

Does Predistention of the Epidural Space before Catheter Insertion Improves the Ease of Insertion of Epidural Catheter

Sham Sunder Goyal¹, Ishan Bansal², Priyanka Rana³, Asha Garg⁴

ABSTRACT

Introduction: Epidural anesthesia and analgesia is best modality of anesthesia and post op analgesia of choice for knee replacement surgeries. Loss of resistance (LOR) technique is commonly used for identification of epidural space. Sometimes it becomes difficult to thread epidural catheter in spite of good confirmation of epidural space. Accidental cannulation of an epidural vein is a common complication. We tested the hypothesis that predistention of the epidural space with normal saline before epidural catheterization would ease catheter insertion and decrease the incidence of its complication

Material and methods: A prospective randomized study was conducted in 100 patients with ASA grade 1-2, between 18-60 years of age, who were posted for elective knee replacement surgery. The patients with spinal deformity, contraindication to epidural anaesthesia etc. were excluded. Patients randomized into two groups, Group N (non - distention), after confirmation of epidural space with air, the epidural catheter was inserted. Group D (distention) patients got additional 5 mL saline in their epidural space after confirmation of epidural space using LOR technique with air. If any patient gets vasovagal attack or develop bradycardia, the patients were excluded from study. The ease of insertion of epidural catheter was noted, if there were accidental intravascular catheter placements or paresthesia or any other catheter related problem was noted.

Results: The age, gender and weight were comparable in both the groups. The P value was >0.05. The ease of insertion of placement of epidural catheter in (N) nondistension group 36/50 was comparable to distension group (D) 42 /49. The p value was (>0.05) not significant. The intravascular placement of epidural catheter was low in distension group 1/49 and in non distension group, it was 8/50. The p value was (<0.05) statically significant.

Conclusion: We concluded that there is no statistically significant difference with use of 5 ml normal saline for ease of insertion of epidural catheter, but same time there are statistically less intravascular placement of epidural catheter with normal saline.

Keywords: Epidural Catheter, Ease of Insertion, Loss of resistance, Intravascular Placement.

INTRODUCTION

Epidural anesthesia and analgesia is best modality of anesthesia and post op analgesia of choice for patients posted for unilateral or bilateral knee replacement surgeries. Identification of needle entry into the epidural space, for this loss of resistance (LOR) technique with air, is used commonly. It was described in 1921 by Sicard and Forestier,

till then this technique is unchanged and gold standard technique.¹ Epidural analgesia efficacy is multifactorial. Sometimes it becomes difficult to thread epidural catheter inspite of good confirmation of epidural space. Accidental cannulation of an epidural vein is a common complication associated with insertion of epidural catheter.² Injection of a sufficiently large volume of fluid before epidural catheter threading decreases the incidence of accidental venous catheter placement during epidural anesthesia.³ On the basis of a pilot study and previous reports; we tested the hypothesis that predistention of the epidural space with saline before epidural catheterization would ease catheter insertion and decrease the incidence of its complication.

Study objective was to find out the ease of insertion of placement of epidural catheter, to find the incidence of direct intravascular catheter placement and to find the incidence of vessel injuries.

MATERIAL AND METHODS

The study was conducted in total number of 100 patients, all patients were posted for elective knee replacement surgeries unilaterally or bilaterally.

Place: The study was conducted in department of anesthesia and intensive care, Adesh institute of medical sciences and research, Bathinda (Punjab) during the period April 2021 to September 2021.

Study design - A prospective randomized study

Inclusion criteria: The patients with ASA grade 1-2, with age 18-60 years were included in study.

¹Associate Professor, Department of Anaesthesiology & Intensive Care, Adesh Institute of Medical Sciences & Research, Bathinda-150001, Punjab, ²Assistant Professor, Department of Anaesthesiology & Intensive Care, Adesh Institute of Medical Sciences & Research, Bathinda-150001, Punjab, ³Junior Resident (PG 2nd year), Department of Anaesthesiology & Intensive Care, Adesh Institute of Medical Sciences & Research, Bathinda-150001, Punjab, ⁴Assistant Professor, Department of Obstetrics and Gynecology, Adesh Institute of Medical Sciences & Research, Bathinda-150001, Punjab, India

Corresponding author: Dr. Ishan Bansal. Assistant Professor, Department of Anaesthesiology & Intensive Care, Adesh Institute of Medical Sciences & Research, Bathinda-150001, Punjab, India

How to cite this article: Goyal SS, Bansal I, Rana P, Garg A. Does predistention of the epidural space before catheter insertion improves the ease of insertion of epidural catheter. International Journal of Contemporary Medical Research 2021;8(10):J1-J3.

DOI: <http://dx.doi.org/10.21276/ijcmr.2021.8.10.1>



Exclusion criteria: The patients with spinal deformity and contraindication to epidural anaesthesia, the patients with history of drug or alcohol abuse; heavy smoking; or abnormal hepatic, renal or haematological test results were excluded from the study. The Departmental and institutional ethical committee approval was obtained before starting the study. An informed and written consent was taken from the patients, a total of 100 Patients were randomized into two groups using computer generated random number table, patients who met the inclusion criteria

Group N (non distention), To receive an epidural with loss of resistance technique

Group D (distention) In distention, after confirmation of epidural space with air, additional 5 mL saline was injected to epidural space over 10-15 seconds.

In distension group if any patient gets vasovagal attack or develops bradycardia, the patients were excluded from study and concerned consultant posted for the study took resuscitative measures. The anesthesiologist who had at least 10 years of experience and was familiar with epidural technique performed the procedure. Pre-anesthetic evaluation was done for all participant patients one day before surgery. The procedure and participation in the study and fasting status as per ASA explained to patient.

On the operation day, patients were examined and iv access of wide bore cannula was established. The monitoring included, non-invasive blood pressure, 12 – lead ECG and pulse oximetry. In both groups, the patients were preloaded with 10ml/kg crystalloids. After proper cleaning and draping, the experienced anesthesia consultant (who has atleast 10 years of experience) secured the epidural catheter using 18G tuohy's needle in sitting position. The catheter was inserted at L2-L3or L3-4(whichever space was more suitable to consultant) by midline approach. In (N) group, after identification with loss of resistance with air & in distension (D) group, extra 5 ml normal saline inserted slowly over 5-10 seconds, the epidural catheter was threaded into the epidural space through the needle. The catheter was fixed properly in both the groups, after confirming that there is no intravascular placement and no dural puncture, if any other catheter related problems, were noted. The patient was made

to lie supine. Regular monitoring of all vital parameters was done during and in postoperative period.

The ease of insertion was defined by consultant as Easy or Difficult. The ease was defined on the basis of Likert's scale. The Likert scale is defined as is a unidimensional scale that researchers use to collect respondents' attitudes and opinions. Psychologist Rensis Likert established a distinction between a scale that materializes from a collection of responses to a group of items. The Likert scale is a five (or seven) point scale which is used to allow the individual to express how much they agree or disagree with a particular statement.

Strongly disagree	Disagree	undecided	Agree	Strongly agree
(1)	(2)	(3)	(4)	(5)

We define Easy as if consultant who secures epidural catheter says that he/ she agree (4) or strongly agree (5) that it was a easy and smooth insertion of epidural catheter.

Difficult insertion was defined as if consultant who secures epidural catheter says that he/ she strongly disagree (1) or disagree (2) or undecided (3) about easiness of insertion of epidural catheter.

STATISTICAL ANALYSIS

All the data were recorded in a microsoft excel sheet. The data were analyzed using microsoft excel software. The discrete and categorical values were analyzed using chi square test. THE P value considered > 0.05= Not Significant and P value < 0.05= Significant.

RESULTS

A total of 100 patients belonging to ASA grade I and II grade participated in the study. Out of which 50 patients in non-distension group and 49 patients in distension group participated in the study. One of the patients in distension group had vaso vagal attack after inserting epidural saline, which was treated by iv atropine and was excluded form study. The demographic data: gender, age and weight between two groups were comparable. (Table 1). There were no significant changes in ease of insertion of epidural catheter in non-distension vs distension group (36 and 42) $P > 0.05$, p value was not significant. There were fewer intravascular placements in non-distention versus distension group 8 and

	Non distension (N)	Distension(D)	
Age	54.6±13.8	56.3±11.1	P > 0.05
Sex	Male 33 (66.0%) Female 17 (34.0%)	Male 28 (56.0%) Female 22 (44.0%)	P > 0.05
Weight in kg	68.8±11.2	62.6±10.7	P > 0.05

P Value > 0.05 → not significant {using chi-square test}

Table-1: Demographic data: Comparison of gender, age and weight between two groups

	Nondistension(N) (N=50)	Distension (D) (N=49)	
Easy	36	42	P > 0.05
Difficult	14 (28%)	7(14.2%)	

P value > 0.05 → not significant {using chi-square test}

Table-2. Ease of insertion of placement of epidural catheter

	Nondistension (N) (N=50)	Distension(D) (N=49)	
Yes	8	1	P<0.05
No	42	48	
P value was <0.05 → significant {chi-square test}			
Table-3: Intravascular placement of epidural catheter			

1. (Table 2). P <0.05, P value was significant

DISCUSSION

We tried to demonstrate the theory in our study that when epidural space is identified with loss of resistance technique with air, further distention of the epidural space with an incompressible fluid (normal saline) would lubricate and distend the epidural space. The blood vessels and other anatomical structure are pushed away from catheter path, when distended with 5 ml normal saline used for distension of epidural space, would provide ease of insertion of epidural catheter and further reduce incidence of intravascular placement of epidural catheter. Evron Shmuel et al demonstrated that distention of the epidural space with 5 vs 2 mL NS before epidural catheter insertion decreased the incidence of accidental intravascular placement, the incidence of unblocked segments and shortened the time to onset of analgesia.¹

Farida Gadalla et al in the series of 100 labouring women found that injecting saline 10 mL through the epidural needle immediately before threading a nylon multiport epidural catheter (PEFI) lowered the incidence of intravenously placed catheters from 20% to 2% during CSE labour analgesia.³ SanchitaSarmaBorkataki, Deba Gopal Pathak demonstrated that distention of the epidural space with 5mL versus 2 mL NS before epidural catheter insertion decreased the incidence of accidental intravascular Placement.² These studies results are consistent with our study results. Beilin, Y et al found that a saline-filled syringe for the LOR technique was associated with a higher frequency of adequate analgesia than when air was used, they also found that women in air group required additional medication (36%) more often than women in the saline group (19%).⁴ Russell R. in their study showed that loss of resistance to saline is better than air for obstetric epidurals.⁵

We do emphasize that although in our study, for ease of insertion when normal saline was used for distension of epidural space, there is not a statically difference found between distension and non distension group. But at same time clinically in non distension group there were almost (14/50) 28% cases with difficult in catheter insertion as compared to distension group where it was only (7/49) 14%. We advocate that further studies to be conducted on large no of sample to find the facts. The complications of loss of resistance through air is such as puncture of dura can be seen and the quality of analgesia might get affected which is ultimately the main motive of inserting epidural catheter. The main advantage of air over saline is that if dura has been punctured, unless the free flow of fluid is seen there must be a confirmatory testing to confirm CSF or saline.

The use of distension of epidural space with 5 ml normal saline technique, we achieved fewer epidural intravascular complications. The limitations of our study being, it was not a double-blinded study and we advocate to do further studies on this over a large number of sample size to support our findings.

CONCLUSION

From our study, we concluded that there is no statistically significant difference with use of 5ml normal saline for ease of insertion of epidural catheter, but same time there are statistically less intravascular placement of epidural catheter with normal saline. We recommend the use of 5 ml normal saline for epidural distension can be used to reduce the epidural catheter related complications.

REFERENCE

1. Evron, Shmuel, Gladkov Vladimir, Sessler Daniel, etal. Predistension of the Epidural Space Before Catheter Insertion Reduces the Incidence of Intravascular Epidural Catheter Insertion. *Anesth & Analg*, 2007;105:460-464
2. Borkataki SS, Pathak DG. Predistension of the epidural space with normal saline before catheter insertion reduces the incidence of inadvertent intravascular epidural catheter placement. *J. Evolution Med. Dent. Sci.* 2018;7:306-309
3. Farida Gadalla, Sung-Hee Rhim Lee, Kue C. Choi, etal. Injecting saline through the epidural needle decreases the iv epidural catheter placement rater during combined spinal-epidural labour analgesia. *CAN J ANESTH*, 2003;50:382-385
4. Beilin, Y. Quality of analgesia when air versus saline is used for identification of the epidural space in the parturient. *Regional Anesthesia and Pain Medicine*, 2000;25:596-599.
5. Russell R. Loss of resistance to saline is better than air for obstetric epidurals. *Int J ObstetAnesth* 2001;10:302-4

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 26-08-2021; **Accepted:** 17-10-2021; **Published:** 30-10-2021