Regional anaesthesia for all?

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In an issue focusing on quality and outcome, it is pertinent to consider whether regional anaesthetic techniques have such clear advantages that they should be offered to all patients, whether alone or in combination with general anaesthesia, when the surgical procedure is suitable. For some surgical procedures, it might even be relevant to debate if patients should be offered only a regional anaesthetic technique. Central neuraxial blocks have become an established and routine part of every anaesthetist’s technical armamentarium over the past 30 yr, and the increasing availability of ultrasound guidance over the past 15 yr has expanded the popularity among anaesthetists for use of an increasing range of regional anaesthetic techniques. It is timely, therefore, to consider the validity of frequently asserted clinical benefits of regional anaesthesia made by its proponents. This will include impact on mortality in high-risk and low-risk procedures, benefits in specific medical conditions, contrasting the severity and incidence of complications specific to regional anaesthesia and general anaesthesia, economic benefits, and patient satisfaction. Finally, if all patients are to be offered the full range of anaesthetic techniques for their operation, we should consider the impact on training in regional anaesthesia.

Kettner and colleagues recently grappled with some aspects of this debate but concluded that the absence of useful outcome data from meta-analyses and the minimal prospect of sufficiently powered prospective randomized trials precluded any hope of establishing the primacy of regional or general anaesthesia. Our evidential outlook is broader and we recognize the value of epidemiological studies of rare events based on large data sets. For example, the national audit projects coordinated by the Royal College of Anaesthetists in the UK have led to estimates of mortality attributable to general anaesthesia of one in 180 000, and of paraplegia or death resulting from central neuraxial block of one in 55 000. Similarly, Gottschalk and colleagues surmised that overall anaesthesia-related mortality was one in 145 000, but while overall mortality was directly correlated with increasing ASA status (one in 250 000, one in 20 000, one in 4000, and one in 200 for ASA status I, II, III, and IV, respectively), permanent complications of central neuraxial block are predicted rather by specific risk factors. Thus, Freise and colleagues concluded that adherence to guidelines leads to a high level of safety with thoracic epidural blocks and recommended their use in routine anaesthetic practice. Epidemiological studies have also provided clear evidence that central neuraxial anaesthesia carries a lower risk of mortality than general anaesthesia for obstetric patients.

In ASA I patients having low-risk surgical procedures, the relatively higher risk of serious harm or death from central neuraxial anaesthesia, albeit based on rather crude data, perhaps favours general anaesthesia over central neuraxial block. The position is different, however, when a peripheral regional anaesthetic technique is a viable alternative to general anaesthesia. Closed-claim analyses from the USA indicate that permanent harm or death resulting from peripheral nerve block techniques are almost exclusively attributed to local anaesthetic toxicity. Ultrasound guidance has been shown to delineate anatomy, reduce block performance time, evaluate effective doses, improve success rate, and identify concomitant pathologies. It is likely that the incidence of local anaesthetic toxicity will be reduced by using ultrasound guidance, but evidence for the comparative safety of ultrasound guided nerve blocks is not yet available. Nerve injury is the other commonly asserted major problem with peripheral nerve blocks, and an experimental study in pigs has demonstrated the link between the magnitude of injury and the size of the needle perforating a
nerve. Moore and colleagues looked at the spectrum of iatrogenic nerve injury in New Zealand by analysing treatment injury claims accepted by the national no-fault compensation scheme. They reviewed 313 iatrogenic nerve injuries for which they had sufficient information for analysis. The great majority resulted from direct surgical injury. The other leading causes of iatrogenic nerve injuries were malpositioning under general anaesthesia (12.9%) and venepuncture (8.3%). None of the injuries were specifically attributed to peripheral nerve blocks, but one assumes any that did occur were included in the ‘other injections’ category, which accounted for only 2.6% of the claims.

In terms of safety, therefore, for operations amenable to anaesthesia using a peripheral nerve block technique, our advice to ASA I patients is that there is little to choose between regional and general anaesthesia. However with increasing ASA status, we believe the balance of risks favours regional anaesthesia. It may also be relevant that rare idiosyncratic (unpredictable) causes of major harm, in the form of malignant hyperthermia and drug allergy are, respectively, entirely or almost entirely avoided with regional anaesthesia compared with general.

Aside from serious complications and death, evidence is emerging in support of better perioperative outcome with regional compared with general anaesthesia in terms of analgesia, deep vein thrombosis, myocardial events, regional compared with general. The majority resulted from direct surgical injury. The other leading causes of iatrogenic nerve injuries were malpositioning under general anaesthesia (12.9%) and venepuncture (8.3%). None of the injuries were specifically attributed to peripheral nerve blocks, but one assumes any that did occur were included in the ‘other injections’ category, which accounted for only 2.6% of the claims.

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Aside from serious complications and death, evidence is emerging in support of better perioperative outcome with regional compared with general anaesthesia in terms of analgesia, deep vein thrombosis, myocardial events, pulmonary complications, and, more controversially, tumour recurrence rate. Richardson and colleagues in their review suggested that surgical flap survival may be better and chronic pain reduced in patients receiving bilateral paravertebral blocks. Regional anaesthesia avoids the risks of awareness under general anaesthesia, damage to teeth or eyes, and sore throat, although there is greater procedural discomfort. General anaesthesia is also associated with a greater incidence of nausea and vomiting. Many patients are concerned about the prospect of regional anaesthesia and some are unduly anxious, with perhaps the greatest concern being the possibility that they may be sensate of surgical pain. Provision of information before the procedure has been shown to considerably reduce anxiety in patients undergoing surgery under regional anaesthesia. Our experience is that patient satisfaction after the procedure is equally high for regional and general anaesthesia.

If one accepts that regional anaesthesia using peripheral nerve blocks is at least not inferior to general anaesthesia for appropriate surgical procedures, a case might be made not to offer general anaesthesia if the costs of the regional anaesthetic technique were less. Health economic comparisons relevant to this scenario are few and they provide inconsistent results. Nordin and colleagues found regional anaesthesia and general anaesthesia to be equally expensive for inguinal hernia surgery. On the contrary, Gano and colleagues demonstrated ultrasound-guided interscalene block to be significantly more cost-effective than general anaesthesia for arthroscopic shoulder surgery. Perhaps the discrepancy can be partly explained by the fact that most surgical facilities have been designed for surgery conducted under general anaesthesia. Efficiency in provision of peripheral nerve block regional anaesthesia is improved if the surgical facility design and staffing is planned to accommodate the interval required for the block to develop and takes advantage of the need for a much shorter period of immediate postoperative monitored care. There is also the potential for one anaesthetist to be responsible for patients in more than one adjacent operating theatre if there are suitably trained staff to whom intraoperative monitoring can be delegated. Our experience of such a unit is that it does function well, but efficiency is compromised when conversion to general anaesthesia is required. The major counter-argument to such a ‘regional anaesthesia only’ facility is the potential removal of patient autonomy in the decision about anaesthesia technique. The impact that this has depends on the values of the funder and provider of the service. In our opinion, the available evidence is insufficient for patient choice not to be an important determinant of anaesthetic technique and alternative arrangements should be made for patients electing for general anaesthesia.

In summary, regional anaesthesia and general anaesthesia have contrasting inherent risks, which in healthy non-obstetric patients favour general anaesthesia over central neuraxial anaesthesia. When comparing the overall risk of general and peripheral nerve block regional anaesthesia, current evidence is too limited to make a distinction. For all types of regional anaesthesia, increasing ASA status shifts the balance in favour of avoiding general anaesthesia when possible. Where patient autonomy is valued, the implication is that anaesthetists should be able to offer an informed choice of a regional anaesthetic alternative to general anaesthesia for the relevant surgical procedure. Just as it is unthinkable that anaesthesia training programmes could produce specialists who are not competent to perform epidural or spinal anaesthesia, we consider competence in peripheral nerve block regional anaesthesia to be a prerequisite for anaesthesia specialist certification.

**Declaration of interest**

P.M.H. has the use of ultrasound equipment loaned by SonoSite UK Ltd.

**References**


Continuous thoracic epidural block for surgery: gold standard or debased currency?

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Thirty years ago, continuous epidural block was used during and after surgery of the trunk by only a few dedicated enthusiasts following the example set by pioneers such as Dawkins.1 The method was usually reserved for very major