A Service Evaluation of Ultrasound Assessment of the Epidural Space: A Retrospective Audit

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ABSTRACT

Interest in the ultrasound assessment of the epidural space prior to regional anaesthesia is becoming extremely popular. The published data to date comes mainly from single operators performing scans in clinical trial settings. The clinical data from a busy teaching unit has been examined to see how it compares with standards in the published literature. 114 scans were performed by a total of 6 consultant anaesthetists as part of their normal clinical work. The majority of scans were performed for either maternal obesity (72%) or training (18%). The difference between the ultrasound assessed depth and needle depth was 0.25 +/- 0.7 (mean +/- sd) cm. The correlation coefficient (r) for these two variables was 0.86. This data suggests that the ultrasound reliably measure depth of epidural space in a routine clinical setting.

Keywords: Ultrasound, Epidural space, Epidural block, Obesity, Parturients.

INTRODUCTION

Interest in ultrasound assessment of the epidural space is becoming extremely popular, both in the United Kingdom and many other developed countries.1 It is thought that this technique offers increased success rate, improved maternal comfort and improved learning dynamics in trainee anaesthetists.2-4 Up until now this technique has been described mainly as a research tool by enthusiasts, the data coming mainly from carefully conducted projects. The scanning has often been performed by highly specialised single operators. It is difficult, therefore to know whether the results achieved are applicable to multiple practitioners using this as a clinical tool. The delivery suite at Leicester Royal Infirmary, Leicester, UK is a tertiary referral unit delivering just over 6500 women per year. A significant number of women (5-8%) booked at our institution with a body mass index (BMI) greater than 35 kg/m². This trend has been increasing over the last few years. Ultrasound was introduced to our unit in 2006 to help with the siting of central neuroaxial blocks in this group of patients. Training has gradually spread through our unit and scanning is now routine practice. Of the eight consultants with regular obstetric anaesthetic sessions, six now regularly use ultrasound assessment. The National Institute for Clinical Excellence (NICE) recommends service evaluation against a number of key performance outcomes.1 Our computer records have captured data for this procedure over the last two years. A retrospective audit of our practice to date was conducted to compare our performance against the currently available published data.

METHOD

Permission was granted from our institutional audit board (CASE) to perform this audit. A retrospective search of our computerised maternity database, Euroking™, was performed. Data from all patients, where ultrasound had been used, over a two-year period from 1st January 2008 to 31st December 2009, was examined.

Our results were compared against the outcome variables described in the NICE guidance for ultrasound assessment of the epidural space1 and those in the current literature.2,3 The data was analysed using SPSS v14.

RESULTS

We identified 114 patients in whom ultrasound assessment of the epidural space had been performed. BMI ranged from 17 to 57 (median 36). Six different consultants were responsible for directly supervising or performing the ultrasound assessments. Table 1 shows the indications for using ultrasound as a preinsertion technique.

When ultrasound assessed depth was compared with needle depth, a correlation coefficient of 0.86 was observed implying a good level of agreement (Fig. 1).

A Bland and Altman plot, for comparison of methods, was constructed to determine the limits of agreement between

Table 1: Indications for ultrasound scan

<table>
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<tr>
<th>Number of cases</th>
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<tr>
<td>Obesity (BMI &gt; 30)</td>
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<td>Spinal deformity</td>
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<td>Training</td>
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<td>Previous difficult epidural</td>
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ultrasound depth and needle depth assessment (Fig. 2). In the majority (80%) patients, the ultrasound depth was less than the depth measured at needle placement. In 31 (27%) patients epidural space insertions were difficult despite the use of ultrasound. Of these, 28 patients were obese (BMI > 30 kg/m²), 2 had a history of previous difficult insertion, and 1 had a spinal deformity. There were 5 episodes of transient paraesthesia during needle insertion, but no other complications were reported.

DISCUSSION
This sample data of women from an obstetric population, over 2-year period, is representative of the usual breadth of BMI measurements seen in our routine daily practice. This ranged from thin to super-morbidly obese. It is not that surprising that the correlation between these two measurements was good, as measuring a variable with two similar techniques using the same units of assessment are mathematically bound to show at least modest correlation. The mean difference and limits of agreement displayed by the Bland-Altman plot are therefore more relevant to clinical practice. They allow us to decide if the differences are clinically useful. The average difference between ultrasound depth and needle depth in this data was 0.25 cm, within the values published in the current literature, despite multiple operators with varying levels of experience performing the scans.²,³ This would imply that once this technique is learnt it is reproducible across different operators. The tendency to underestimate depth is consistent with the published literature and represents the pressure applied to mobile skin with the ultrasound probe. This is especially common in the obese population.³ Although, localisation of the epidural space with the needle remained difficult in some women, it is beyond the scope of this audit to say if they would have even been possible without the use of ultrasound, especially as many of them were in morbidly obese women. Prospective assessment is required to establish patient comfort and satisfaction with this procedure.

In conclusion, this data would suggest that this previous research tool can be adapted into routine clinical practice by a body of consultant anaesthetists in a busy obstetric unit.

REFERENCES