PERIODICUM BIOLOGORUM
VOL. 113, No 2, 125–128, 2011

UDC 57:61
CODEN PDBIAD
ISSN 0031-5362

Leading article

Benefits, risks and best practice in regional anaesthesia

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Received May 19, 2011.

Relief from pain is a worthwhile humanitarian and clinical goal and there is good evidence that regional anaesthesia and analgesia offer a superior quality of analgesia compared to opioid-based analgesia (1, 2, 3). For this reason alone it may be argued that a regional technique should be offered whenever clinically justified (4), although others may dispute this. Unfortunately, it is more difficult to find good data to support the hypothesis that regional anaesthesia can influence a reduction in surgical morbidity and mortality, length of hospital stay, and other markers of improved outcome from surgery.

In recent years, there has been a marked growth in the use of both neuraxial and peripheral nerve regional anaesthesia techniques and concerns have been raised about the potentially serious adverse events associated with this increased use. We need to examine the currently available evidence for both the risks and benefits associated with major regional techniques to strike a balance, which can inform our clinical practice. Equally importantly, where such evidence is lacking, we can then identify the direction that future research might take.

THE BENEFITS

There is a large database of published studies claiming to show benefits in favour of regional techniques compared to other anaesthetic and analgesic techniques. The problem is that when this database is interrogated, the limitations of many of the studies become apparent (underpowered, failure to control patient inclusion criteria, other influences on outcome, variable end point criteria etc.) making it difficult to compare different studies. In 2000 the landmark CORTRA study *(5)*, demonstrated a significant reduction in mortality in the central neuraxial group compared to the GA group. Criticisms of the methodology and statistical analysis were soon raised, in particular, that the older studies included did not represent current clinical practice. The MASTER trial *(6)* contradicted the CORTRA study, finding that epidural infusions offered no benefits other than good analgesia and some respiratory protection. In turn, this trial was also subject to detailed criticism. The uncertainty generated by this lack of consistent data is partly to blame for a decline in the use of epidural infusions for postoperative analgesia and as the tendency of patients and lawyers to seek compensation grows, many anaesthetists have become reluctant to continue to offer epidural analgesia, even to those patients who might well benefit from them. In the UK, a case series showing a raised incidence of epidural complications *(7)* accelerated the decline in popularity of epidurals, despite the

lack of data about the incidence of both usage and complications. The same is reported from other countries (Canada, USA, Australia). The available randomised studies do not have large enough patient numbers to demonstrate a clear difference in mortality and morbidity *(8)* and there are too many confounding variables. The review by Liu *(1)* confirms that although regional analgesia is superior to systemic opioid analgesia, improvement in specific outcome parameters (cardiovascular and respiratory) is restricted to particular patient subsets and overall, there is no convincing evidence of improvement in outcome. A more recent review of neuraxial analgesia confirms the same message; beyond the demonstrable benefits of analgesia other perioperative benefits are difficult to demonstrate, although there are small positive effects that may prove to be clinically relevant. A reduction in the incidence of chronic pain, better functional recovery in the early postoperative period and, possibly, a reduction in the recurrence rates for some types of cancer are suggested in some studies but adequately powered prospective studies are required to confirm or refute these findings *(9)*.

THE RISKS

There is a similar large but confused database concerning the risks of regional anaesthesia because some studies do not distinguish between temporary and permanent harm. Serious permanent nerve damage associated with regional anaesthesia is rare; the mean incidence of permanent damage is approximately 1:10,000, although the range varies between different studies. Moen *(10)* offers some useful retrospective data from the Swedish study of neurological complications as it distinguishes between spinals (1:20-30,000), obstetric (1:25,000) and non-obstetric epidurals (1:3,600). Published rates of severe adverse events associated with epidurals for major surgery range from 1:875 *(7)* to 1:19,000 *(11)*. A systematic review in 2007 calculated the incidence of both temporary and permanent injury for epidural, spinal and peripheral blocks with differences noted between peripheral, spinal and epidural techniques *(12)*. The figures for neuraxial blocks are in broad agreement with the NAP3 study *(13)*.

The NAP3 project was a prospective study of risks in 5 pre-defined patient groups (paediatric, obstetric, perioperative, chronic pain and non- anaesthetic). It gathered a snapshot census of data to provide an accurate figure as the numerator and then collected all the severe complications notified nationally during the 12 month data collection period. With a total of 707,425 central blocks as the numerator, the number of cases of spinal cord infarct, vertebral canal haematoma, vertebral canal abscess, meningitis and spinal cord and nerve root neuropathy included in the analysis was 52, of which 22 made a full recovery during the monitoring period. Perioperative epidurals produced more than half of all the complications, with an incidence of between 1:5,700 (pessimistic) and 1:12,200 (optimistic).

NAP3 confirmed that different subsets of patients are subject to differing risk, which means that we can now offer patients a validated source of information regarding risks associated with central neuraxial block in a variety of clinical settings and separated into different categories of complication.

BEST PRACTICE

Given the potential for rare but serious adverse events associated with regional anaesthesia *(14)*, we need good data to define best practice, to demonstrate individual competence and have safe and effective systems in place to maximise benefits and minimise risks *(15)*. Much of our practice, until recently, has been custom and practice – influenced by local and cultural factors, dependent on the enthusiasm of individuals or groups of enthusiasts. As RA has become part of „mainstream" anaesthetic care, more concerted efforts to inform our practice with good evidence have been developed *(16, 17)*. The Australian and New Zealand College of Anaesthetists 3rd edition of the authoritative „Acute Pain Management: Scientific Evidence" *(18)* which gives a balanced view about the role of RA in acute pain management. Evidence is also available to on a procedure-specific basis. The Prospect working group *(19)* is an international collaboration of anaesthetists and surgeons producing systematic reviews and consensus clinical recommendations on a range of surgical procedures, highlighting the role of RA, where appropriate.

Both published literature *(20, 21, 22)* and web-based material *(19, 23)* now provides systematic review evidence to help construct clinical practice guidelines for a number of surgical procedures. The data revealed by a Prospect systematic review may also be robust enough to generate further contributions to what is already known about specific topics *(24)*. With access to better information about both the beneficial role of regional anaesthesia in different procedures and the attendant risks, it is possible to establish standards of best practice, the aims of which are threefold.

1. Optimal quality postoperative analgesia, with a minimum incidence of adverse events.

2. To enable the use of active rehabilitation programmes to accelerate recovery, improve mobility, optimise functional recovery and reduce duration of hospital admission. This is the basis for the Enhanced Recovery After Surgery „ERAS" programme

3. Improve long term outcome and potentially reduce the incidence of chronic pain and poor functional results due to the inadequate management of high-intensity pain in the early postoperative period

Total hip arthroplasty serves as an example the complexity in defining best practice. A meta-analysis comparing central neuraxial techniques with general anaesthesia confirmed that the regional techniques had significant advantages over general anaesthesia with a reduced incidence of thromboembolic events, blood loss, blood transfusion and surgical operating time but there was no comparison of analgesic effectiveness *(25)*. However, a second

review *(26)* found only 18 randomised trials (1293 patients) that fulfilled their search criteria and the benefits of regional anaesthesia were limited to improved pain scores, less blood loss and fewer opioid related adverse events. A third review *(27)*, looking at both hip and knee replacement, identified 21 papers, which showed a reduction in operating time, the need for transfusion, the risk of DVT and PE. Methodological differences in these reviews may explain their different findings and demonstrate the difficulties in comparing even large reviews. Other studies *(28, 29)* support the use of both spinal and lumbar plexus block for hip arthroplasty. The current evidence of best practice for hip replacement recommends either a single-shot local anaesthetic spinal with a small (100–200mcg) dose of morphine or a general anaesthetic with minimal opioid use combined with a lumbar plexus block. Both techniques offer a good risk: benefit profile. Local Infiltration Analgesia (LIA) is a new analgesic technique currently undergoing formal investigation after initial clinical experience suggested that it might have some benefit in lower limb joint replacement *(30-32)*. Currently, the limited RCT's available suggest that it is not useful for hip surgery although may be useful for knee replacement.

Best practice is a complex concept and is subject to significant influence by surgical as well as anaesthetic factors. Ward routines and physiotherapy regimens, as well as local medical custom and practice all influence Best Practice; it is not simply „the Gold Standard" anaesthesia or analgesia technique. As surgical techniques evolve and set new standards of recovery, rehabilitation and mobilization in ERAS programmes, our analgesic techniques also need to adapt and evolve to keep pace *(33–35)*.

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