Does regional anaesthesia in trauma patients lead to delayed recognition of compartment syndrome?

Regional anaesthesia, such as epidurals and nerve blocks, offers excellent pain control and decreases the amount of required intravenous anaesthesia and analgesics. There are other well-documented advantages including decreased infection rates and neuroendocrine stress responses. However, orthopaedic surgeons are resistant to the use of perioperative blocks for trauma surgery as they may result in a delay in recognizing compartment syndrome.

Evidence against the use of regional anaesthesia for trauma patients

Compartment syndrome occurs when increased pressure in a closed compartment impairs the circulation in the tissues, resulting in ischaemia and necrosis. It causes significant morbidity if not treated promptly. The commonest cause is trauma: about 36% of all cases of compartment syndrome are associated with tibial fracture. One symptom of compartment syndrome is increased pain, often disproportionate to the injury (Shadgan et al, 2010). Continuous compartmental pressure measurement is an accurate but invasive diagnostic study (sensitivity 94%, specificity 98%) (Schmidt, 2013). More recently near infrared spectroscopy has been suggested as a useful, continuous, non-invasive alternative for patients at risk (Reisman et al, 2013).

The consensus in the orthopaedic community is that regional anaesthesia may mask this hallmark sign of pain. Although no randomized control trials exist demonstrating this, there are multiple reports attributing a delay in diagnosis of compartment syndrome to the use of regional anaesthesia (Wu et al, 2011), or lower limb peripheral nerve blocks.

Anaesthetists may also resist placing nerve blocks in trauma patients for medicolegal reasons. It may be challenging to defend a situation where a delayed diagnosis of compartment syndrome had occurred following a nerve block, especially if a surgeon had asked for regional anaesthesia not to be performed.

Evidence for the use of regional anaesthesia for trauma patients

There are no UK recommendations, but the French Society of Anaesthesia advises that the risk of compartment syndrome is not a contraindication to performing a block. Pain is not the only diagnostic criterion for compartment syndrome and may be unreliable as well as subjective. It should not be relied upon and therefore should not prevent anaesthetists from performing regional blockade.

A review of 35 patients in whom epidurals were associated with a delayed diagnosis of compartment syndrome demonstrated that 32 of these patients had classical signs of compartment syndrome (Mar et al, 2009). These included breakthrough pain in the hours after surgery or pain in a site unrelated to the injury or surgery. The remaining three had dense sensory and motor blocks resulting from regional anaesthesia, which may have masked the symptoms of compartment syndrome. However, such dense blockade is not required in these patients and low-dose local anaesthetic mixtures removing painful perceptions should be the preferred technique. Lucas (2012) found that low-dose epidurals do not delay the diagnosis of compartment syndrome.

Compartment syndrome can be detected despite peripheral nerve blocks in both lower and upper limb surgery (Wu et al, 2011). Closer examination of these reports demonstrates that these patients actually presented with signs of classical compartment syndrome in the hours after surgery (Mar et al, 2009). Upper limb nerve block and low dose infusions of local anaesthetic delivered via continuous perineural catheters have not been shown to delay the diagnosis of compartment syndrome.

Most analgesic modalities have been associated with a delayed diagnosis of compartment syndrome, including patient-controlled analgesia (Mar et al, 2009). Therefore withholding certain analgesic options, including regional anaesthesia, to facilitate diagnosis of compartment syndrome is controversial, especially as analgesia should be offered on humane grounds.

Conclusions

In trauma surgery, dense regional anaesthesia may mask compartment syndrome but these extensive, long-lasting blocks are undesired by surgeons and patients postoperatively. With appropriate training, use of low dose anaesthetic mixtures could allow a higher index of suspicion of compartment syndrome as significant breakthrough pain should be a red flag for compartment syndrome. There is not enough evidence to suggest that low dose regional anaesthesia delays the diagnosis of compartment syndrome. Nonetheless these patients still warrant close monitoring for compartment syndrome including the use of compartment pressure monitoring and near infrared spectroscopy. BJHM

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