International Journal of Obstetric Anesthesia (2010) **19**, 61–66
0959-289X/$ - see front matter
doi:10.1016/j.ijoa.2009.06.003

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ORIGINAL ARTICLE

A double blind comparison of the variability of block levels assessed using a hand help Neurotip™ or a Neuropen® at elective caesarean section under spinal anaesthesia

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ABSTRACT

Background: We previously noted that when two experienced anaesthetists assessed the level of spinal block to touch at caesarean section, one with a hand held device (Neurotip™), and the other with a very similar spring loaded device (Neuropen®), the median difference between the assessed levels of block was zero but there were some wide individual paired differences between the anaesthetists. We theorised that differences in the applied pressure of the stimulus may have contributed to this variation. We wished to investigate whether compared to the Neurotip™, the Neuropen® would reduce the variability of assessed block levels between anaesthetists of varying experience.

Methods: The levels of block to touch and sharp pinprick were assessed by paired anaesthetists using both the Neurotip™ and Neuropen®. The anaesthetists were blind to each other's assessments. To ensure comparability of dermatome identification, the patient's torso was marked before surgery.

Results: In 44 cases, managed by 35 different pairs of anaesthetists, there was no statistically significant difference in the variability of differences in assessed levels of block between anaesthetists (P=0.23) whether the Neurotip™ or Neuropen® or touch or sharp pinprick were used. The median dermatomal difference [upper quartile, lower quartile] was 0 [1, -1] for both instruments with both touch and sharp pinprick.

Conclusion: Compared to the Neurotip™, the Neuropen® did not result in a reduction of the variability in the differences in spinal block levels when assessed by 35 different pairs of anaesthetists.

Keywords: Spinal anaesthesia; Sensory block assessment; Caesarean section

Introduction

Spinal anaesthesia is used for the vast majority of caesarean sections in the UK and pain during surgery is a common cause of complaint.[1] While there is general agreement on the height of the block required for caesarean section there is continued controversy as to which sensory modality should be used to assess the level of block. The commonly used modalities are cold, pinprick and touch and it is well recognised that for any individual spinal anaesthetic each of these modalities may indicate a different level of block. Furthermore, even within the same testing modality there are different ways of presenting the stimulus. Touch, for example, can be assessed by such mechanisms as stroking (cotton wool, Von Frey hairs), prodding (blunt needle, Von Frey hairs), or the sensation from the fluid jet of an ethyl chloride spray or a jet of air from an 18-gauge needle. Whether the use of different mechanisms for testing the same sensation makes a difference to the assessed level of block is unknown.

In a previous study from our unit two experienced anaesthetists, one using a Neurotip™ (Fig. 1a) and the other using a Neuropen® (Fig. 1b) compared their assessments of a spinal block using the touch sensation created by the blunt round needle tip of these instruments.[2] In that study, although the median dermatomal difference between levels of block obtained by two assessors using two methods was zero, there were frequently disparities of two or more dermatomes between the two assessors and, at times, some short-lived wide disparities of up to seven dermatomes. We postulated that some of the variation in assessed levels of block could be due to differences in the applied pressure by the two assessors. If this hypothesis were correct then, in theory, if all anaesthetists applied the same standardised pressure, variation in block levels assessed by pairs of anaesthetists should be much reduced. We conducted this study

Accepted June 2009
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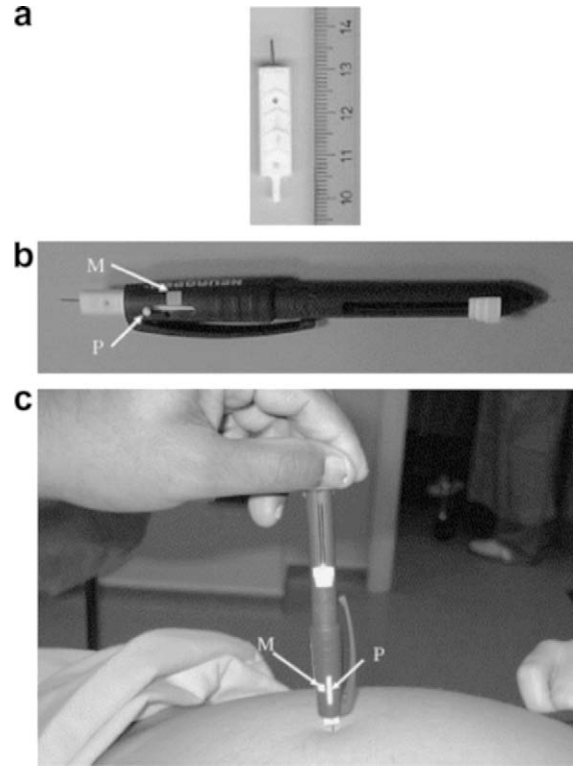

Fig. 1 (a) A Neurotip™ alongside a centimetre scale. (b) The Neuropen® device showing the Neurotip™ loaded. The pointer on the side of the Neuropen is arrowed ''P'' and the mark with which the pointer should line up during skin testing is arrowed ''M.'' (c) The Neuropen® showing the Neurotip™ pressed onto the skin and the Neurotip™ depressed into the body of the Neuropen®. The Neuropen® is pressed against the skin until the pointer (''P'') lines up with the white mark on the body of the pen (''M''). This then corresponds to 40 g pressure on the skin.

to investigate whether, compared to the Neurotip™, using the Neuropen® would reduce the variability of assessed block levels between pairs of anaesthetists of varying experience.

Method

The study was approved by the Hull and East Yorkshire Hospitals Local Research Ethics Committee. The study population were ASA I or II women scheduled for elective caesarean section under spinal anaesthesia and who gave informed consent to participate. Women were seen on the morning of surgery by one of the two anaesthetists to be involved in their care and informed consent was obtained. Just before the patient came to the operating theatre, a 5-cm wide strip of low allergenic tape (Micropore, 3M Health Care Ltd, Leicestershire, UK) was applied to the midline of the patient's body, from sternal notch to umbilicus. Dermatomal levels from T3 to T10 were estimated and marked on the tape.

The Neurotip™ (Owen Mumford, Oxford, UK) consists of a short, round-tipped blunt needle mounted in a plastic body. The Neuropen® (Owen Mumford, Oxford, UK) consists of a Neurotip™ that is spring-mounted into a pen-like body. When using the Neuropen® the end of the blunt needle is pressed against the skin and the force applied by the assessor is standardised by pushing on the pen until a marker on the Neurotip™ aligns with a white mark on the pen body: this is described as the equivalent of 40 g pressure.[2] When using the Neurotip™ it was pressed momentarily against the patient's skin according to the assessor's own interpretation of the required pressure.

The spinal anaesthetic, consisting of 0.5% bupivacaine in 8% w/v dextrose (2.3–2.8 mL) with diamorphine 0.3 mg, was administered at what was estimated to be L3-4 interspace with the patient in a lateral or sitting position depending on her body habitus. Generally, the spinal was performed by the more junior of the two anaesthetists.

The two anaesthetists assigned to each case designated themselves A or B. At 5, 10, and 20 min after spinal injection and again at the end of surgery the block levels on the left were assessed by both anaesthetists. A screen was placed in front of the mother to ensure that she could not see when and how the stimulus was applied to her skin. To minimise the potential for the spinal block levels to have changed between the assessments made by A and B, comparisons were not made until 5 min and only the left side was tested before changing the assessor. It takes about 10-15 s to assess the block to touch and pinprick on one side with one instrument. Before the first of each sensory assessment, a control stimulus with the chosen device was applied to the upper arm to allow the mother to feel what the sharp pinprick felt like. The levels of block to touch and sharp pinprick were checked on the left side first by A using both the Neurotip™ and Neuropen® and then immediately B would do likewise. Anaesthetist A always tested first at each assessment. Each anaesthetist chose for themselves which instrument to use first and this was always used first for any individual patient. Neither anaesthetist was aware of the order of the instruments used by the other, nor the levels of block the other had obtained. The assessed block levels were recorded on separate data-collection sheets so that the anaesthetists remained blind to the block levels obtained by each other. After both A and B had assessed the left-sided block the principal anaesthetist (who may have been either A or B) then checked the right side to ensure there was no major discrepancy in the block levels by his/her assessment. The start of the surgical procedure was determined by the principal anaesthetist, once satisfied with the bilateral block levels.

The touch level was defined as the first level where touch was appreciated. The question asked of the