., 2014; Stein et al., 2012), safe (Saporito et al., 2014; Stein et al., 2012) and economic (Stein et al., 2012).

As demonstrated by our case series, patient-controlled analgesia through a local or perineural catheter with ropivacaine can be highly successful in selected patients after hand surgery, especially when they do not respond to conventional pain management. The use of such devices requires very specific indications and compliant and reliable patients. Hence, its role is very limited as yet, but may be important in patients with difficult hand conditions, such as CRPS.

So far this is just a preliminary study; further work will demonstrate the role of this technique in future.

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