



Editorial

Extending epidural anaesthesia for urgent (code-red or Category 1) caesarean section: Factors of success



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For many years, being called by the midwife or the obstetrician for an urgent caesarean section (CS) was an anxiety-provoking situation for the anaesthetist on duty. Achieving rapid and safe anaesthesia for an obstetric patient presented significant challenges, and the role of extension of labour epidural analgesia was recognised early on. There was, however, considerable variation in its practice, with no consensus on the most effective local anaesthetics among a wide range of drugs (doses and concentrations) being used, and a controversy over the acceptable block height to ensure the absence of pain during surgery and even the urgency of the clinical situation, all having an impact. There was little evidence to support standardised practice. Concerns about the potential consequences of rapidly injecting a large dose of local anaesthetic often led to a limitation of the total volume of local anaesthetic given (volume often less than 15 mL). As a result, women often experienced pain at the time of incision, and an unacceptably low success rate associated with labour epidural extension for CS was observed. Milne et al. reviewed the anaesthetic management of 722 consecutive cases of CS and found an overall success conversion rate of 69%, widely regarded as a too low rate to ensure safe practice [1].

The last twenty-five years have seen a significant evolution in the practice of obstetric anaesthesia, notably in 1991, with the launch of the *International Journal of Obstetric Anesthesia*. This first journal devoted exclusively to obstetric anaesthesia has played an essential role in the development of the sub-speciality, providing a platform for research and publication for the principal elements of anaesthetic care for the obstetric patient. In the very first issue, Morgan et al. described a simple way to extend labour epidural analgesia to produce satisfactory extension for an urgent CS [2]. The technique of injecting 20 mL of lidocaine with adrenaline,

whatever the situation (duration of previous labour, height of the existing block), was relatively straightforward and the authors described a high success rate, albeit in a small series of patients. In 1995, Russell et al. published the first [3] in a series of landmark papers [4–6] investigating the most effective way to assess the height of the neuraxial block to ensure painless surgery during CS. Rather than the absence of cold sensation alone, the loss of sense of touch was demonstrated as a predictor of pain during CS; when above T5, the absence of sense of touch is the most reliable way to ensure a high enough block for a painless surgery. Lucas et al. published another study that modified the management of non-elective CS in 2000 [7]. They asked obstetricians and anaesthetists to assess the urgency of ten hypothetical cases of CS using a variety of classification systems. The most consistent scoring was obtained with a classification system of urgency based on clinical definitions, which was subsequently recognised by the publication of a joint Royal College of Obstetricians and Gynaecologists (RCOG)/Royal College of Anaesthetists (RCOA) statement [8]: the national adoption of a single classification system had benefits in terms of improved data collection and multidisciplinary communication. The statement stressed that in the non-elective CS, there was a continuum of urgency and that each situation should be assessed on a case-by-case basis. To emphasise the “continuum” of urgency, the statement included a colour scale. Many units of several countries, including France, now use this classification [9].

In this issue of *Anaesthesia Critical Care & Pain Medicine*, Bidon et al. present the findings of their retrospective cohort study of decision-to-delivery interval and neonatal outcomes for code-red emergency CS. A “code-red” situation corresponds to the RCOG/RCOA Category 1 CS – where there is an immediate threat to the life of the mother or baby. Bidon et al. demonstrate that it is feasible to quickly and effectively extend labour analgesia epidural for CS and that a general anaesthetic is not necessarily required in urgent cases. More precisely, the median decision-to-delivery interval was 10 [8–12.5] min, and the interval was ≤ 15 min in 174 (90%) women. A general anaesthetic was necessary in only 7% of cases because of epidural extension failure, although sedation was used in 17% of cases, suggesting that in several patients the quality of anaesthesia was not perfect. Nevertheless, these findings are mostly reassuring for all anaesthetists who work in maternity units.

Bidon et al. also undertook a comparison of neonatal outcomes between those who received epidural extension of labour analgesia and those who had a general anaesthetic. The analysis

was limited by the characteristics of the women who received general anaesthesia and were predominantly not in labour, did not have an epidural anaesthesia instead and were not in the delivery ward, in contrast to women who received epidural extension. Additionally, when comparing neonatal outcomes between women who received neuraxial anaesthesia *versus* general anaesthesia for CS, it is crucial to consider the impact of confounding factors, such as the underlying condition of the mother or baby before the CS. Any results obtained may not necessarily be related to the anaesthetic technique, but rather to the underlying situation. The authors tried to mitigate for underlying differences by using multivariate analysis in order to adjust for confounders. Their results, indicating a better neonatal outcome with regional anaesthesia, compare favourably with those obtained by Palmer et al. (although the study of Palmer et al. did not adjust for potential confounding factors) [10]. This area requires further exploration in the future.

The primary result, showing that the vast majority of patients could undergo a code-red CS in 10 minutes, highlights the role of organisational infrastructure that supports rapid delivery when maternal or foetal compromise occurs. Bidon et al. addressed organisational imperfections [11] and implemented local rules to minimise delays to an emergency CS. A key aspect of the study of Bidon et al. was the ability to summon the labour ward team rapidly; the maternity unit was equipped with a button that triggered a telephone call to all team members simultaneously as a simple mean to facilitate communication. A similar system has previously been described with this group, achieving a mean decision-to-delivery time of 15 minutes, with all but one of the 113 cases being delivered within 30 minutes [12]. Using a standardised and familiar classification to define urgency is an important measure to clarify communication within the obstetrical team, and thus improve patient outcomes. It should be embedded in a well-defined organisational culture [13].

These strategies worked because all team members were permanently present in the maternity unit, as is it often the case in large units with a high volume of deliveries.

The high epidural rate in this maternity unit reflects the high rate of labour epidural use in France, which formed the basis to use epidural extension for anaesthesia in emergency CS in this unit. A senior anaesthetist was always involved, and the epidural top-up was commenced as soon as possible after the decision was made, which means before transfer to the operating theatre. The authors balanced concerns about the rare but severe complications of local anaesthetic toxicity and high neuraxial block against the potential to expedite delivery. During the top-up, the patient was carefully monitored by a nurse anaesthetist before being transferred to the operating theatre, located only 20 metres away from each delivery room.

In summary, obtaining excellent and rapid regional anaesthesia for emergent (code-red or Category 1) CS is feasible in the vast majority of cases with optimal organisation and best practice. National recommendations in the UK are to perform a Category

1 and 2 CS as quickly as possible after making the decision. The work published in ACCPM demonstrates the vital role labour epidural analgesia can play in the provision of anaesthesia for a CS; emergency anaesthesia should then not be limited to spinal or general anaesthesia.

Disclosure of interest

The authors declare that they have no competing interest.

References

- [1] Milne MK, Dalrymple DG, Allison R, Lawson JI. The extension of labour epidural analgesia for Caesarean section. *Anaesthesia* 1979;34(10):992–5.
- [2] Price ML, Reynolds F, Morgan BM. Extending epidural blockade for emergency caesarean section. Evaluation of 2% lignocaine with adrenaline. *Int J Obstet Anesth* 1991;1(1):13–8.
- [3] Russell IF. Levels of anaesthesia and intraoperative pain at caesarean section under regional block. *Int J Obstet Anesth* 1995;4:71–7.
- [4] Russell IF. Testing regional anaesthesia before caesarean section. *Anaesthesia* 1998;53:93–4.
- [5] Russell IF. Assessing the block for caesarean section. *Int J Obstet Anesth* 2001;10:83–5.
- [6] Russell IF. The futility of using sharp pinprick (or cold) to assess spinal or epidural anaesthesia for cesarean delivery. *Reg Anesth Pain Med* 2001;26:385–7.
- [7] Lucas DN, Yentis SM, Kinsella SM, Holdcroft A, May AE, Wee M, et al. Urgency of caesarean section: a new classification. *J R Soc Med* 2000;93:346–50.
- [8] The Royal College of Obstetricians and Gynaecologists, the Royal College of Anaesthetists. Setting standards to improve women's health. Classification of urgency caesarean section. A continuum of risk; 2010. <https://www.rcog.org.uk/globalassets/documents/guidelines/goodpractice11classificationofurgency.pdf>. (accessed 10/07/2019).
- [9] Dupuis O, Sayegh I, Decullier E, Dupont C, Clement HJ, Berland M, et al. Red, orange and green Caesarean sections: a new communication tool for on-call obstetricians. *Eur J Obstet Gynecol Reprod Biol* 2008;140:206–11.
- [10] Palmer E, Ciechanowicz S, Reeve A, Harris S, Wong DJN, Sultan P. Operating room-to-incision interval and neonatal outcome in emergency caesarean section: a retrospective 5-year cohort study. *Anaesthesia* 2018;73:825–31.
- [11] Sayegh I, Dupuis O, Clement HJ, Rudigoz RC. Evaluating the decision-to-delivery interval in emergency caesarean sections. *Eur J Obstet Gynecol Reprod Biol* 2004;116(1):28–33.
- [12] Wee HY, Quek SC. An effective system of mobilisation in Singapore. In: *BMJ rapid responses*; 2001. <https://www.bmj.com/content/322/7298/1330/rapid-responses> (last access August 04, 2019).
- [13] Mickan S, Rodger S. Characteristics of effective teams: a literature review. *Aust Health Rev* 2000;23(3):201–8.

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