TECHNICAL STUDY OF EPIDURAL ANALGESIA IN GYNAECOLOGICAL SURGERY

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ABSTRACT:

Aim: *To study ease of location of epidural space, distance of epidural space from skin, difficulties encountered during location of space and insertion of catheter.*
Material & Method: *60 patients posted for gynecological surgery under ASA grade I/II were randomly allocated in 4 groups. 15 patients in each receives midline epidural by hanging drop technique, midline epidural by loss of resistance technique, paramedian epidural by hanging drop technique and paramedian epidural by loss of resistance technique. Epidural depth by sterile marking ink and difficulties during insertion of needle and catheter were recorded.*
Observation & Results: *We observed that epidural space encountered comparatively more deeper in paramedian approach. Difficulties were less encountered during paramedian approach. Ease of location was better with loss of resistance technique.*
Conclusion: *We found no difference between the hanging drop and loss of resistance technique for identifying the lumber epidural space. But efficacy is better with the loss of resistance technique compared with hanging drop technique.*

Key Words: *Hanging Drop, Loss of Resistance, Epidural, Approach, Gynec surgery*

INTRODUCTION

Epidural analgesia is the regional analgesia technique obtained by blocking spinal nerve in the epidural space. To administer epidural analgesia, we must first locate the epidural space.[1] Correct placement obviously requires correct identification of the epidural space.[2] For that mainly "hanging drop" & "loss of resistance" techniques and "midline" & "paramedian" approaches are used.[2,3]

Failure of epidural anaesthesia and analgesia occures in up to 30% in clinical practice. Technical aspect can help to increase the primary and the secondary success rate.[2] Accurate location of epidural space for epidural analgesia relies upon the sensitivity of the technique and method used in the hands of a skilled physician.
So here the technical aspects were studied for locating the epidural space in gynaecological patients.

MATERIAL AND METHOD

After obtaining approval from the Hospital Ethical Committee and informed consent 60 patients were selected randomly with ASA grade I & II undergoing gynaecological surgery. Detailed pre-anaesthetic assessment and routine investigations were done.

Those with history of myocardial ischemia, hypertension, neurological disorder, bleeding diathesis, spinal deformity or local sepsis on the lumber spinal area and those with a history of allergy or addiction to any drug or narcotics were excluded from this study.

After placement of venous line patients were place in left lateral position with knee flexed on the abdomen, head & neck flexed.

As per our study, 4 groups and 2 different techniques and approaches were used. 15 patients in each group are as follow,

Group M-HD Midline Epidural by Hanging drop Technique.
Group M-LOR Midline Epidural by Loss of Resistance Technique.
Group PM-HD Para Median Epidural by Hanging Drop Technique.
Group PM-LOR Para Median Epidural by Loss of Resistance Technique.

All procedures were performed by the attending anaesthetist with the patient fully awake and cooperative. Autoclaved epidural set containing: Tuohy's epidural needle no 16 G, Epidural catheter 18 G, Plastic syringe 10 ml, 5 ml, Hypodermic needle no 24 G, 1.5 inch, Needle no 20 G, Caliper compasses (accuracy 0.05 cm), Sterile marking ink was used.

Midline Epidural Hanging Drop Technique

After sterilization Midline is identified and point of insertion is infiltrated with 1% lignocaine. The Touhy needle(16 G) with stylet was introduced through the infiltrated space in the midline piercing the skin at right angles to the back. The needle was advanced up to supraspinous ligament and stylet withdrawn. A drop of local anaesthetic solution was put on the hub of the needle, than needle was slowly advanced till the epidural space was reached when the drop is "sucked in." Aspiration was done to rule out accidental dural or blood vessel puncture.

Midline Epidural Loss of Resistance Technique

All the procedure is same as above till the 16 G tuohy needle advances up to the supraspinous ligament and stylet is withdrawn. A 10 ml air filled loss of resistance syringe is then attached to the needle hub. The needle is gripped with the thumb on the top and proximal and distal phalanges of the crooked fore fingers below. The hand is supinated and the wrist partially flexed and the back of the carpus braced against patient's back. Forward motion is imparted on the needle by gradual extension of the wrist and the carpus and metacarpus roll in toward the back. The non-dominant hand rests against patient's back and stabilizes the needle to prevent any sudden forward motion, constant unremitting pressure is placed on the plunger of the air-filled syringe with the thumb. A sudden loss of resistance is felt when the bevel pierces the ligamentum flavum. Injection, which was previously obstructed, should suddenly become as easy as discharging the syringe into an empty space. The forward motion of the needle should be stopped immediately.

Paramedian Approach, Hanging drop Technique

1.5 cm lateral to the inferior border of the spinous process, area is infiltrated with local anaesthetic by 24 G needle in the paraspinous muscle, path directed ventrally and slightly medially. Needle is then withdrawn to the skin, redirected more cephalad until either lamina or superior edge of the lamina is contacted. Then needle is removed and 16 G tuohy needle is inserted with bevel facing cephalad. Stylet removed and needle advanced to contact lamina. The needle is then "Walked off" the superior edge of the lamina until ligamentum flavum is contacted with drop of local anaesthetic solution on hub of needle, then it advanced further till the drop "Sucked in" into the needle.

Paramedian approach,,loss of resistance technique

All the procedure is same as above till the 16 G tuohy needle contact lamina. Then needle is "Walked off" the superior edge of the lamina and a 10 cc plastic syringe filled with air is attached to the hub of the needle. Then needle is advanced until the ligamentum flavum encountered and finally enter in the epidural space which is confirmed by loss of resistance to injecting air in the space.

All above four different techniques are used to locate the epidural space and study was done to find the easier and accurate technique. Than 18 G epidural catheter is inserted through the needle and to study the case of insertion or difficulties encountered during the insertion of catheter and also study the depth at which the epidural space is located by marking the epidural neeedle with sterile marking ink.

RESULTS

Table 1: Demographic Data

Parameter		Group M-HD	Group M-LOR	Group PM-HD	Group PM-LOR
Age (yr)		50.06 +/-18.14	42.13 +/- 16.83	48.73 +/- 20.38	50.66 +/- 23.98
Weight (kg)		48.60 +/- 11.94	48.40 +/- 12.16	48.4 +/- 10.60	49.66 +/- 10.62
ASA Grading	I	10	12	10	11
	II	5	3	5	4

There were no difference between demographic characteristics

Table 2: Depth of epidural space from the skin

	Depth of epidural space(cm)	
Group M-HD	4.0 +/- 0.4	4.01 +/- 0.5
Group M-LOR	4.0 +/- 0.6	
Group PM-HD	4.6 +/- 1.0	4.67 +/- 0.9
Group PM-LOR	4.7 +/- 0.9	

Table 3: Difficulties encountered during insertion of epidural needle

Difficulty	Group M-HD	Group M-LOR	Group PM-HD	Group PM-LOR
Blood in Needle	1(6.66%)	1(6.66%)	1(6.66%)	1(6.66%)
Bone Encountered	6(40%)	4(26.6%)	1(6.66%)	0
Accidental Dural Puncture	0	1(6.66%)	0	0

Table 4: Difficulties encountered during insertion of catheter

Difficulty	*Group M-HD*	*Group M-LOR*	*Group PM-HD*	*Group PM-LOR*
Paraesthesia	6(40%)	4(26.6%)	1(6.66%)	0
Blood in Catheter	1(6.66%)	0	0	1(6.66%)
Resistance during Insertion	0	1(6.66%)	0	0

DISCUSSION

The epidural space is a potential space in the area where bone and ligamentum flavum contact the dura. At the intervertibral level, a real space exist containing fat and connective tissue but it only exists potentially at the vertibral level. This compartmentalization of the epidural space was demostrated in anatomical and radiological studies.[1] As the ligamentum flavum has somewhat oblique cords, posterior epidural space depth varies at each

intervertibral level depending on whether cranial or caudal approach is used.[8]

Several techniques and different approaches have been advocated for location of epidural space. The most commonly used techniques are the 'loss of resistance' and 'hanging drop' techniques and two most commonly tried approaches are 'midline' and 'paramedian' approach.[2,3]

Depth of Epidural space

In the present study, the depth of epidural space was measured. According to the calculation result in each group and in each approach, the mean depth of epidural space is significantly greater in the paramedian approach compared with the midline approach. The mean depth of epidural space by midline approach was 4.01+/-0.5 cm and by paramedian approach was 4.67 +/-0.9 cm.

Adachi YU studied depth of epidural space from skin according to puncture site, level, and approach. It showed epidural space is deeper in upper thoracic than lower thoracic and lumber sites. The depth with paramedian approach was greater than midline approach at both sites.[8]
Muranaka K et al also observed that depth with paramedian approach was greater than midline approach.[6]

Ease of epidural space location

Our demonstrated less number of cases with difficulties in locating the space in paramedian groups compare with the midline groups, five cases in group M-HD and four cases in group M-LOR- total nine cases in midline group compared with the only one case in paramedian group. The results also showed the trend toward the loss of resistance technique for ease of location of epidural space compared with the hanging drop technique.

In a similar study of V.L.H.Hoffmann et al, skin to epidural space distance was compared with both techniques. This indicated that the hanging drop technique may be equally effective in identifying the lumber epidural space. In contrast, one can assume that with the loss of resistance technique, the pressure difference between the period of passage through the ligamentum flavum and the moment of perforation is accentuated compared with hanging drop technique because of the pressure exerted on the plunger of the loss of resistance syringe. In more difficulties, loss of resistance could be an advantage.

The study of Blomberg RG et al, supports the view that the paramedian approach has technical advantages over the midline approach for lumber epidural analgesia.[4]

In this study air was used for the loss of resistance technique. Some evidance shows that distilled water or saline is a preferable medium.[2,3] But recent study of Antibas PL on 852 cases shows that there were no statistically significant differences using air or saline in: inability to locate the epidural space, accidental intravascular catheter placement, accidental subarachnoid catheter placement, unblock segment, pain and postdural puncture headache.[10]
One of the disadvantages of saline for use in loss of resistance technique is confusion with CSF if accidental dura puncture has occurred. To rule out this confusion air is used in this study.

Ease of insertion of epidural catheter

This study saw high incidence of paraesthesia, 6 in the M-HD group, four in the M-LOR group and only one in the PM-HD group. Blood during aspiration from catheter noted one in M-HD and one in PM-LOR group. Resistance during insertion of catheter is noted in only one case in M-LOR group. Thus, in this study difference between the two approaches with regard to blood aspiration in catheter and resistance in catheter insertion was not significant but with regards to incidence of paraesthesia was significant and more in midline group compared to paramedian group.

A study in Leide University Medical Center in netherland had the similar conclusion compared with this study. They concluded that catheter insertion was faster in paramedian group and they found a trend towards a higher incidence of paraesthesia with the midline approach.[7,2]
Blomberg RG also noted in his study that more paraesthesia in midline group

compared to paramedian group and not statistically significant difference in intravascular catheter insertion.[4]

Complications

No evidance of any type of neurological complication was observed in any case during this entire study. In every case epidural catheter was removed intact which was confirmed by the bulb tip at the end of the catheter.

CONCLUSION

In conclusion we found no difference between the hanging drop and loss of resistance technique for identifying the lumber epidural space. But both efficacy and complication rate are better with the loss of resistance technique compare with hanging drop technique. The study supports that paramedian approach has technical advantages over the midline approach for lumber epidural analgesia with catheter technique.

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