

Thoracic epidural anaesthesia for major abdominal surgeries: experience in private hospital setting in Uyo, South-South Nigeria

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Background: Thoracic epidural anaesthesia (TEA) has many benefits over general anaesthesia in major abdominal surgeries including avoidance of endotracheal intubation.

Aims: To evaluate the feasibility of TEA for major abdominal surgeries in the private hospital setting.

Patients and methods: This was a retrospective study of all major abdominal surgeries performed under TEA in two private hospitals in Uyo, Akwa Ibom State, Nigeria over a two-year period. All thoracic epidural anaesthesia was performed under aseptic conditions at the T_{8/9}, T_{9/10} or T_{10/11} interspinous space using a size 18G Tuohy epidural needle and catheter inserted as appropriate. A test dose of 3 ml of 1% lidocaine with adrenaline was used in all patients, after which a loading dose of 10–15 ml of 2% lidocaine with adrenaline was injected at 5 ml every 5 minutes till a block height of approximately T₄–L₁ was obtained. Anaesthesia was maintained with 5 ml of 2% lidocaine with adrenaline every 45 minutes till the end of surgery.

The operative condition was assessed on the basis of sedation and analgesic requirement, as well as response to mesenteric traction. The pulse rate, blood pressure and oxygen saturation were monitored throughout the procedure and recorded. Data were obtained from the patients' folders and operation register. Information obtained included: age, gender, ASA status, diagnosis and type of surgery performed. Data analysis was performed using SPSS[®], version 16.

Results: Twelve patients underwent major abdominal surgeries under TEA. The mean age (range) was 49.58 (20–78) years, with a male to female ratio of 1:1.4. TEA was adequate in 10 (83.3%) patients, while two (16.7%) patients developed total spinal anaesthesia and were successfully resuscitated and their surgeries completed under general endotracheal anaesthesia.

Conclusion: TEA for major abdominal surgeries is feasible. However, careful patient selection, a meticulous approach and preparation for resuscitation is required to prevent and manage complications.

Keywords: major abdominal surgeries, private hospital, thoracic epidural anaesthesia

Introduction

Major abdominal surgeries are commonly performed under general endotracheal anaesthesia due to the need for controlled respiration and adequate muscle relaxation. However, general anaesthesia, especially in high-risk patients, is associated with a high incidence of cardiorespiratory complications.¹ Thoracic epidural anaesthesia (TEA) on the other hand is frequently reported as a safe alternative to GA in high-risk patients.^{2–4}

In a previous study, Consani et al.³ documented the feasibility of thoracic epidural anaesthesia in two patients with chronic obstructive pulmonary disease (COPD), hypertension and atrial fibrillation for gastrectomy. Similar reports on the feasibility and safety of TEA have been documented by other researchers.^{4,5}

At the University of Uyo Teaching Hospital, Uyo, Akwa Ibom State, Nigeria, the authors have successfully used TEA in a variety of surgical procedures including exploratory laparotomy, thoracostomy and mastectomy in high-risk patients.^{2,6} Since TEA places less demand on drugs, personnel and equipment, we deemed it suitable for use in a private hospital setting where resources are relatively constrained.^{7–9} In this study, we evaluate our experience with thoracic epidural anaesthesia for major abdominal procedures in the private hospital setting.

Patients and method

This was a retrospective study of all TEA performed for major abdominal surgeries in two private hospitals in Uyo, Akwa Ibom State, Nigeria. Ethical clearance for the study was obtained from the Research Committees of the respective hospitals, as well as informed consent from all the patients recruited for the study. In both hospitals, there were no anaesthetic machines, ventilators and no piped oxygen facility; however, there was oxygen in large cylinders. Also, there were no anaesthetic staff in either hospital. In the event of any surgical procedures, an anaesthetist is usually invited to provide anaesthesia services while the resident physician will provide the postoperative care as directed by the anaesthetist and/or surgeon. All anaesthetic drugs and equipment used were provided by the anaesthetist. The anaesthetic drugs available included propofol, sodium thiopentone, suxamethonium, pancuronium, adrenaline and other basic medications. Also, laryngoscopes, endotracheal tubes, and an ambu bag connected to an oxygen cylinder were available for patients who may require conversion to general anaesthesia using total intravenous anaesthesia (TIVA).

All thoracic epidural anaesthesia was performed under aseptic conditions at the T_{8/9}, T_{9/10} or T_{10/11} interspinous space using a size 18G Tuohy epidural needle and catheter inserted as appropriate. A test dose of 3 ml of 1% lidocaine with adrenaline was used in all

patients, after which a loading dose of 10–15 ml of 2% lidocaine with adrenaline was injected at 5 ml every 5 minutes till block height of approximately T₄–L₁ was obtained. Anaesthesia was maintained with 5 ml of 2% lidocaine with adrenaline every 45 minutes till the end of surgery.

Intraoperative monitoring was done with a portable multiparameter monitor measuring pulse rate, blood pressure and oxygen saturation. All patients received oxygen by mask throughout the procedure. The patients were given light sedation and vasopressors using small doses of diazepam, ketamine, pentazocine and ephedrine as required. The epidural catheter was removed at the end of surgery in theatre before transferring the patient to the ward.

Data were obtained from the patients' anaesthetic records and operation register. Information included: age, gender, ASA status, diagnosis, surgery performed, and the duration of surgery. The operative condition was assessed on the basis of sedation and analgesic requirement, as well as response to mesenteric traction. TEA was considered adequate if the patient was comfortable and verbal contact was maintained throughout the procedure whereas it was inadequate or failed if the patient was uncomfortable during surgical manipulation warranting deep sedation and/or conversion to general anaesthesia. Intraoperative complications such as hypotension, shivering, nausea/vomiting and others were recorded. Data analysis was done using SPSS[®], version 16 (SPSS Inc, Chicago, IL, USA).

Results

Thoracic epidural anaesthesia was performed on 12 patients for major abdominal surgeries. The mean age was 49.58, with a range of 20–87 years. There were 5 (38.5%) males and 7 (53.83%) females, giving a male to female ratio of 1:1.4 (Table 1).

The majority of the surgeries performed were exploratory laparotomy (7; 58.3%) for intraperitoneal abscess and intestinal obstruction, followed by herniorrhaphy for giant ventral abdominal hernias (2; 15.4%), while fistulectomy, cholecystectomy and nephrectomy were performed in (1; 7.7%) patient each (Table 2).

Table 3 shows that TEA was adequate (successful) for the surgeries in 10 (83.3%) patients, while 2 patients (16.7%) developed total spinal anaesthesia within 5 minutes of induction of anaesthesia and were successfully resuscitated with oxygen, rapid endotracheal intubation, intravenous normal saline and adrenaline. Their surgeries were

Table 1: Demographic characteristics and ASA

Category	Value
Age	
Mean (years)	49.58
Range (years)	20-87
Gender	
Male, n (%)	5 (38.5)
Female, n (%)	7 (53.8)
ASA status, n (%)	
I	Nil
II	4 (33.3)
III	7 (58.3)
IV	1 (8.3)

Note: ASA = American Society of Anesthesiologists.

Table 2: Diagnosis and surgeries performed

Category	Frequency	Percentage
Diagnosis		
Abscess	3	23.1
Ventral abdominal hernia	2	15.4
Intestinal obstruction	4	30.8
Enterocutaneous fistula	1	7.7
Chronic cholecystitis	1	7.7
Renal carcinoma	1	7.7
Surgery performed		
Exploratory laparotomy	7	58.3
Herniorrhaphy	2	15.4
Fistulectomy	1	7.7
Cholecystectomy	1	7.7
Nephrectomy	1	7.7

Table 3: Intraoperative profile of the patients

Category	Value
Use of sedation, n (%)	6 (60)
Use of vasopressor, n (%)	1 (10)
No. of epidural doses used	
Mean, n	3.2
Range	2-5
Duration of surgery	
Mean (minutes)	190.42
Range	60–260
Complications, n (%)	
Hypotension	2 (20)
Shivering	1 (10)
Vomiting	1 (10)

eventually completed under general anaesthesia. Of the 10 patients in whom TEA was adequate, sedation was used in 6 (60%) patients. The mean number of epidural top-up doses used was 3.2 with a range of 2–5. Hypotension was observed in 2 patients, 1 patient received ephedrine, while shivering and vomiting occurred in 1 patient each. The mean duration of surgery was 190.42 minutes, with a range of 60–260 minutes.

Discussion

Thoracic epidural anaesthesia for major abdominal surgeries is not common in Nigeria.¹⁰ To the authors' knowledge, no previous study in Nigeria has reported TEA for major abdominal surgeries. In this study, TEA was adequate for the surgeries in 10 (83.3%) patients. This high success rate is comparable to previous studies, which reported 100% success in their series.^{5,11}

In this study, TEA was applied to a variety of surgical procedures with specific anaesthetic considerations including laparotomy for intestinal obstruction and nephrectomy, thus demonstrating the versatility of epidural anaesthesia. Similarly, Bhosle et al.⁵ in a previous retrospective study demonstrated the feasibility and safety of TEA in a variety of upper and lower abdominal surgeries including emergency procedures. In our study, lower thoracic epidural anaesthesia was used. Previous studies have documented the use of lumbar epidural anaesthesia as well as

spinal anaesthesia in abdominal surgeries.^{5,12,13} However, the magnitude of haemodynamic 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 postoperative analgesia and marked decrease in postoperative pulmonary complications.¹⁴

In the 10 patients whose surgeries were successfully performed under TEA in this study the intraoperative course was fairly stable. Two (20%) patients had hypotension while shivering and nausea/vomiting were observed in one patient (10%). These complications were recorded in a 65-year-old man who had a nephrectomy. These may be attributed to hypovolemia following blood loss that occurred intraoperatively. The patient was successfully managed with intravenous fluid, ephedrine, pentazocine and metoclopramide. Bhosle et al.⁵ documented hypotension warranting the use of vasopressors in 23.33% of their patients; no shivering, nausea or vomiting was recorded. In contrast, Balzarena et al.¹¹ reported a high incidence of hypotension (60%) in 20 patients who required TEA for mastectomy; also, pruritus and vomiting were recorded postoperatively. This difference may be due to differences in the epidural drug dosing and blood loss during the procedure.

Two (16.7%) of our patients developed total spinal anaesthesia and were successfully resuscitated and their surgeries completed under GA with intubation without any untoward postoperative sequelae. The incidence of such a major complication observed in our study appears rather high. However, it cannot be concluded that TEA is associated with a high incidence of total spinal anaesthesia considering our small sample size. Previous studies in a larger population have shown that TEA is safe.^{5,11} This complication may be attributed to inappropriate patient selection and technical problems and not the technique per se. The first patient was a 75-year-old woman in whom localisation of the epidural space was difficult; five attempts were made. The patient became unresponsive and hypotensive following administration of 5 ml of 2% lidocaine with adrenaline. The second patient was a 20-year-old woman scheduled for exploratory laparotomy for intra-abdominal abscess. She was haemodynamically unstable preoperatively, and was resuscitated with intravenous fluid and blood transfusion. The epidural space was localised at a single attempt. She developed total spinal anaesthesia following a loading dose of 5 ml of lidocaine with adrenaline. Total spinal anaesthesia suggests inadvertent introduction of local anaesthetics into the intracranial subarachnoid space.^{15,16} It is probable that dural puncture following multiple epidural attempts, catheter migration, age as well as preoperative hemodynamic instability may have contributed to total spinal anaesthesia in these patients. It is important to note that although total spinal anaesthesia is a rare complication of spinal and epidural anaesthesia, it may occur even in circumstances when it is least expected. Previous studies have reported total spinal anaesthesia following administration of 3 ml of lidocaine with adrenaline used as a test dose during epidural anaesthesia.^{15,16} Therefore, adequate preparation should be made at all times to detect and manage this complication when performing TEA.

The epidural catheters were removed in the theatre at the end of surgery in this study; thus our patients did not maximise the benefits of epidural anaesthesia, which include superior pain control, lower incidence of paralytic ileus, wound infection, nausea and vomiting etc.^{17,18} This was due to non-availability of appropriately trained personnel, monitoring equipment and opioid medications in these hospitals.

Finally, one major limitation of our study is the small sample size, which is a potential source of error in a retrospective study like ours. Therefore, a prospective study with an appropriate sample size that incorporates postoperative epidural analgesia management is indicated.

Conclusion

TEA is feasible, and can be applied to a wide variety of major surgical conditions in the abdomen. However, careful patient selection, a meticulous approach and preparation for resuscitation is required to prevent and manage complications.

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