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What is the place of dural puncture epidural in labour analgesia?

Epidural analgesia is the gold standard for labour analgesia. Dural puncture epidural analgesia is a modification of the conventional technique, where the dura is intentionally perforated with a spinal needle but no intrathecal medication is given. This article reviews the evidence for and against the clinical use of dural puncture epidural.

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Introduction

Labour analgesia is an important area of clinical practice, provided by a range of techniques including Entonox, intramuscular opioids such as pethidine, intravenous opioids such as remifentanil and neuraxial techniques (NHS England, 2023). Use of Entonox may reduce pain without any harmful side effects but can cause nausea and dizziness for the mother (NHS England, 2023). Intramuscular opioids are associated with maternal nausea and drowsiness, and can have harmful effects on the infant's breathing if given close to the time of delivery (NHS England, 2023). Short-acting intravenous opioids can also cause harmful effects on the mother's and infant's breathing (NHS England, 2023).

Neuraxial analgesia for labour is common, with approximately 33% of women in the UK choosing to have an epidural (Cambic et al, 2010). Despite being safe and effective, epidurals can cause complications such as severe headache, transient or permanent nerve injury, unilateral or failed block (Chau et al, 2017). Research has focused on methods to optimise the efficacy of a labour epidural, but the onset of analgesia remains gradual and some women experience inadequate analgesia in the second stage of labour because of limited sacral spread of epidural medication (Vally and Van De Velde, 2022). Alternative neuraxial techniques include combined spinal-epidural, single shot spinal and dural puncture epidural.

Dural puncture epidural involves the same loss of resistance technique as conventional epidurals, and the dura is punctured with a spinal needle as in combined spinal-epidural, but no intrathecal medication is administered. The hypothesis is that the dural puncture provides a conduit for the epidural medication to spread intrathecally (Chau et al, 2017).

Advantages of dural puncture epidural

The benefits of dural puncture epidural are a faster onset of analgesia, more reliable block, reduced incidence of unilateral block and reduced sacral sparing compared to a conventional labour epidural (Chau et al, 2017; Vally and Van De Velde, 2022). Dural puncture epidural analgesia has a median onset of 11 minutes compared to 18 minutes with a conventional epidural (Chau et al, 2017).

Dural puncture epidural appears to offer advantages when compared to combined spinal-epidural. Although the median onset time of analgesia with combined spinal-epidural is even faster at only 2 minutes, it can be complicated by maternal side effects including hypotension, pruritis and uterine hypertonus (Chau et al, 2017). Direct intrathecal administration of local anaesthetic and opioid can cause fetal bradycardia and compromise. Dural puncture epidural allows a small amount of local anaesthetic and opioid to spread intrathecally, but has fewer associated complications as the total amount reaching the intrathecal space is significantly reduced (Cook et al, 2009).

NAP3 confirmed that combined spinal-epidural was associated with the highest rate of complications (Cook et al, 2009). When performing a combined spinal-epidural, immediate assessment of the efficacy of the epidural can be challenging, which is problematic when the patient has to be taken to theatre urgently before the spinal component has worn off (Cappiello et al, 2008). With dural puncture epidural, the presence of CSF in the spinal needle confirms midline placement and may result in lower failed epidural rates (Vally and Van De Velde, 2022).

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Disadvantages of dural puncture epidural

There is limited evidence confirming a clear benefit of dural puncture epidural over conventional epidurals (Vally and Van De Velde, 2022).

The mechanism determining flux of medication through the meninges relies on multiple factors including the size of the dural hole, total volume of epidural drug administered and the injectate pressures. Studies have shown that for the dural puncture epidural to be effective, at least a 25G spinal needle must be used in order to allow sufficient spread of intrathecal medication (Vally and Van De Velde, 2022). The underlying mechanism is thought to be because there is a larger hole in the dura, but this may result in an increased risk of post-dural puncture headaches. Furthermore, to get the local anaesthetic to enter the intrathecal space from the epidural space may require higher injectate pressures than the standard pump delivery system. This may require a physician-delivered manual bolus of the anaesthetic drug, increasing the physician workload (Vally and Van De Velde, 2022).

Compared with a conventional epidural, dural puncture epidural is also associated with an increased instrumental delivery rate and lower incidence of spontaneous vaginal delivery (Cappiello et al, 2008).

Conclusions

Neuraxial techniques require further optimisation to improve block quality and side-effect profiles, and ultimately improve maternal satisfaction. The conventional epidural is safe but can be associated with a slow onset, variable quality block. Combined spinal-epidural has a faster onset but is associated with more complications. Dural puncture epidural may be the happy medium but the completed studies include small numbers of cases with incomplete evidence and show varied results. More research is needed to support dural puncture epidural as a favourable technique for labour analgesia.

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