‘My block doesn’t work’ - analysis of possible reasons, avoidance and emergency strategies

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‘It is not a failure to fail, it is a failure to not have a plan in case you fail.’

Operator

No clinician or technique can sustain a 100% success rate due to the many variables that exist between the patient, clinician and the environment. Success in regional anaesthesia is itself a variable, do you measure operative anaesthesia, operative analgesia or just postoperative analgesia? In clinical terms most anaesthetists would accept success of a regional technique as ‘that which avoids the need for general anaesthesia’. Whatever your end-point is, regional anaesthesia has an inherent failure rate; what’s important is whether your failure rate is acceptable and what strategies you should employ to minimise failure and how to deal with it.

Regional anaesthesia is a practical skill that has to be learnt and as such has a definite learning curve; the main determining factors of this learning curve are the clinician himself, the teaching available and the number of cases that they are exposed to. A common failure is the exposure to multiple techniques, which confuses the trainee who then fails to become competent in any one technique.

To learn a procedure, adequate exposure to sufficient numbers is important and the learning curve for techniques can to an extent be expressed as minimum numbers need reach a certain level or consistency. Early work done by Kopacz et al showed that a 90% success rate for spinal or epidural was not reached till 45 and 60 procedures were performed, respectively, although significant improvement compared with baseline was shown at 20 and 25, respectively [1]. This can also be shown with other techniques, and the numbers needed vary considerably with each technique. Scheupfer et al showed that in children, a 91% success rate for penile blocks can be achieved after ten procedures, and this will increase to 96% after 20, but will not significantly change further with increasing numbers [2]. However, for lumbar plexus blocks (children) the institutional learning curve to achieve only a 70% success was 55 procedures [3]. These learning curves will vary between individuals and institutions and a better way of tracking individual learning curves is the use of cumulative summation analysis (CUSUM) [4]. Even with all these methods, we need to know what is an acceptable failure rate and is this different for trainees or specialists. Grau et al surveyed German-speaking anaesthetists and found success rates for residents performing supraclavicular blocks (SPB) of 69.7% and for spinal anaesthesia (SAB) of 85.5%, compared with rates in specialists of 79.2% and 91.0%, respectively [5]. Failure is inevitable even in the best-trained hands and may be as high as 20% for certain techniques.

Although the promise of improved success rates with the use of ultrasound has not materialised [6], the benefits of ultrasound may well be improved patient comfort, a better side-effect profile and a shorter and steeper learning curve, with reduced numbers performed to achieve acceptable failure rates [7, 8].

Regional anaesthesia is just applied anatomy and as such a comprehensive knowledge of the anatomy is essential. Anatomical variation is common and the path and area of innervation of peripheral nerves may be variable. It is important to know the innervation of the structures being operated on and the proposed surgical approach and incision.
Patient

Patient factors may well affect success, and choice of patient and the choice of technique are important, as anxious patients do not make ideal candidates for regional anaesthesia. Co-morbidities such as obesity, arthritides and diabetes will affect positioning, access, nerve location and identification.

Technique

The techniques and the method of nerve location and identification (loss of resistance - LOR, peripheral nerve stimulation –PNS, ultrasound –UGRA) will also effect success. Most LOR techniques have an inherent failure rate - thoracic paravertebral blocks 10%, rectus sheath blocks and ilio-inguinal blocks of 45-60% [9, 10]; this can be improved in some cases by the use of ultrasound. When using PNS, knowledge of the motor response of the innervating nerve is crucial to maintain acceptable success rates, as the use of non-ideal motor responses will increase failure rates [11, 12].

Environment

The environment in which regional anaesthesia is performed may influence success as when hurried or pressurised a clinician's performance will suffer and failure rates will increase.

Management of an inadequate or failed block

When presented with a failed or inadequate block:

- Allow adequate time for the block to work, not all nerves block at the same rate, for example the sciatic nerve taking up to 30 min to show an effect. Consider the anaesthetic / analgesic effect of the tourniquet for brachial plexus blocks (the tourniquet causes nerve compression, this will have a additive effect to the block within 10-15minutes) Repeating the block (UGRA) or use top-up blocks to selectively anaesthetise the area or nerve (nerves) missed with the initial technique.
- Infiltration by anaesthetist or surgeon
- Analgesia with opioids or adjuvants, for example ketamine
- Sedation is only effective for anxiety and minor positional or tourniquet discomfort. Never use sedation to overcome pain or an inadequate block.
- General anaesthesia. Conversion to a GA is not a failure as almost always your regional technique will provide a reduction in postoperative pain and morphine consumption. To struggle with an inadequate regional technique will cause anxiety or trauma to the patient.

Key learning points

- Know the anatomy and understand the innervations of the structures undergoing surgery
- Chose the most appropriate technique based on risk and benefit
- Consider the patient’s anatomical variability, co-morbidities and morphology
- Use the most appropriate method of nerve location (LOR, PNS, US) and choose your drug accordingly
- Always have a plan in the event of failure; don’t be afraid of failure - be prepared for it!
References


