

WHAT'S NEW IN REGIONAL ANAESTHESIA?

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Local Anaesthetic Injection Location

Discussion around intra-neural vs extra-neural injection has been around for some years, the arguments boosted by the realisation that nerve stimulator techniques often lead to intra-neural needle placement. Bigeleisen, the most prominent proponent of deliberate intra-neural placement of local anaesthetic (LA) recently showed using Indian ink in cadavers that injections deliberately close to but not within nerves on ultrasound (US) may still spread to the perineural tissues between nerve fascicles.¹ Sonographic spread of LA around a nerve has been correlated with rapid and successful blocks. In addition, smaller nerves are blocked faster than large nerves. These findings suggest that transport or diffusion of LA into the nerve is often a limiting step.^{2,3} The appearance of LA deposited into a cleavage plane around the nerve fascicles has been recognised for some time and it is unclear whether this represents intra-neural injection. Some have termed this site "sub-perineural" however a new histologic study has identified a separate connective tissue layer around nerves termed the para-neurium, which appears separate from the peri-neurium and may represent the ideal injection point as the sub-paraneural injection has a characteristic appearance.^{4,5} Many studies have now confirmed that reliable nerve block is possible with very small doses of accurately placed LA, particularly if attention is placed to surrounding the nerve with LA.

Safety of Ultrasound Guided Regional Anaesthesia

Several large series containing prospective data have been published recently, looking specifically at the rate of complications of US guided regional anaesthesia (RA).^{6,7} Ultrasound guidance does not seem to have altered the incidence of neurological complications, perhaps reflecting the multi-factorial nature of these events. Interscalene block for shoulder surgery continues to be over-represented in the incidence of post-operative neurological deficits. However this may be more related to surgical factors, as the incidence of deficits has been found to be the same independent of the use of RA.⁸ With ultrasound we may be trying to place the LA very close to nerves, with the possibility of vascular disruption and LA toxicity. However, the incidence of LA systemic toxicity (LAST) was impressively small in the most recent database report, with only one seizure and no cardiac arrests in over 12,000 US guided blocks.⁷

New Blocks

Ultrasound has opened the gates to targeting previously difficult-to-block nerves, and reports continue to be produced on new blocks. These include the pudendal nerve,⁹ obturator¹⁰ and suprascapular¹¹ nerves as well as small sensory and motor nerves. Almost all the subcutaneous sensory nerves can be targeted with US. Clinically useful blocks include the lateral femoral cutaneous nerve, anterior femoral cutaneous nerve, infra-patellar nerve, supraclavicular nerves,¹² accessory nerve,¹³ saphenous nerve, superficial peroneal nerve, deep peroneal nerve and medial cutaneous nerve of the forearm.¹⁴ New potentially useful fascial plane blocks include the pectoral nerve block¹⁵ and hamstrings block.

Education

The resurgence in interest in RA has been accompanied by its incorporation into the core curriculum of the new ANZCA training scheme. Techniques of learning are being investigated with distinction made between trainees and senior anaesthetists, in the suitability of training techniques.¹⁶ The learning process of acquiring RA skills is being unravelled.¹⁷ Specific errors such as advancing the needle without imaging the tip and unintentional probe movement are most common, along with failure to accurately image the distribution or mal-distribution of LA. A



cadaver study has shown approximately 30 ultrasound needling tasks are required to achieve adequate hand / needle co-ordination. The number of procedures to achieve competence may be much higher¹⁸ and the conventional probe is preferable for learning compared to a hockey stick probe.¹⁹

Where Are We Going?

Anaesthetists have always had an interest in pain management, and increasing numbers are crossing over their US skills into chronic pain and musculoskeletal applications. At one level, the ability to pre-operatively map nerve location, find foreign bodies and identify pathology is being increasingly used by our surgical colleagues. Other practitioners are taking their US skills into new musculoskeletal and pain interventions as shown by the growth of meetings such as the International Symposium of Ultrasound in Regional Anaesthesia (ISURA) into Pain and Musculoskeletal imaging (MSK).

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