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EDITORIAL IV

Does anaesthetic technique really matter for total knee arthroplasty?

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Total knee arthroplasty (TKA) is a common, painful surgical procedure requiring good quality anaesthesia and postoperative analgesia to provide best patient care and facilitate effective rehabilitation. More than 70 000 knee replacements are performed in the UK each year and this is projected to increase as the population ages and osteoarthritis, the most common reason for TKA, becomes more prevalent. Given ever increasing pressure on resource utilization the quality and the type of anaesthesia and postoperative pain relief can have a significant impact on ability to meet rehabilitation goals.^{1–3} Studies have also demonstrated that poor pain control after knee replacement is associated with development of chronic pain⁴ although our understanding of this area is only starting to develop.⁵

The anaesthetic management of patients undergoing TKA has undergone several refinements and transitions. In the past, general anaesthesia (GA) with systemic opioid analgesia alone was commonly used. Spinal anaesthesia, uniquely suited to lower extremity orthopaedic procedures, has gained prominence with several landmark studies demonstrating the superiority of spinal anaesthesia over GA in terms of morbidity and mortality.^{6–7} Contemporary studies have continued to reinforce these data with recent epidemiological studies using large databases indicating a reduction in risk of morbidity and mortality with the use of neuraxial anaesthesia.^{8–9} The mechanisms underlying these benefits remain to be fully understood but may include improvements in blood flow, cardiorespiratory benefits and a possible reduction in surgical stress response.⁹ Outcomes such as pain relief, opioid consumption, and length of hospital stay (LOS) also favour spinal anaesthesia.^{2–10} However, neuraxial anaesthesia is not without risk, and although rare, does have potential for spinal haematoma, infection, or abscess in contemporary practice.¹¹

Therefore, despite the perceived benefits of neuraxial anaesthesia, newer methods of providing anaesthesia for knee replacement need to be evaluated and existing techniques challenged.

In this issue of the *British Journal of Anaesthesia*, Harsten and colleagues¹² compare recovery from TKA after GA [specifically with total-i.v. anaesthesia using target-controlled infusions (TCI) of propofol and remifentanyl] with spinal anaesthesia with bupivacaine in a randomized study of 120 patients. The authors demonstrate that patients in the GA group had a shorter time to meet discharge criteria (46 vs 52 h), less nausea and vomiting, better pain control (except for the first two postoperative hours), and less dizziness compared with the spinal anaesthesia group. The findings of this paper appear to contradict previous recommendations regarding spinal anaesthesia for TKA¹³ and prompt an assessment of the reasons for disparity with previous results.

A closer examination of the study reveals both strengths and limitations. A major strength of this study is the comparison of a state-of-the-art general anaesthetic technique including multimodal analgesia with a basic spinal technique. Both of these relatively straightforward and common methods of anaesthesia would be feasible in all hospitals where total knee replacement procedures are currently performed. Many institutions across the world are unable to provide consistent, high-quality regional anaesthesia for their patients and in this regard demonstration of the effectiveness of a GA with multimodal analgesia technique is timely. The recovery time and time to reach discharge criteria are impressive in both groups and is currently faster than that achieved in many centres.

Some criticisms and observations with the techniques used in this study should be noted. First, the authors use a spinal

anaesthetic technique without additional adjuvant and it is therefore not surprising that the spinal group had severe pain on block resolution. Most practitioners using spinal anaesthesia for TKA would institute adequate opioid-related analgesia before spinal resolution either by adding a dose of intrathecal hydrophilic opioid such as morphine, diamorphine, or hydromorphone,¹³ or by giving opioid analgesics by another effective route. Although the use of intrathecal opioids is associated with adverse effects such as pruritis, urinary retention, and respiratory depression, their addition will provide long lasting analgesia after resolution of the local anaesthetic effect. The post-surgical pain that the patient experiences with the rapid regression of spinal anaesthesia can be intense, particularly when limited provisions for analgesia are made such as omitting peripheral nerve blocks,^{1 2} neuraxial opioids,¹³ or other systemic analgesia and this certainly contributed significantly to the poor pain control that the spinal group reported in this study.

Secondly, the duration of effectiveness of the local infiltration analgesia (LIA) technique was surprisingly short. Given the recent excitement for the potential of LIA as a simple method of pain relief after knee replacement¹⁴ it was disappointing to see how poorly it performed in this study. Personal clinical experience of using LIA has given the impression of an effective but short-lasting effect. The study by Harsten and colleagues¹² reinforces our impression because although the LIA appeared to provide good early analgesia in the GA group by the time the sensory block had resolved in the spinal group, the analgesic effectiveness of LIA appears to have disappeared.

It is also interesting to note that despite availability of rescue analgesia, the spinal group continued to experience significantly more pain for 2 days after surgery. The landmark editorial by Wall¹⁵ who coined the term preoperative pre-emptive analgesia and more recent work on preventive analgesia^{16 17} also note the 'protective' effect of opioids and other analgesics such as N-methyl D-aspartate receptor antagonists on pain control well beyond the clinically expected duration of these drugs. The seemingly prolonged analgesic effect of an intraoperative dose of oxycodone appears also to have provided some 'preventive' analgesic effect in the GA group. Conversely, there is no evidence of a hyperalgesic effect from remifentanyl infusion that has previously been demonstrated.¹⁸ Finally, although a significant difference in LOS was demonstrated between the GA and spinal group, a 6 h differential may be of limited clinical or practical significance in most institutions and might not actually influence the day of discharge.

Several important messages can be taken from this paper. First, despite current beliefs, it appears that a good quality GA technique such as the TCI method can in fact provide effective anaesthesia and transition to reasonable postoperative analgesia after knee replacement. This may be a very useful option in centres that are currently unable to provide consistent high-quality regional anaesthesia such as neuraxial anaesthesia, continuous peripheral nerve blocks, or both.^{1 2 19} Secondly, the importance of multimodal analgesia in facilitating good pain control is underscored by the fact that all patients

were given acetaminophen and celecoxib. The better pain control in the GA group reflects the important role that long-acting opioids continue to play in the context of multimodal postoperative analgesia especially when given before recovery of anaesthesia. Finally, the transient and disappointing effect of the LIA technique was especially evident in the spinal anaesthesia group and continues to call into question the overall utility of this method²⁰ especially when used alone without systemic or spinal opioids.

TKA is a common and painful surgical procedure that requires effective, safe anaesthesia and good postoperative pain control to facilitate best outcomes including reduction in LOS and chronic pain after surgery.⁴ Harsten and colleagues¹² demonstrate that the TCI GA technique used compares favourably with a very limited spinal anaesthesia technique. However, better regional anaesthesia methods are available in centres that have the expertise and resources to provide them.^{1 2 19} Regional anaesthesia including neuraxial techniques continue to provide short-, medium-, and long-term outcome^{1 2 8 9 21 22} benefits for patients having TKA. Although Harsten and colleagues provide thought provoking data they do not really compare their GA technique with the standard of care for spinal anaesthesia¹³ not to mention peripheral nerve block techniques.^{1 2 19} Further studies are required to continue to investigate the best method of anaesthesia and postoperative analgesia for patients undergoing TKA (including GA techniques) before significant change in guidance can be advised.

Authors' contributions

Both authors contributed to the writing of this editorial.

Declaration of interest

None declared.

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EDITORIAL V

Ventilator associated pneumonia: can we ensure that a quality indicator does not become a game of chance?

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Critical care was an early focus of national quality improvement (QI) programmes, driven first by the US-based Institute for Healthcare Improvement (IHI) (<http://www.ihl.org>) and later adopted in the UK by initiatives such as the Patient Safety First initiative (<http://www.patientsafetyfirst.nhs.uk/Content.aspx?path=/interventions/Criticalcare/>) and Scottish Patient Safety Programme (<http://www.scottishpatientsafetyprogramme.scot.nhs.uk>). Much emphasis has been placed on nosocomial infection, of which the most prevalent in the intensive care unit (ICU) is ventilator associated pneumonia (VAP).¹ Ideally, indicators for QI should be person-centred, safe, effective, efficient, equitable, and timely. VAP rates

fulfil most of these criteria, because they are relevant to all ICUs, are associated with adverse patient outcomes, and result in greater use of broad-spectrum antibiotics.¹ In principle, measuring VAP rates seems straightforward, does not increase risk to patients, and can be undertaken in all ICUs at low cost.

Various interventions decrease the incidence of VAP when introduced effectively. The quality of evidence for some of these is weak, such as nursing in the head-up position, avoiding frequent ventilator circuit changes, using heat and moisture exchange circuit humidification, and hand-washing, but as these interventions are inexpensive they are strongly