

## EMERGING ISSUES IN ORTHOPAEDIC ANAESTHESIA

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This talk aims to highlight some emerging concepts and research in orthopaedic anaesthesia that will have an impact on our execution of patient care.

### Enhanced Recovery After Orthopaedic Arthroplasty Surgery

A recent audit of primary total knee arthroplasty carried out at Auckland City Hospital demonstrated an average length of inpatient hospital stay of seven days, with an average time to mobilisation (walking 10 metres) of three days. This was consistent with data from the United Kingdom, prior to the institution of an enhanced recovery for surgery program in primary joint arthroplasty which has yielded very encouraging results.<sup>1</sup> At the time of this meeting, a Ministry of Health coordinated nationwide program for ERAS is being developed for New Zealand.<sup>2</sup>

The precise patient care model will vary between institutions – as several key influential parameters such as patient demographics, levels of social support, the existence of a pain service etc will be inconsistent between institutions. Notwithstanding this, momentum is building towards developing a multi-disciplinary infrastructure where initial mobilisation of hip arthroplasty patients can be achieved on day zero, with knee arthroplasty patients on day one and hospital discharge on day three.

A perioperative care pathway is likely to involve all or some of –

- Optimisation of pre-op haematocrit
- Managing expectations by formalised pre-op education
- Pre op carbohydrate drink<sup>3</sup>
- Gabapentin to commence preoperatively and to continue into the post op period
- Low to moderate dose spinal anaesthesia, with adjuvant general anaesthesia or sedation as required
- Avoidance of intrathecal morphine<sup>4</sup>
- Routine use of tranexamic acid
- Avoidance of drains, and urinary catheters where possible
- High Volume Local Anaesthetic Infiltration (HLVAI) by surgeon, with or without an indwelling joint infusion catheter for post-op management
- Regular simple analgesia with oxycodone for breakthrough
- Prophylactic antiemetics

Conventional femoral nerve blockade (with or without an indwelling catheter) is avoided in most published protocols as the associated residual motor blockade is frequently sufficient to preclude mobilisation even on day 1. However a 2013 study has demonstrated that the addition of adductor canal nerve block was associated with even further improvements in early ambulation.<sup>5</sup> Routine insertion of lumbar epidurals will not have a role in these pathways.

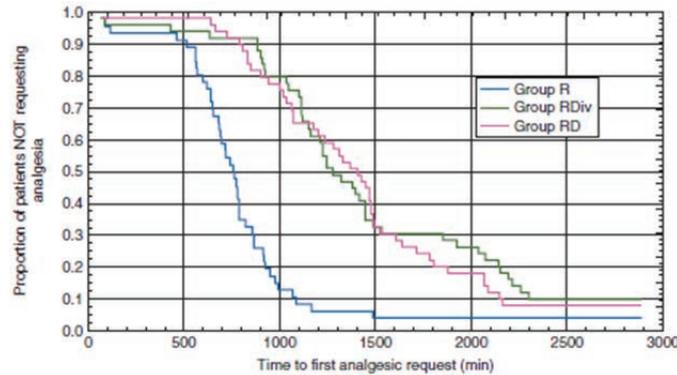
The ideal technique providing minimal analgesia with excellent side effects has yet to be established. However newer techniques including HVLAI are demonstrating equivalence in patient satisfaction and encouraging earlier mobilisation with fewer side effects than currently used regimens.

### Adjuvants to Local Anaesthetics

A double blind randomized trial by Cummings et al in 2011 demonstrated an enhanced duration of analgesia by combining dexamethasone with both ropivacaine and bupivacaine for elective shoulder surgery,<sup>6</sup> compared with either drug administered alone. This paper has led to some enthusiasm in combining dexamethasone with local



anaesthetic solutions in regional blockade. However a more recent investigation in 2013 by Desmet et al<sup>7</sup> compared three different patient groups having arthroscopic shoulder surgery – interscalene block (ISB) with ropivacaine 0.5% only; ISB with ropivacaine and 10mg perineural dexamethasone; and ISB with ropivacaine alone but with intravenous dexamethasone (10mg) administered. These authors found nearly a twofold increase in time to first postop supplemental analgesic requirement in both the dexamethasone groups compared to the non-dexamethasone group.



Kaplan-Meier survival plot, reproduced from BJA April 2013.<sup>7</sup>

Therefore this study demonstrated dexamethasone as an effective analgesic adjuvant. However this effect was independent of whether it was deposited perineurally or intravenously. The authors concluded that because perineural dexamethasone remains unlicensed, intravenous dexamethasone should be considered as an alternative to perineural dexamethasone when prolongation of post op analgesia is sought.<sup>7</sup> Whether the main mechanism of action of glucocorticoids is a systemic anti-inflammatory effect or a local effect on peripheral nerves remains unknown.

A 2013 meta-analysis combined nine RCTs comparing the effect of dexmedetomidine (3-15mcg) as a local anaesthetic adjuvant. Five trials investigated intrathecal dexmedetomidine and four investigated dexmedetomidine as part of a brachial plexus block. Sensory block was prolonged by 150min with intrathecal dexmedetomidine, but did not reach statistical significance in brachial plexus block. The authors concluded that there is currently insufficient safety data to support perineural dexmedetomidine in the clinical setting.<sup>8</sup>

## Postoperative Visual Impairment in Spinal Surgery

This is obviously a catastrophic complication of medical care. The incidence is quoted as 0.2% for spinal surgery and is probably increasing. There is fortunately an improving awareness of its mechanisms and therefore practices which will reduce the likelihood of it occurring. The optic nerve is a watershed zone which has impeded perfusion in the prone position, further complicated by periorbital oedema with impaired venous drainage which occurs in the prone position. A recent review by Zimmerer et al<sup>9</sup> defined the at risk patient as “patients who suffer from a pre-existing cardiovascular disease and additional metabolic diseases, where a prolonged duration of surgery in prone position (eg > 2h) or an increased blood loss is expected.” Further, a 2012 multi-centre case-control study<sup>10</sup> identified obesity, male sex, Wilson frame use, duration of surgery, greater estimated blood loss and decreased percentage colloid administration as independent risk factors for ischaemic optic neuropathy.

Recommendations according to the literature –<sup>9</sup>

- Avoid direct pressure on the globes
- Avoid perioperative hypotension
- Avoid perioperative anaemia
- Consider 10 degrees of reverse Trendelenburg during prone surgery
- Lower transfusion threshold to keep haematocrit above 30% in at-risk patients
- Avoid infusions of large amounts of crystalloid
- Consider staging long spinal surgeries (above 8h)
- Maintain mean arterial pressure at patient’s baseline
- Avoid changes in any perfusion-related medication shortly before surgery
- Perform a postoperative visual exam as early as possible in at-risk patients



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