



## Short Report

## Investigating the use of non-loss of resistance syringes for epidural insertion: experience on a mannequin

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## ABSTRACT

**Introduction:** The Obstetric Anaesthetists' Association has released a statement outlining the disruption to supply of the Portex® Loss of Resistance Syringe (Smiths Medical, UK) which is commonly used for epidural insertion within our Trust. We sought to investigate the use of standard available syringes for epidural insertion and whether tactile feedback when getting loss of resistance was similar.

**Methods:** Using an epidural trainer model, we asked anaesthetists regularly working in the maternity unit to trial three alternative syringes (10 mL BD Emerald, 10 mL BD syringe from our epidural packs, and 20 mL BD Plastipak) (Becton Dickinson U.K. Limited, UK) and to complete a qualitative questionnaire about their experience.

**Results:** Responses from 16 anaesthetists, including individuals with a range of obstetric anaesthetic experience who regularly provide obstetric anaesthesia, were collected. With the BD Emerald 10 mL syringe, 81% considered there was no difference or only a slight difference when feeling for loss of resistance. For the BD 10 mL syringe, this figure was 75%. With the 20 mL syringe 66% reported either a reasonable or marked difference in tactile feel. The most popular syringe was the 10 mL BD Emerald syringe.

**Conclusion:** Using an epidural training mannequin, this study suggests that it is still possible to elicit clear loss of resistance using alternative syringes. Of the three alternative syringes commonly available in our organisation, the BD Emerald 10 mL syringe was the most popular.

## Introduction

The Obstetric Anaesthetists' Association (OAA) has recently released a statement outlining the disruption to the supply of the Portex® Loss of Resistance (LOR) Syringe (Smiths Medical, UK) which is commonly used for epidural catheter insertion in our Trust and many Trusts around the country.<sup>1</sup>

There is a wealth of literature investigating whether there is a difference in success rates and complication rates of epidural insertion when using LOR to saline or air.<sup>2-3</sup> Results from several trials were reviewed by Cochrane in 2014, with no significant difference found.<sup>2</sup> Likewise, there are many investigations of the various other methods of identifying the epidural space, for example using the Epidrum® or acoustic devices.<sup>4</sup> Loss of resistance to saline with the continuous advancement of the epidural needle remains the most common epidural insertion technique according to a recent Association of Anaesthetists survey.<sup>5</sup>

There is, however, limited literature comparing specific low resistance syringes, such as the Portex® syringe, to standard syringes

commonly used in anaesthetic practice. Early work compared the gliding characteristics of several different syringes including the Portex® syringe.<sup>6</sup> This showed the Portex® syringe performed favourably, although the setting was laboratory testing. The OAA statement suggests using alternative syringes in the absence of LOR syringe availability. We sought to further compare the use of specific LOR syringes with commonly available syringes. To our knowledge, this is the first study of its kind and was performed in an attempt to support anaesthetists in the context of a LOR syringe shortage.

## Method

Our study did not require ethical approval according to the NHS Research Ethics Committee assessment tool.<sup>7</sup>

Using our epidural trainer model (Limbs and Things Advanced Epidural and Lumbar Puncture Model, Limbs and Things Ltd., Bristol, U.K.), we asked anaesthetists who regularly work in the maternity unit

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Fig. 1. Left to right: Portex® LOR syringe, 10 mL BD Emerald, 10 mL BD Plastipak, 20 mL BD Plastipak.

to trial three different syringes used in the department and to compare them with the Portex® LOR syringe. This specific model was used for the first time for this study to avoid previous usage affecting the tactile feedback. We primarily investigated the similarity or difference in tactile feedback during LOR to enter the epidural space. The syringes used were the 10 mL BD syringe (found in our epidural packs), the 20 mL BD Plastipak and the 10 mL BD Emerald syringe (Becton Dickinson U.K. Limited, UK) (Fig. 1).

All syringes used Luer-slip to connect to the epidural needle. Respondents were asked to complete a qualitative questionnaire about their experience and asked: A. Whether there was any difference in tactile feedback when compared with the Portex® syringe. B. How confident they would be in using that syringe on a patient. C. Which would be their syringe of choice in place of the Portex LOR syringe.

**Results**

We collected responses from 16 anaesthetists, including individuals with a range of obstetric anaesthetic experience who regularly provide obstetric anaesthesia. All participants used an 80 mm 16-gauge Tuohy needle (Smiths Medical, UK). The participants included consultant specialists (56%), SAS (Speciality and Associate Specialist doctors who are non-training doctors on the registrar level rota) (32%), and core trainees (trainee doctors in their first three years of postgraduate anaes-

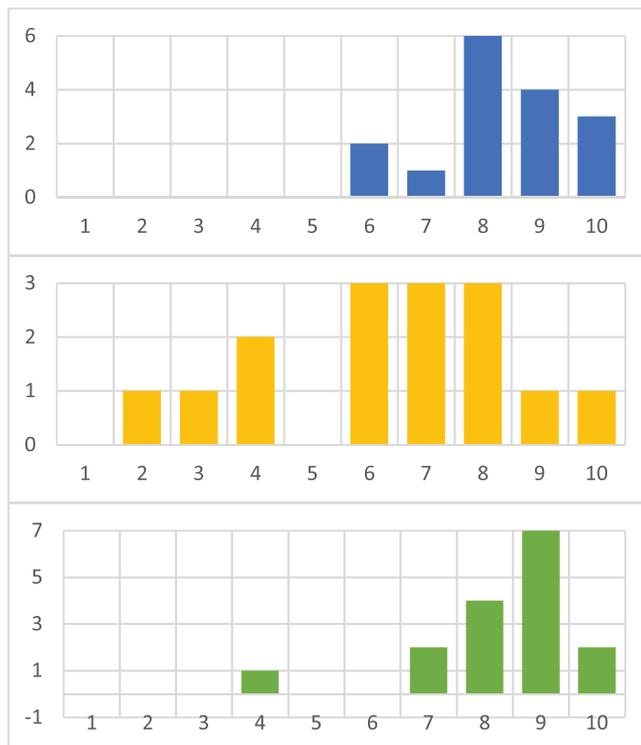


Fig. 3. Based on your experience on the mannequin, on a scale of 1-10 how confident would you be using the alternative syringe on a patient? Top to bottom: BD 10 mL, BD Plastipak 20 mL, BD Emerald 10 mL.

thetic training) (13%). All reported having between 2 and 10 mL of saline in the syringe with the majority reporting between 6 to 8 mL. All reported their technique to be holding the syringe plunger with one hand and the Tuohy needle wings with the other.

With the BD Emerald 10 mL syringe, 81% felt there was no difference or only a slight difference when applying LOR (Fig. 2). With the BD 10 mL syringe this figure was 75%. The results with the 20 mL syringe were more mixed with 66% reporting either a reasonable or marked difference in feel (Fig. 2).

Both 10 mL syringes also performed well when participants were asked how confident they would be in using that syringe on a patient (using a 10-point rating scale). The responses for the 20 mL syringe were more varied, with responses from two to 10 (Fig. 3).

Comments from participants suggested that all three syringes provided a clear tactile response, with LOR still clearly discernible. The negative comments related to the 20 mL syringe and reflected the dif-

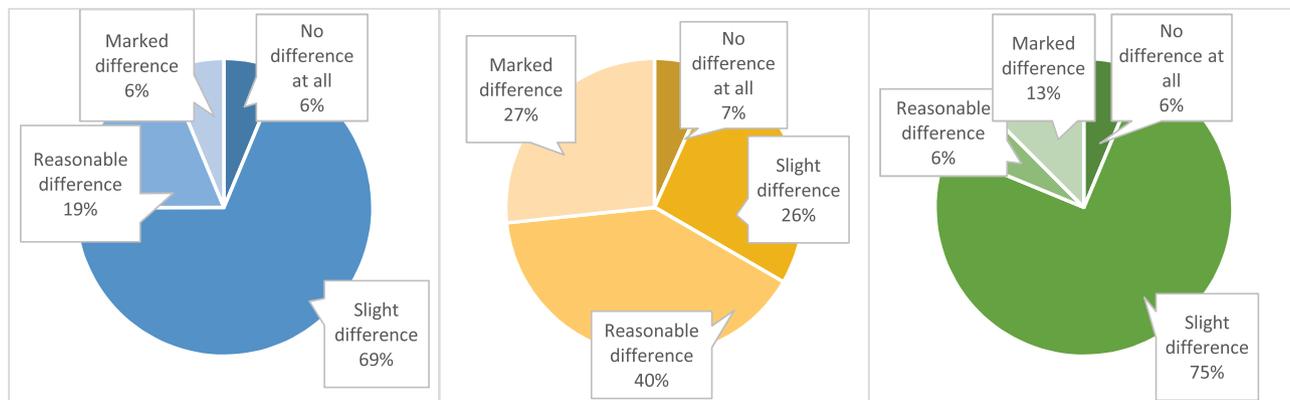


Fig. 2. Did you feel there was a difference between the LOR syringe and the trial syringe when feeling for LOR on the mannequin? Left to right: BD 10 mL, BD Plastipak 20 mL, BD Emerald 10 mL.

ference in the size of the syringe rather than the tactile feedback generated upon LOR and many anaesthetists noted that the syringe felt too bulky. This may reflect that standard practice in our Trust is to use a 10 mL syringe. Of the three syringes studied, the 10 mL BD Emerald syringe was the preferred choice of 64% of respondents, with the rest split equally between the other two options.

## Discussion

The National Health Service in the UK is currently facing significant disruption to its supply chains. As such, staff must demonstrate flexibility and respond accordingly in their clinical practice. This requirement must be balanced against the risk to patients in changing a well-established practice. This is particularly important for practical procedures, such as epidural placement, which relies on tactile feedback, and which is determined in part by the equipment used. Results using the mannequin in this study were positive, with most anaesthetists still able to elicit a clear LOR with each syringe. Anecdotally, the rate of accidental dural puncture in our unit has not increased since alternative syringes have been used in addition to the Portex® LOR syringe. The use of an epidural simulator to compare different syringes allowed comparison that would not be feasible in a patient cohort, although the simulator cannot completely simulate the in vivo tactile feel of the procedure.

As described in the OAA statement, alternative syringes may have to be used in the absence of Portex® LOR syringes. Using an epidural training mannequin, we have shown that it is still possible to elicit clear LOR using alternative syringes. Of the three alternative syringes commonly available in our organisation, the BD Emerald 10 mL syringe was the most popular. In our study, the majority of the anaesthetists who participated were confident to use this syringe in a clinical setting. We suggest further work should be undertaken to iden-

tify if there is a significant difference in rates of dural puncture when using standard syringes compared with low resistance LOR syringes.

## Funding

None.

## Declaration of interests

None.

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