ORIGINAL RESEARCH PAPER

Anesthesiology

CORRELATION OF BODY MASS INDEX WITH SKIN TO EPIDURAL SPACE DISTANCE

KEY WORDS: Body mass index, Epidural space

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ABSTRACT

Background and Aim: With advent of labour analgesia and post op analgesia, epidural ananesthesia is increasingly used and this study is designed to correlate the Body Mass Index with distance from skin to epidural space, for proper identification of epidural space even in obese patients and without complications.

Materials and Methods: This is a controlled study involving 60 patients of either sex aged between 18-60 years undergoing abdominal surgeries under epidural anaesthesia. Patients are divided into two groups, Non Obese group with BMI < 30 and Obese group with BMI >30. The distance from skin to epidural space is measured with help of rubber stopped inserted in Tuhoy's needle in all.

Results: There was definite correlation between BMI and distance from skin to epidural space. The average depth was about 3.47±0.29cm in Non obese group and 4.35±0.28cm in Obese group.

Conclusion: As the BMI of the patient increased the distance from skin to epidural space also increased linearly.

Introduction:
Obesity has become a common problem nowadays with more number of patients now on higher range of Body mass index (BMI). The regional anaesthetic techniques become difficult in these patients due to various reasons like difficulty in identifying the anatomic landmarks, difficulty in positioning of patient, longer length of needles required etc.,. Commonly epidural space is identified with loss of resistance technique for air or saline in syringe. The success of epidural block depends upon the correct identification of epidural space [1]. The distance from skin to epidural space is also important for the length of cathter to be placed in epidural catheters. The distance is usually measured with help of markings in Tuhoy needle.

Aim: To correlate the Body Mass Index with Skin to epidural space distance in patients undergoing epidural anaesthesia. This would help to achieve higher success rate of epidural placement in morbid obese patients.

Methodology: This study was conducted in a tertiary care hospital after obtaining ethical committee approval. A total of 60 adult patients posted to undergo abdominal surgeries under epidural were selected. The patients included were of age 18-60 years, belongs to ASA I & II category. Those patients who refused regional technique, with spinal deformities, local site infection, patients on anticoagulants, neurological deficits, pregnant patients and those allergic to local anaesthetic were excluded from study. The patients were divided into two groups as Obese group (BMI >30) and Non obese group (BMI <30).

All the patients were briefed about the study and conduct of epidural block. Written informed consent were taken from all patients. Detailed history taking, general and physical examination done on all patients. Body Mass Index was caluculated by weight in kg divided by height in meter square. On shifting to operating room the baseline parameters like, pulse rate, Blood pressure, oxygen saturation were recorded. An intravenous line secured with 18G IV cannula and infusion of Ringer lactate started on table. The patient is placed in sitting position for epidural block. All aseptic precautions were followed. After painting the area with aseptic solution and draped, L3-L4 interspace is marked and infiltrated with 2% lignocaine. A rubber marker is inserted on the 18G Tuhoy's needle and placed near the hub. The midline approach is used in this study. Epidural block is performed by gently inserting the needle in L3-L4 interspace and loss of resistance syringe is attached. Needle is pushed gradually till epidural space is identified by loss of resistance to air. The rubber marker is pushed to touch the skin. The epidural catheter is placed and fixed at appropriate length. The needle is removed after fixing the catheter and handed over to other person not involved in study for measurement. The test of 3 ml of lignocaine 1.5% with adrenaline (1:2,00,000) is given in the catheter. After ruling out the intravascular and intrathecal placement, required volume of drug is given as per surgery and surgical procedure is performed. The quality of epidural block is assessed as satisfactory or unsatisfactory. The length measured between the tip of tuhoy's needle and rubber stopper gives the skin to epidural space distance and is measured with a standard measuring scale.

Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta.

Results: There was no significant difference in the demographic analysis in the study as to distribution of age and sex involved as in table 1.

Table 1: Demographic profile

	Non Obese group	Obese group	p value
Age (in years)	49.311.9	44.411.1	0.14 (not significanct)
Male	17	18	0.79 (not significanct)
Female	13	12	

The mean length of skin to epidural space was about 3.47±0.29cm in non-obese patients and about 4.35±0.28cm in obese patients. There were variations in length of skin to epidural space between the female and male patients which may be due to body contour. The mean length of skin to epidural space was increased in obese patients which is statistically significant (Table 2). There was a linear correlation between the epidural space distance and weight. The length increased as the weight of the patient increased as shown in table 3. But there was no significant correlation between the epidural length and height of the patient as shown in the table 4.

Table 2: Epidural length and BMI

Epidural length (in cms)	Non Obese group	Obese group	p value
Males	3.360.32	4.19±0.18	0.0006 (significanct)
Females	3.59±0.24	4.5±0.27	0.0002 (significanct)

Table 3: Epidural length and weight

Total	3.47±0.29	4.35±0.28	0.0002 (significanct)

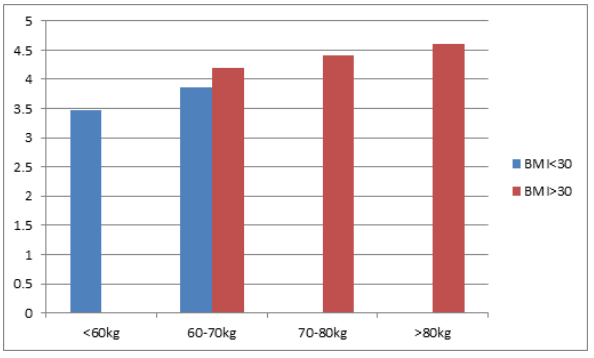
Weight	Epidural length	
	Non obese group	Obese group
<60 Kg	3.47±0.31	
60 – 70 Kg	3.86±0.3	4.2±0.09
70- 80 Kg		4.4±0.15
>80 Kg		4.6±0.44

Table 4: Epidural length and Height

Height (in cms)	Epidural length	
	Non obese group	Obese group
<150	3.46±0.39	4.5±0.1
150-160	3.52±0.24	4.37±0.23
>160	3.27±0.21	4.28±0.43
p value	0.35(not significant)	0.51(not significant)

As BMI increased, the distance between the skin to epidural space also increased and thus there was a significant correlation between the skin to epidural space distance and Body Mass Index of the patients.

Figure 1: Epidural length and BMI



Discussion: Regional anaesthesia especially epidural has become mor frequent techniques followed now with advent of postop-analgesia for major surgeries[2] and labour analagesia. But the technique is difficult in obese patients. Also the success of epidural block depends on the correct identification of epidural space and placement of the tip of catheter. The depth of epidural space as defined by Lai et al is the distance from the skin to tip of the needle penetrating the epidural space[3]. Correct identification of epidural space depends on the correct advancement of the needle at appropriate depth. Otherwise there may be false identification of loss of resistance at muscle level or ligamentum level. If the needle is advanced too further, then dural puncture occurs leading to CSF leak and its complication. As the epidural needle is wide bored, postdural puncture headache would be very severe. Total spinal can occur if drug is given intrathecally in single shot. Hence it becomes very important to identify the epidural space correctly at appropriate level.

In this study, we correlate the BMI with distance from skin to epidural space. The distance from skin to epidural space can be important in obese patient where anatomical landmarks are obscured. This would help to enhance the success rate of epidural block performance as general ananestheisa can be too risky in obese patients, as most are associated with intubation difficulties[4]. It can also be used to give good quality post op analagesia.

The distance from skin to epidural space had a linear correlation with BMI of the patients in this study. The average epidural depth in non obese patients were 3.47±0.29 cm compared to 4.35±0.28cm in obese patients. Thus as the BMI increased the distance from skin to epidural space also increased.This result was similar to that found in study by komaljitkaur et al[5], where BMI had linear correlation with epidural depth. The distance from skin to epidural space was increased as the weight of the patient increased as found in study by Palmer S et al[6].

The study to determine the systemic relationship between distance from skin to epidural space and physical contour was conducted by Hirabayshi et al[7]. They found good correlation between the body weight and epidural depth. The height of the patient had less influence on the epidural depth. This was also found in our study, where the distance from skin to epidural space had linear correlation with BMI of the patient. There was no correlation between height and distance from skin to epidural space. The same findings were found in study conducted by Rosenberg H et al[8] and Shiroyama et al[9] where the distance from skin to epidural space correlated with weight and BMI of the patient and not with age, sex or height of the patient.

Conclusion: There is a definite correlation between Body Mass Index and distance from skin to epidural space. As the BMI of the patient increased the distance from skin to epidural space also increased. The knowledge of distance from skin to epidural space can help in better identification of epidural space and epidural catheter placement with fewer incidences of complications.

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