

RETROSPECTIVE ANALYSIS OF SEGMENTAL EPIDURAL ANAESTHESIA FOR ABDOMINAL SURGERIES

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ABSTRACT

A retrospective analysis of segmental epidural anaesthesia for upper and lower abdominal surgeries in 30 patients was undertaken. Epidural anaesthesia is a regional anesthetic technique that has a specific advantage in that selective segments can be blocked along with providing postoperative analgesia. We explored this advantage in selective cases. The patients were within the age group of 26-70 yrs with 67% females. Upper abdominal surgeries included open cholecystectomy, epigastric hernia repair, pyelolithotomy, upper ureterolithotomy, duodenal perforation. Lower abdominal surgeries like loop colostomies, umbilical and incisional hernia repairs with abdominoplasty were studied. Both routine (76.67%) and emergency (23.33%) cases were included into the study group. Patients with comorbidities like diabetes mellitus, chronic hypertension, respiratory disease, muscular dystrophy were part of the study group. The epidural catheter was placed at a level appropriate for the surgery to be undertaken and the segments required to be blocked. Local anaesthetic (lignocaine and bupivacaine) dose was as per the weight of the patient with appropriate age related reduction in geriatric patients. All patients were supplemented with oxygen. 23.33% of the patients required sedation. 23.33% developed hypotension which responded to IV fluids and vasopressors. 50% required post-operative epidural analgesia. In 23% of the patients in whom lower thoracic segments were blocked, none complained of any respiratory difficulty. To summarise, all our patients were operated under segmental epidural anaesthesia without any intraoperative complications. The regional technique was supplemented with light sedation. Thus, segmental epidural should be considered as a very good choice in patients with respiratory problems, muscular dystrophy or in the geriatric patients. The surgeries under segmental epidural anaesthesia have better outcome with surgeon's & patient's cooperation.

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INTRODUCTION

Epidural anaesthesia is a valuable technique in the present day anaesthesiologist's armament. The epidural blockade can be placed at any level of the spine allowing it to be used for surgeries from the neck to the foot. Abdominal surgeries are performed invariably under GA or with combined anaesthetic techniques i.e. either a combined spinal and epidural anaesthesia or general anaesthesia along with epidural anaesthesia. In our study, we have analysed the use of only segmental epidural anaesthesia in patients undergoing a wide variety of abdominal surgeries of differing operating time periods. Upper abdominal surgeries included open cholecystectomy, epigastric hernia repair, pyelolithotomy, upper ureterolithotomy, duodenal perforation. Lower abdominal surgeries like loop colostomies, umbilical and incisional hernia repairs with abdominoplasty were done under segmental epidural block. Advantages attributable to this technique are early ambulation, low cost, reduction in

intraoperative blood loss and postoperative morbidity, stable cardiovascular status, control of pain and reduction of stress response.⁽¹⁾

METHODS:

We have undertaken a retrospective study of abdominal surgeries performed under segmental epidural anaesthesia between August 2005 and July 2010 at the Bharati Vidyapeeth University Medical College and Hospital.

After complete preoperative evaluation, counselling of the patient and his/ her relatives and appropriate (high risk) consent, 18 G epidural catheter was inserted with all aseptic precautions. The level of insertion was decided as per the surgery planned and the anticipated segments required to be blocked. All patients received a test dose of 2% lignocaine with adrenalin, and followed with 0.25% and/ or 0.125% bupivacaine. The dose of the local anesthetic was as per the body weight of the patient. Age

related adjustments i.e. a reduction of 10% per decade over 30 yrs, was done especially in the elderly patients. Intraoperative monitoring was done with SpO₂, 3 lead ECG and NIBP and urine output. All patients received oxygen supplementation @ 2-4L/min through venturi mask. The patients were given light sedation or vasopressors as per requirement. The demographic records and preoperative evaluation of the patients were noted. The insertion of the epidural catheter, the level of insertion, the dermatomal level of the upper and lower limit of sensory and motor block were noted. The operative conditions were assessed on the basis of sedation requirements, analgesia requirement, ease of retraction of the operative area and the response to mesenteric traction and surgical field with estimation of blood loss. Intraoperative hemodynamic status was recorded and the incidence of hypotension requiring management with vasopressors was noted, as was the need for sedation. The requirement of postoperative analgesia with epidural adjuvants was also noted.

OBSERVATIONS

After analysing the records of 30 patients in whom abdominal surgeries had been performed under segmental epidural anaesthesia, it was observed that 20% of the cases were conducted in emergency hours. The indication for the technique in most cases was the presence of very high risk factors e.g. geriatric patients for palliative surgery for neoplasms, muscular dystrophy, COPD etc. The age distribution of our patients was quite varied with the youngest patient being 25 years of age and the oldest 75 years old. The majority of our cases were female.

Table 1: Distribution according to age.

Age (years)	Patients	Percentage
25-45	13	43.33%
46-65	11	36.67%
>65	6	20%

Table 2: Distribution according to sex

Sex	Patients	Percentage
Male	10	33.33%
Female	20	66.67%

While most of our patients were thin, 26.66% of our patients were in the overweight segment. We noted that the technique itself becomes difficult to perform in the obese patient as the space is difficult to identify. But once the space is identified, the technique remains the same as for the average weight patient. No other factor differed for such patients.

Table 3: Weight distribution.

Weight (kg)	Patients	Percentage
30-40	11	36.67%
41-50	5	16.67%
51-60	6	20%
61-70	8	26.66%

We performed the technique for a wide variety of cases as shown in the table. The surgeons had no complaints regarding ease of retraction of the abdominal wall etc.

The majority of the surgeries performed were upper abdominal which meant a mid to lower thoracic epidural catheter placement. Equal number of catheters were placed at T8-T9 & T10-T 11 levels.

Table 4: Distribution according to the surgery performed.

	Surgery	Patients	Percentage
1	Open cholecystectomy	8	26.67%
2	Umbilical/ paraumbilical hernia repair	5	16.67%
3	Epigastric / incisional hernia repair with abdominoplasty	5	16.67%
4	Pyelolithotomy/ ureterolithotomy	2	6.67%
5	Exploratory laprotomy	5	16.67%
6	Feeding jejunostomy	3	10%
7	Gastrojejunostomy	1	3.33%
8	Transverse loop colostomy for carcinoma rectum	1	3.33%

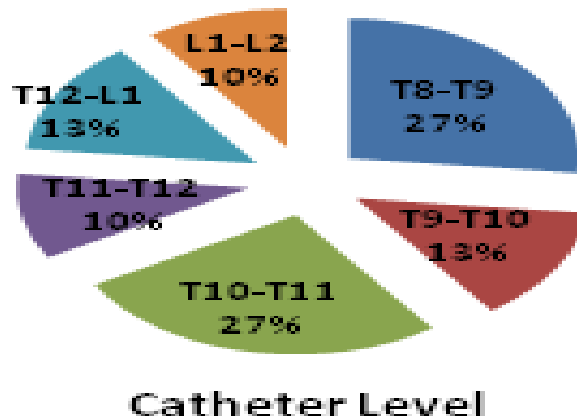


Fig 1: Distribution as per level of insertion of the epidural catheter.

The average duration of surgery was approx 2.5 hrs. The longest case lasted for 4 hrs.

Table 5: Patient distribution according to duration of surgery.

Duration of surgery (hr)	Patients	Percentage	No. of epidural doses required.
1-2	12	40%	2-3
2-4	18	60%	3-6

Table 6: Other observations

Other observations	Patients	Percentage
Catheter retained post operatively	15	50%
Sedation required	22	73.33%
Emergency surgery	7	23.33%
Vasopressor requirement	7	23.33%

The majority of the patients in this series required sedation. Vasopressors were required in 7 patients i.e. 23.33%. In this set of patients, we observed that the ones who had preoperative fluid imbalances were more prone to developing hypotension requiring vasopressors.

Surgeries were also performed in emergency hours. All these patients had very high anaesthetic risk in view of respiratory compromise, fluid imbalance, pre existing cardiac disease, hypertension and diabetes mellitus and diabetic ketoacidosis.

DISCUSSION

Epidural anesthesia is a very versatile technique available to the modern anaesthesiologist. Both spinal and epidural anesthesia are techniques for central neuraxial block. Spinal anesthesia is better known to the general public/ lay person because it is more commonly employed due to its certain obvious advantages. Segmental epidural anesthesia restricts the action of the local anaesthetic to only those spinal segments which supply the area to be operated upon. Well-conducted randomized trials have demonstrated the perioperative use of epidural anesthesia and analgesia reduces overall mortality and morbidity by

approximately 30% compared with general anaesthesia using systemic opioids.⁽²⁾

Bromage was the first to report a strong correlation between patient age and the epidural segmental dose requirements in lumbar epidural anaesthesia. ⁽³⁾ Studies have reported sensory blocks with maximum cephalad spread 3–8 segments higher in older patients after injection of the same epidural dose of LA compared to younger patients ^(4, 5, 6) Bromage recommends a 10% reduction in epidural dose for every decade over 30. ⁽³⁾ In our patients we observed that not only was the total dose required less, the time duration between top up doses was also more in older patients. One of our patients was a 70 yr old lady operated for transverse loop colostomy who required top ups of 1 cc 0.25% bupivacaine about 45 minutes apart.

Few studies report on the correlation between weight and spread of sensory blockade. In a study comparing lumbar and thoracic epidural anaesthesia, no correlation was found. ⁽⁶⁾ We observed no such correlation either. The identification of vertebral space in obese patients was difficult.

Around 20% of our cases were operated during emergency hours. They were high risk for anaesthesia due to factors like uncontrolled hypertension, uncontrolled diabetes mellitus/ Diabetic ketoacidosis, ECG abnormalities and respiratory compromise. As a result of segmental epidural anaesthesia, we were able to avoid post operative pulmonary morbidity and associated ventilatory support. Segmental epidural anaesthesia had the advantage of avoiding endotracheal intubation with positive pressure ventilation and the polypharmacy of a general anaesthetic.

Increased plasma concentrations of catecholamines, vasopressin, growth hormone, rennin, angiotensin, cortisol, glucose, antidiuretic hormone and thyroid stimulating hormone have been documented and referred to as the surgical stress response. This response manifests as hypertension, tachycardia, hyperglycemia, suppressed immune function, and altered renal function. It is completely abolished by an appropriate level of sensory blockade produced by regional anaesthesia. ^(7, 8) Clinical predictors of neuroendocrine response were evaluated in study cases revealing a reduction in stress response. The various hormone levels could not be tested due to logistic limitations and financial constraints.

Prospective randomized trials have found thoracic epidural analgesia (TEA) superior to patient controlled analgesia (PCA) in delivering pain relief following major thoracic / abdominal surgery. Regional analgesic techniques provide physiological benefits over PCA by inhibiting sympathetic outflow and facilitating parasympathetic drive. Patients undergoing major surgery are at risk of pulmonary complications due to dysfunction of respiratory and abdominal musculature. Poor tidal volumes, ineffective expectoration and inadequate responses to physiotherapy due to inadequate analgesia might lead to pulmonary complications. ⁽⁹⁾ 50% of our patients received post operative epidural analgesia with local anaesthetics with or without opioids or opioids alone and good post operative analgesia was achieved. Thus, it was a significant advantage compared to a general anaesthetic technique followed by post operative intravenous analgesia.

The magnitude of hemodynamic changes resulting from epidural anaesthesia is significantly less than that

seen with comparable levels of subarachnoid block. It also scores over spinal anaesthesia with its ability to provide prolonged anaesthesia, effective post-operative analgesia and marked decrease in post operative pulmonary complications. ^(10, 11)

Epidural blockade, at the levels involved in our study i.e. mid to lower thoracic, has minimal effects on patients with adequate lung function. Lung volumes, resting minute ventilation and dead space are basically unchanged. None of our patients had symptoms or signs of respiratory compromise due to the effects of the epidural blockade. This blockade does not affect lung function adversely even in the compromised lung. With post operative epidural analgesia, the risk of postoperative pulmonary complications is markedly decreased and the duration of hospital stay is also shortened. ⁽¹²⁾ All our patients were provided with oxygen supplementation at 2–4L/min.

The first case that heralded our journey into the world of segmental epidurals was a 34 yr lady diagnosed with muscular dystrophy posted for an elective open cholecystectomy. A neurophysician opinion taken prior to surgery recommended the avoidance of neuromuscular blockers. The surgery was performed under mid-thoracic continuous epidural blockade. There were no intraoperative complications. We provided postoperative epidural analgesia. The patient, the surgeons and of course, the anaesthesiologists were all quite satisfied with the perioperative course.

Thus, encouraged by this landmark case in which segmental epidural anaesthesia was the only possible technique, we started using this indicated technique for patients and are now presenting our observations.

CONCLUSION

From our study, we conclude that segmental epidural anaesthesia can provide safe, reliable and effective anaesthesia for selected abdominal surgical procedures. It provides stable cardiovascular status, reduction in blood loss and prolonged postoperative analgesia. With segmental epidural anaesthesia postoperative need of ventilator care and subsequent pulmonary complications can be avoided.

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