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SEGMENTAL EPIDURAL ANAESTHESIA FOR INGUINAL HERNIA REPAIR

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ABSTRACT: BACKGROUND: Epidural anaesthesia is suitable as a sole agent for lower abdominal surgery and surgery on lower limbs. It has some definite advantages over spinal anaesthesia like avoidance of post spinal headache, minimal chances of meningitis, and minimal chances of nausea and vomiting in postoperative period. But administration of conventional dosage of local epidural anaesthetics (15ml and above) for surgical anaesthesia frequently results in multiple hemodynamic changes, including decreases in chronotropism, inotropism, dromotropism, systemic vascular resistance, cardiac output, and myocardial oxygen consumption. The segmental epidural block denotes the use of a small volume enough to block only the segments involved in the field of surgery. **AIM:** To study the effectiveness of segmental epidural anaesthesia for inguinal hernia repair. **DESIGN:** Randomized control study. **METHODS:** 100 pts belonging to ASA PS I & II posted for inguinal hernia repair given 5ml of 0.5% bupivacaine through epidural route at L1- L2 level and after conforming the adequacy and level of analgesia, the surgery was commenced. If the patient complained of pain during needle prick, then injected local anaesthetic (0.5% Bupivacaine) with an incremental dosage of 1ml at a time, till the complete onset of analgesia Pulse Rate and Blood Pressure were recorded at an interval of 1 minute for first 5 minutes and then every 5 minutes till the end of the surgery. Oxygen saturation and ECG monitoring was done continuously. Onset of analgesia, level of analgesia (Pre & post operatively), duration of analgesia, total dosage of local anaesthetic used were recorded. Complications like bradycardia, hypotension, respiratory depression, shivering, nausea and vomiting, sweating and inadvertent dural puncture were recorded. **RESULTS:** 53% of patients had excellent quality of analgesia and relaxation. 34% patients had good quality analgesia and relaxation, mild discomfort while handling sac. 10% of patients had fair quality of analgesia and relaxation only. In 3% patients the epidural block failed, in whom general anaesthesia was given. Overall success rate was 97%. Intraoperative and post-operative complications were very minimal. No cases of hypotension, bradycardia, nausea vomiting, total spinal block and respiratory depression were seen. **CONCLUSION:** From the present study it can be inferred that 0.5% Bupivacaine 5-6 ml is effective for segmental epidural block for inguinal hernia repair. Segmental epidural block is safe anaesthesia with minimal physiological alterations. With less side effects.

KEYWORDS: Epidural anaesthesia, Segmental epidural block, Inguinal hernia repair, Bupivacaine.

INTRODUCTION: "I esteem it the office of the physicians not only to restore health, but to mitigate pain". Sir Francis Bacon. "Divine is the task to relieve pain". Hippocrates.

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Most common symptoms for which a patient seeks medical advice are pain and structural deformity and whatever may be the basic cause they demand a relief.

Medical profession has attempted various methods of pain relief from ancient times. The development of epidural analgesia and anaesthesia played a small but significant role in man's triumph over pain, which undoubtedly is one of the most fascinating chapters in the history of medicine.

The rationale of epidural analgesia in surgery is simple. The technique is used to prevent afferent impulses from reaching the central nervous system and to prevent transmission of inappropriate efferent signals to the target organs such as muscle, blood vessels and viscera. In doing so, epidural blockade fulfills the central aim of anaesthesia that is, prevention of pain, overall control of patient and his reflexes and preservation of physical wellbeing.

Hernia is the word derived from Greek words "Herons" an offshoot or bulge. It is defined by Sir Astley Cooper (1804) as "protrusion of any viscous or part of the viscous through an abnormal opening in the walls of its containing cavity."¹

Inguinal hernia repair is one of the most commonly encountered surgical corrections in men. In the international classification of diseases 9th division clinical manifestation, the number was 9 for hernias with relative value guide of 6.² In providing anaesthesia for inguinal herniorrhaphy, the technique chosen must be cost effective with respect to speed of recovery, patient comfort, and associated incremental costs.³ Inguinal hernia repair is one of the common treatments performed. This can be performed under spinal, epidural, general and inguinal field block. Epidural anaesthesia is suitable as a sole agent for lower abdominal surgery and on lower limbs. It has some definite advantages over spinal anaesthesia like avoidance of post spinal headache, minimal chances of meningitis, and minimal chances of nausea and vomiting in postoperative period.⁴ But administration of conventional dosage of local epidural anaesthetics (15ml and above) for surgical anaesthesia frequently results in multiple hemodynamic changes, including decreases in chronotropism, inotropism, dromotropism, systemic vascular resistance, cardiac output, and myocardial oxygen consumption.⁵ The economic consequences of these hemodynamic changes are far from being calculated.

As inguinal hernia is usually seen in elderly age group, the above mentioned complications will be more severe. For a simple inguinal hernia repair, which is located at the level of the 12th thoracic and 1st lumbar dermatomes, an upper analgesic level of the 8th to the 10th thoracic dermatomes is satisfactory.⁶ The practice of the technique whereby, the block extends only to the segments involved in the surgical field is said to have the following advantages.

1. Accurate limitation of the area of analgesia.
2. Minimal or no depression of blood pressure.
3. Small doses of local anaesthetics required and toxic doses are avoided.
4. Minimal incidence of complications.

Hence to meet the above requirements the present study of segmental epidural anaesthesia for inguinal hernia repair is undertaken.

AIM: To study the effectiveness of segmental epidural anaesthesia for inguinal hernia repair.

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METHODS: The study has been conducted in 100 patients posted for elective inguinal hernia repair after the approval of ethical committee in the dept. of anaesthesia, MGM Hospital, KMC, Warangal during the period of 2012-2014.

Selection of Patients:

Inclusion Criteria:

1. Patients undergoing inguinal hernia repair.
2. Age 18– 70 years.
3. Normal adults belonging to ASA Grade I and ASA Grade II

Exclusion Criteria:

1. Patients below 18 and above 70 years.
2. Patients with ASA Grade III and ASA Grade IV.
3. Patients allergic to local anaesthetics.
4. Presence of ischemic heart diseases, inability to climb a flight of stairs
5. Hypertension,
6. Symptomatic asthma,
7. Uncontrolled diabetes,
8. Epilepsy,
9. Renal problems,
10. Bleeding disorders,
11. Patients on chronic drug medications such as MAO inhibitors, acute substance abuse
12. Previous problem with anaesthesia,
13. Obesity,
14. Neurological deficit, infection at injection site, and patients unwilling to comply with instructions.

Pre anaesthetic evaluation was done along with all requisite blood and urine examination, Hb, BT, CT, ECG, 2D ECHO in pts above 50 yrs.

All patients were assessed and they were graded according to the ASA physical status I and II. They were educated regarding the anaesthetic technique. Consent for the same was obtained. Local anaesthetic test dose was carried out on the previous day of surgery. Patients were premedicated with oral Alprazolam 0.5 mg and Oral Ranitidine 150 mg on the night prior to surgery and 2 hours before the surgery.

Procedure: Each patients selected for the study was positioned laterally (on affected side) on the operation theatre table. With all aseptic precautions the epidural space was identified by loss of resistance technique at L1-L2 space, with 18G epidural needle, 5ml of 0.5% Bupivacaine is injected very slowly after negative aspirations for blood and C.S.F. Only to block the segments (T12-L2) involved in the field of surgery. Later epidural catheter was inserted and secured and patient positioned back to supine position.

Level of analgesia was checked by needle prick. After conforming the adequacy and level of analgesia, the surgery was commenced. If the patient complained of pain during needle prick, then injected local anaesthetic (0.5% Bupivacaine) with an incremental dosage of 1ml at a time, till the complete onset of analgesia.

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Pulse Rate and Blood Pressure were recorded at an interval of 1 minute for first 5 minutes and then every 5 minutes till the end of the surgery. Oxygen saturation and ECG monitoring was done continuously.

Onset of analgesia, level of analgesia (pre & post operatively), duration of analgesia, total dosage of local anaesthetic used were recorded.

Complications like bradycardia, hypotension, respiratory depression, shivering, nausea and vomiting, sweating and inadvertent dural puncture were recorded.

Criteria for hypotension was taken as a fall in systolic Blood pressure more than 20% of patients basal reading and treated with vasopressors like Inj. Ephedrine 3-5 mg IV.

Bradycardia as heart rate less than 60 and treated with Inj. Atropine 0.6 mg IV.

If any inadvertent dural puncture occurred, those cases were excluded from the study and were given homologous epidural blood patch to prevent post dural puncture headache.

After confirming the onset of analgesia patient was sedated with Inj. midazolam 1 mg IV.

In the present study the following scale was adopted to grade quality of analgesia and relaxation.

- 1. Excellent:** Patient comfortable, analgesia and surgical relaxation adequate, no supplementation required during surgery.
- 2. Good:** Analgesia and relaxation adequate, minimal discomfort present during surgical procedure. Additional top-ups of local anaesthetic at an incremental dose of 1 ml are given.
- 3. Fair:** Analgesia and relaxation adequate, discomfort present even after additional top-up of epidural local anaesthetic, this was alleviated by analgesic dose of Inj. Fentanyl 1 Mcg/kg IV.
- 4. Poor:** Patients complaining of severe intolerable pain during surgery without relaxation. These cases were supplemented with general anaesthesia.

STATISTICAL ANALYSIS: Descriptive data included mean, standard deviation and percentage which were determined for the study group.

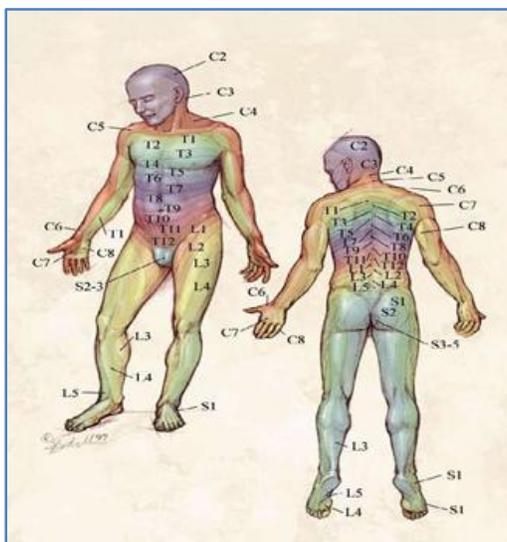


Fig. 1a & 1b: Dermatomes

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RESULTS: Segmental epidural anaesthesia was given to one hundred patients undergoing inguinal hernia repair at MGM Hospital, Warangal, during the period of 2012 to 2014 and these cases were taken up for study as outlined in the methodology.

AGE DISTRIBUTION: Age of these patients ranged from 18 to 70 years and this incidence is shown in Table – 9

Mean Age: 42.65 years STD., Deviation 12.85.

Majority of the patients were in 31-40 Age group.

Sex	No. of Cases
Male	97
Female	3
Total	100

Table 1: Sex Incidence

Regarding the sex incidence it is the male who predominates as compared to females, as shown in the table - 1

WEIGHT DISTRIBUTION:

Table 9 shows the weight distribution of patients.

Maximum weight was 85Kgs.

Minimum weight was 37Kgs.

Mean weight 57.65Kgs with a standard deviation of 9.1.

HEIGHT DISTRIBUTION:

Table 9 shows the Height distribution of patients.

Maximum Height-180 cms, Minimum Height @148 cms

Mean Height 165.16 cms with a standard deviation of 8.24.

Type of Hernia	No. Of Cases
Indirect	73
Direct	27
Total	100

Table 2: Type of Hernia

Incidence in type of hernia is shown in the Table - 2 Direct hernia - 27 cases, Indirect hernia @ 73 cases.

Volume of Bupivacaine Used: Volume of Bupivacaine required, ranged from 5 ml to 8 ml. with a mean volume of 5.8 ml.

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	No. of Cases
Excellent	53
Good	34
Fair	10
Poor	3
Total	102

Table 3: Quality of Analgesia

Table 3 shows the quality of analgesia and relaxation in patients.

53 patients had an excellent type of analgesia and relaxation. Patients were comfortable no supplementation required during surgery.

In 34 patients analgesia and relaxation was adequate, minimal discomfort was present during surgical procedure. Additional top-ups of local anaesthetic at an incremental dose of 1 ml were given.

In 10 patients, discomfort was present even after additional top-up of epidural local anaesthetic, this was alleviated by analgesic dose of Ing. Fentanyl 1 Mcg/kg IV.

3 patients had no analgesia at all, Patients were complaining of severe intolerable pain during surgery without relaxation. These cases were converted to general anaesthesia.

Time Range in Minute	Number of Patients
120-130	12
131-140	11
141-150	11
151-160	13
161-170	12
171-180	15
181-190	4
191-200	9
201-210	7
211-220	0
221-230	1
231-240	2

Table 4a: Duration of Analgesia

Table 4 shows the Duration of analgesia in minutes. The patients, who received general anaesthesia, had no analgesia.

Mean duration 167.42 min.

Minimum duration 120 min.

Maximum duration 240 min.

In 3 patients who had poor quality of analgesia and converted to general anaesthesia, duration of analgesia could not be recorded.

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Level	No. of cases
T8	2
T9	16
T10	54
T11	22
T12	3

Table 4b: Level of Analgesia Pre-Operatively

Table 4 shows the sensory level of analgesia pre operatively.

In majority of the patients (54) level of analgesia was up to T10.

In 22 patients T11.

In 16 patients T9.

In 3 patients T12.

In 2 patients T8.

In 3 patients who had poor quality of analgesia and converted to general anaesthesia, level of analgesia could not be appreciated.

Side Effects	No. of Cases
Shivering	5
Sweating	9
Hypotension	NIL

Table 5: Side Effects

Table 5: Shows the incidence of side effects.

Sweating is seen in 9 patients.

Shivering in 5 patients.

Inadvertent dural puncture in 2 patients.

No cases of Hypotension.

Quality of analgesia	No. Of cases	
Excellent	53	97 %
Good	34	
Fair	10	
Poor	3	

Table 6: Analgesia and Relaxation Success Rate

Success Rate 97%.

Minutes	Mean heart rate
Pre-op	83.8
0	87.22

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1	86.58
2	86.44
3	86.72
4	85.9
5	85.06
10	85.24
15	85
20	84.32
25	83.8
30	84.44
35	84.14
40	84.03
45	83.48
50	83.76
55	83.36
60	83.08
End	83.42

Table 7: Mean heart rate changes

Minutes	Mean syst. bp.	Mean diast. bp.
Pre-op	130.26	80.44
0	132.84	82.6
1	132.3	82.18
2	130.56	81.56
3	130.56	80.9
4	129.62	81.12
5	126.55	80.66
10	127.76	79.98
15	127.87	79.88
20	127.7	79.46
25	127.82	79.5
30	128.26	79.66
35	128.92	79.48
40	128.42	78.82
45	128.3	79.66
50	128.58	79.9
55	128.36	79.48
60	129.08	80.06
End	130.48	81

Table 8: Mean blood pressure changes

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Age group (years)	No. Cases	Mean age (years)	Mean Weight (kg)	Mean height (cm)	Mean drugvol (ml)	Mean onset (min)	Mean duration (min)	Mean bp fall	Mean % bp fall
18-30	21	26.19 (std. dev 3.31)	55.66 (std. dev 8.77)	164.90 (std. dev 8.08)	6.81 (std. dev 1.07)	8.11 (std. dev 1.24)	171.42 (std. dev 30.21)	8.76	6.69
31-40	30	36-63 (std. dev2.95)	56.23 (std. dev9.05)	166.57 (std. dev 7.24)	5.60 (std. dev 0.85)	8.03 (std. dev 1.19)	162.03 (std. dev 26.24)	8.74	6.64
41-50	22	46.09 (std. dev 2.88)	60.50 (std. dev 9.63)	167.09 (std. dev 7.43)	5.59 (std. dev 0.73)	7.88 (std. dev 0.90)	166.67 (std. dev 24.56)	9.90	7.36
51-60	17	55.47 (std. dev 3.28)	59.47 (std. dev 8.90)	162.56 (std. dev 10.55)	5.53 (std. dev 0.79)	8.36 (std. dev 1.17)	174.11 (std. dev 34.65)	14	10.20
61-70	10	65.9 (std. dev 2.51)	56.17 (std. dev 9.10)	161.3 (std. dev 8.40)	5.3 (std. dev 0.94)	8.17 (std. dev 1.09)	163.89 (std. dev 28.26)	15.56	13.38

Table 9: Summary of results (age groups)

DISCUSSION: Inguinal hernia repair is one of the most commonly performed surgical corrections in men. In providing anaesthesia for inguinal herniorrhaphy, the technique chosen must be cost effective with respect to speed of recovery, patient comfort, and associated incremental costs.

Inguinal hernia repair is one of the common treatments performed. This can be performed under spinal, epidural, general and inguinal field block.

Epidural anaesthesia is suitable as a sole agent for lower abdominal surgery and on lower limbs. It has some definite advantages over spinal anaesthesia like avoidance of post spinal headache, minimal chances of meningitis, and minimal chances of nausea and vomiting in post-operative period.

Segmental epidural block, though introduced by Fidel Pages (1921) and Dogliotti (1931), clinically its use has been advocated by Massey Dawkins (1971) for thoracic epidural for upper abdominal surgery and Doughty (1969) and Steel (1972) in labour analgesia for uterine and perineal pain and have recommended that this technique to be a very safe and satisfactory procedure to all concerned.

These works have given a useful suggestion for extending the technique as "Segmental Epidural Block" for Inguinal hernia repair as the nerve supply to this area is very suitable for carrying out this procedure and also has some attractive advantages over the conventional epidural block using larger doses. The study of Segmental Epidural Analgesia for inguinal hernia repair was carried out with an intension of administering limited quantity of drug required to make the procedure precise and safe.

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Segmental or conventional block can be performed at any region like cervical, thoracic, lumbar or caudal. However the volume used in the segmental block is very small so that the block covers only the particular segments concern. Whereas in conventional block, the volume used is large enough to spread widely giving rise to complications like arterial hypotension, bradycardia etc.

Advantages claimed with segmental epidural analgesia are:

1. Small quantity of local anaesthetic drug enabling to use an effective dose or higher concentration without the fear of complications like extensive muscular paralysis and toxic effects.
2. Complications like hypotension and bradycardia are reduced.
3. Even in accidental subarachnoid block the cardio-respiratory involvement is minimal, as these small doses used will act as subarachnoid block.
4. Economical.

In our study the following parameters were studied.

1. Volume of local anaesthetic used.
2. Level of sensory blockade achieved pre-operatively (using standard dermatome map).
3. Level of sensory blockade achieved post operatively.
4. Effectiveness of block or quality of analgesia.
5. Onset and Duration of analgesia.
6. Complications encountered.

In our study site of puncture for epidural space is fixed (L1-L2) so as to block only the segments involved in the field of surgery and keep the dose to minimum.

Along with the site of injection, posture of the patient was also important so as to get a denser block on the operative side.⁷ Hence with the patient on the side of surgery the slow injection of small volume of drug permits gravity to deposit all the solution on the dependent side to block the nerves which supplies the region involved in the surgical procedure thereby minimizing the complications associated with large volume.⁸

Volume of the drug used: Sicard stated that spread of analgesia depends upon the volume of the drug injected.⁹ Cedric Prys-Roberts and Andrew M. S. Black stated that segmental epidural block with local anaesthetic is far more satisfactory when placed at correct vertebral level and in more than 90% patients undergoing lower abdominal surgeries where block required is between T10-L2 the volume of local anaesthetic required is 5ml.¹⁰

Studies conducted by Dr. M. H. Rao, and Dr. Phani Thota, on Segmental dose requirement of epidural lignocaine stated that dose required to block each segment in males was about 22.3mg/segment and in females about 19.7 mg/segment.¹¹

Based on these studies volume of the drug injected by us was 5 ml, so as to limit the spread to only the segments involved in the field of surgery.

In this study, a majority of patients (53 patients) who received 5ml the analgesic effect was found to be satisfactory. 22 patients received 6 ml, 16 patients 7 ml and 9 patients received

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8ml. It is observed that the majority of patients who required the additional top ups up to 7 and 8 ml were younger age group. This can be explained by, in younger age group the spread is minimal due to spillage of drug through the patent intervertebral foraminae. But escape of fluid is reduced to minimum in the elderly patients due to the stenosed intervertebral foraminae which can be observed by the largest spread of volume as seen in two patient aged 70 and 65 years, where the spread was up to T8 with 5ml of drug.

The mean volume of drug is 5.8 ml. The table 15 shows that, with the increase in age the volume required decreases.

Level of sensory blockade achieved pre-operatively and post operatively: While using the minimal quantity of local anaesthetic drug of 5ml, the extent of spread of analgesia was tested 5-10 minutes after the block was given and at the end of surgery. The extent of analgesia was elicited with the help of pin prick.

Bromage in 1954 demonstrated that there are two mechanisms in the spread of analgesia, one by the longitudinal spread and the other by neuraxial spread. Diffusion gradient appears to be important in relation to solutions of small volume but of high concentration. With these small volumes of concentrated solution longitudinal spread in the epidural space is presumably confined to a few segments but neuraxial spread is extensive owing to the concentration gradient blocking more segments which was seen at the end of surgery. The same has been corroborated in this study after the block and before starting of the surgery the longitudinal ascent of analgesia with the small volume was minimal, affecting only few segments. Whereas at the end of surgery the spread was definitely wider than what it was in the beginning which was probably due to the neuraxial spread owing to the diffusion gradient with higher concentration solution of 0.5% Bupivacaine.

Bromage in 1962¹² has also drawn attention to the exaggerated spread of epidural analgesia in atherosclerotic patients. 56 patients who were severely atherosclerotic reacted to 2% lignocaine as if they had received the drug of higher concentration than that. It is probable that the degenerative changes in the connective tissue associated with atherosclerotic disease produces increased permeability of neural coverings. Furthermore sclerosis of vasa nervosium hastens the neural degeneration of myelin sheaths which occur with increasing age, thus bringing the solution more readily into contact with the axons of the posterior nerve roots.

In our study, even with 5 ml of local anaesthetic when injected at L1-L2 in elderly patients (60 years and above) it has been found that the spread has been usually high (T8).

Effectiveness of block or quality of analgesia: In the present study we graded 53 patients as excellent analgesia and relaxation, i.e. patient comfortable, analgesia and surgical relaxation adequate no supplementation is required during surgery.

34 patients had good analgesia and mild discomfort during surgical procedure, which required Additional top-ups of local anaesthetic at an incremental dose of 1ml.

10 patients had analgesia graded as fair where mild discomfort was present even after additional top-up of epidural local anaesthetic; these patients were given an analgesic dose of Inj.Fentanyl 1 µg/kg IV to alleviate the pain.

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3 patients had severe intolerable pain during surgery, requiring conversion to general anaesthesia.

It has been observed by various authors that at the time of traction on the sac, patients often complain of discomfort.¹³ This finding was observed in 9 patients in our present clinical study.

Onset and Duration of analgesia: Many studies did not mention about duration of analgesia. A study conducted by Hollman A et al. In 418 parturients, the onset of analgesia was rapid that is 3-5 mins and the duration was on average 150 mins.¹⁴

In a study by Prys Roberts and Andrew Black, stated that in 90% of the patients undergoing lower abdominal surgeries where block required is between T10-L2 the volume of local anaesthetic required is 5 ml and the duration of block with Bupivacaine 0.5% is limited to 3-4 hours.¹⁰

In the present study mean onset of analgesia was 8.09 minutes and mean duration of analgesia was 167.42 minutes (120 min – 240min).

In the present study onset of analgesia was relatively late and duration of analgesia correlates with studies done by Hollman A et al.

Complications Encountered:

Hypotension: Criteria for hypotension was taken as a fall in systolic blood pressure more than 20% of patient's basal reading.

Odom (1936), Guitierrez (1939), Doglitotti (1939) and Dawkins (1954) claimed that the hypotension in epidural block is less than that from spinal analgesia. But the works of Bromage (1954) and Bonica et al (1957) found that the extent of fall in blood pressure is similar in both the techniques, speed of onset is slow in epidural analgesia.

Factors contributing to the hypotension in epidural block have been enumerated as the advanced age of the patient, high volume of the drug and height of the block.

In our study as the volume of the drug used is minimal and height of the block is limited, thereby the incidence of hypotension is nil.

Only 4 patients had a 15-17% fall in blood pressure, in 20 patients 10-15%, in 50 patients 5-10% and in 24 patients 1-5% fall in blood pressure. TABLE 14 shows that percentage of fall in blood pressure increases with the increase in age.

Inadvertent Dural Puncture: The incidence of dural puncture was claimed to be low with thoracic epidurals than with lumbar epidurals. Dawkins and Steel (1971) claimed to be as 1.6% in 282 cases of thoracic epidurals as against 2.6% in 397 cases of lumbar epidurals. This is because of the obliquity of the anatomy of spinous processes.

In this present study there were no cases of dural puncture.

In 9 cases symptoms of sweating are seen, majority of these cases were under fair or poor quality of analgesia groups. So poor quality of analgesia may be the reason for sweating. The symptoms were decreased after the analgesic dose of Inj. Fentanyl IV.

5 patients complained of shivering, was relieved by sedation.

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Other complications like massive subarachnoid block, massive extradural block, toxic reaction to local analgesic drug, bradycardia, respiratory depression, nausea and vomiting, retention of urine and any neurological complications were not encountered in the present study.

CONCLUSION: Based on the present clinical study concluded that;

- Segmental epidural block with 5-6 ml of 0.5% Bupivacaine is found to be safe and fulfil the surgical requirement.
- Could be successfully employed for inguinal hernia repair with limited spread of analgesia involving only few segments. i.e T12 –L2.
- Fall in blood pressure and other complications were very minimal.
- This technique can be safely used in elderly patients.
- 0.5% Bupivacaine 5-6 ml is effective for segmental epidural block for inguinal hernia repair. Segmental epidural block is safe anaesthesia with minimal physiological alterations. With less side effects.

BIBLIOGRAPHY:

1. Kingsnorth, Bennett DH. Hernias, Umbilicus, Abdominal Wall. In: Short practice of surgery Bailey and Love. 23rd ed. 2000.p.1143.
2. Dexter F, Macario A, Penning DH, Chung P. Development of an appropriate list of surgical procedures of a specified maximum anaesthetic complexity to be performed at a new ambulatory surgery facility. *Anesth Analg* 2002; 95: 78-82.
3. Song D, Greilich NB, White PF, Watcha MF, Tongier WK. Recovery profiles and costs of anaesthesia for outpatient unilateral inguinal herniorrhaphy. *Anesth Analg* 2000; 91: 876-81.
4. Cheng P.A. The anatomical and clinical aspects of epidural analgesia, part I and II. *Anesth Analg* 1963; 42: 398-407.
5. Cousins MJ, Bromage PR. Epidural neural blockade, neural blockade in clinical anaesthesia and management of pain. Cousins MJ, Bridenbaugh PO (eds): *Neural Blockade*. Philadelphia: JB Lippincott; 1988. p. 253–260.
6. P. Prithviraj. *Textbook of regional anaesthesia*. Vol (1). Elsevier (USA): Churchill Livingstone; 2003.p.568.
7. Burn, J. M. Guyer, B. P. Langdon L. Spread of solution injected in the epidural space. *Br J Anaesth* 1973; 45:338.
8. Swerdlow M, Sayle Creer W. A study of extradural medication in the relief of lumbosciatic syndrome. *Anaesthesia* 1970; 25: 341-345.
9. Sicard M. "Les injections medicamenteuses extradurales par voie sacro- coccygienne" *C R Soc Dev Biol* 190153: 396-398.
10. Cedric Prys-Roberts and Burnell R.Brown. *International practice of anaesthesia*. 1st ed. Vol. 2. Oxford: Butterworth, Heinemann; 1996.p.140/9.
11. M.H.Rao, Phani Thota. Segmental dose requirement of epidural lignocaine. *J Anaesth Clin Pharmacol* 1995; 11: 99-102.

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12. Bromage P.R. Exaggerated spread of epidural analgesia in atherosclerotic patients. Dose in relation to biological and chronological ageing. *BMJ* 19622: 1634.
13. Tverjkoy M, Cozacovc, Ayache M, Bradley EL, Kissin I. Post-operative pain after inguinal herniorrhaphy with different type of anaesthesia. *Anesth Analg* 1990; 70: 29-35.
14. Hollman A, Jouppila R, Pihlajaniemi R, Karvonen P, SjostedtE. Selective lumbar epidural block in labour. A clinical analysis. *Acta Anaesthesiol Scand* 1977; 21 (3): 174-81.

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