

Our Experience in Epidural Analgesia Following Large Abdominal Surgeries.

Nehat Baftiu¹, R.Baftiu¹

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Abstract

Background: Epidural analgesia is a gold standard in post-operative pain control in patients undergoing large abdominal interventions. Different studies report a failure ratio of epidural analgesia of 20-32%.

The aim of this study is to analyze the success rate of epidural analgesia and its consequences in patients that have been subject to large abdominal surgeries.

Materials and methods: We have prospectively collected the data of 50 patients that were subject to open abdominal surgeries during a 2 year timeframe (September 2015 – September 2017) at University Clinical Center of Kosovo. Experienced anesthesiologists inserted the epidural catheters. A dedicated team used the Verbal Scale to collect the data regarding post-operative pain during coughing or moving. The success rate of epidural catheter was measured in terms of: the scale of pain, pulmonary post-operative infection and length of hospital stay.

Results: The study group included 33 males and 17 females, most of whom were subject to liver surgery. The secondary liver formations (70%), primary tumours (20%) as well as benign liver disorders (10%) were an indication for liver resection. Large resections (≥ 3 segments) were completed in 44% of patients, small liver resections were (≤ 2 segments) completed in 48% of patients, while 8% of patients were considered inoperative. Epidural analgesia was successful in 46 patients (92%). Bacterial colonisation of the catheter was observed in only one case. There were no neurological complications. 5 (10%) patients showed radiological signs of a pulmonary infection. Three patients (6%) had surgical wound infection. One patient died of hepatic insufficiency after massive right liver resection and cholecystectomy due to gallbladder carcinoma. The average length of hospital stay was 6 days.

Conclusions: Our experience concludes that epidural analgesia is a safe and effective way of pain relief after abdominal surgeries.

Keywords: epidural analgesia, open abdominal surgery, acute pain, prevention.

*Corresponding Author: Nehat Baftiu

✉ Email: nehatbaftiu@hotmail.com

¹University Clinical Center of Kosovo, Prishtina, Republic of Kosovo.

Full Text

Introduction

Epidural analgesia provides a regional pain control through neuroaxial blockade. It is estimated that epidural analgesia offers a better pain control (especially pain due to movements) at the beginning of the post-operative period, following large abdominal surgeries in contrast to patient controlled analgesia.

The duration of post-operative intubation, post-operative mechanical ventilation, myocardial infarction, gastric and renal complications are more rare when epidural analgesia is applied. There are several physiological factors that reason the decrease of such complication after using this technique. Epidural analgesia allows adequate early post-operative mobilisation, thus reducing early cardiopulmonary complications.

This is why epidural analgesia is as a gold standard in pain control following large abdominal surgeries. It has gained an important role, especially after the implementation of the rehabilitation programs.

However, some studies have shown that a considerable part of the epidural catheters (20-32%) fail partly or in total immediately after the post-operative period, thus resulting in a non adequate pain control.

Liver resection due to benign or malign disorders is a very frequent surgical procedure. Pain following surgery may compromise pulmonary function, especially after large incisions near the diaphragm. Hepatectomy is very often performed under low venous pressure

in order to reduce blood loss from the hepatic veins. Hypotension from neuraxial blockade might be necessary to provide a low venous pressure.

Bilateral subcostal incision, starting from the median axillary line on the right up to outer border of rectus muscle on the left and xiphoid process superiorly is the classical incision for large abdominal surgeries such as hepatectomy. The central part of the incision represents the weakest point of the abdominal wall, that predisposes for post-operative wound dehiscence and incisional hernia.

Epidural analgesia is considered to be less effective, the higher the incision on the abdominal wall. That is why modified incisions are made, including J incision (excluding the left subcostal component) and bilateral subcostal incision (excluding the superior central part) that are advantageous in reducing pain and hence in less post-operative respiratory consequences.

Some of the neurological adverse effects of epidural analgesia such as epidural hematoma and epidural abscess might have very great neurological consequences, are fortunately very rare. Post-operative coagulopathies may be noticed more frequently after hepatectomy surgeries.

Aim

The aim of our study was to analyze the success rate of epidural analgesia and its consequences in patients that have been subject to large abdominal surgeries (including those performed using bilateral modified subcostal incision).

We aimed as well to find any possible relation among epidural analgesia failure, length of hospital stay, and complications such as: pulmonary infections and wound infections.

Materials and methods

We have prospectively collected the data of 50 patients that were subject to open abdominal surgeries during a 2 year timeframe (September 2015 - September 2017) at University Clinical Center of Kosovo. Epidural catheter was successfully inserted in all of our patients. Our variables included: patient's characteristics, surgical indication, size of incision of liver resection, epidural catheter data, results of post-operative pain, complications and length of hospital stay. All of the patients were subject to bilateral subcostal incision without involving the central line (the superior xiphoid process part). Liver resection was classified as large (≥ 3 segments) and (≤ 2 segments). All the patients that underwent large abdominal surgery remained for 24 hours after surgery at intensive care unit. The patients were as well categorized according to their disease: benign, primary malignant and secondary malignant (metastases).

Epidural catheter insertion and management

Experienced anesthesiologists inserted the epidural catheters, at T7-T8 intervertebral space levels while the patients were awake. Bupivacaine

(0,1%) and Fentanyl (2 $\mu\text{g}/\text{mL}$) were used as infusions. All the patients had the possibility to self administer this infusion injecting 3ml of bolus (up to two boluses in one hour).

First, a continuous infusion of 3-12ml/h was applied. The quantity of the infusion was based on the clinical data regarding the scale of pain. Pain scales were collected and documented by a specialized nurse at specific time intervals. If the patient referred for a strong pain, then the nurse applied a bolus of 5ml for the infusion.

All the patients received Paracetamol (1gr every 6h) as a standard auxiliary analgesic. The pain scale was monitored from our team when the patients were moving or coughing by using the Verbal Scale (0-no pain, 1- low pain, 2- average pain, 3-strong pain). Removal of epidural analgesia and opioid administration to control pain were considered as a failure of epidural analgesia. Epidural analgesia was removed one day after the continuous infusion was stopped, usually the third or the fourth post-operative day. The clotting factors were controlled on the day of catheter removal. If the tip of the catheter showed signs of infections it was immediately removed and it was sent for microbiological testing.

The data regarding hepatic insufficiency, pulmonary infections and wound infections were recorded. A pulmonary infection was considered when the clinical signs and radiological signs were present. A wound infection was considered when the clinical signs and positive microbiological results were present. The success rate of epidural catheter was measured in terms of: the

scale of pain, pulmonary post-operative infection and length of hospital stay.

All the data were collected in Excel and were analyzed using the SPSS programme.

Results

The study group included 33 males and 17 females . The mean age was 66 years old (32-84 years old , with an average of 67 and a standard deviation (SD) of 9.2 years). Indications for the intervention were metastases (69 %,n =35), primary tumors (20%, n=10) and benignity (11 %,

n=5). From the metastasis , the majority were colorectal 90 % (n=44) and the others derived from carcinoid (n=2) , breast cancer (n=10), anal squamous cells carcinoma (n=1) and bladder cancer (n=1). The primary liver tumors included hepatocellular carcinoma (HCC , n=7) , cholangiocarcinoma (n=3) and cholecysto carcinoma (n=4) . Major and minor interventions were done in respectively 44 % (n =22) and 48 % (n=24) of patients , whereas 8 % (n=4) were inoperable . The patient' s characteristics and the complications are illustrated in the table below (*Table 1*)

| Variables | | Major interventions | Minor interventions | Inoperable |
|-------------------------|-----------------|---------------------|---------------------|------------|
| Number (%) | | 22 (44%) | 24 (48%) | 4 (8%) |
| Age (years) | Average | 67 | 69 | 59 |
| | Minimum-Maximum | 57-81 | 32-84 | 49-77 |
| Gender | Males | 13 | 16 | 1 |
| | Females | 9 | 8 | 3 |
| Indications | Benign | 2 | 3 | 0 |
| | Malign | 20 | 21 | 4 |
| Epidural | Success | 21 | 21 | 4 |
| | Failure | 1 | 3 | 0 |
| Pulmonary infection | | 3 | 1 | 0 |
| Wound infection | | 2 | 1 | 0 |
| Length of hospital stay | On average | 7 | 6 | 5.5 |
| | Minimum-Maximum | 5-27 | 4-20 | 3-9 |

Table 1: Patient' s characteristics and the complications

Epidural analgesia resulted successful in 46 patients (92 %) . The failure of epidural analgesia was noticed only in male patients (n=4). The analgesia was not successful in 2 patients due to unilateral block. There was also initially

an unilateral block in 3 patients , but the grade of pain was reduced in a low one (grade 1) after redeployment of the epidural catheter (aseptic traction of 1 cm) and bolus administration of the medications by the nurses . These cases

were not included in the group of failures. All the patients that failed with epidural analgesia were given a continuously morphine therapy . The grade of postoperative pain were collected for each patient , every day after the epidural catheterization. It resulted that 16 patients didn't have any kind of pain (lowest pain grade 0) . The

most common pain grade was 1 (mild pain) found in 23 patients , than pain grade 2 (moderated pain) in 5 patients and severe pain (grade 3) in 5 patients. The frequency of the pain's grade of successfully catheterized patients , until the 3 day post intervention is illustrated in *Figure 1*.

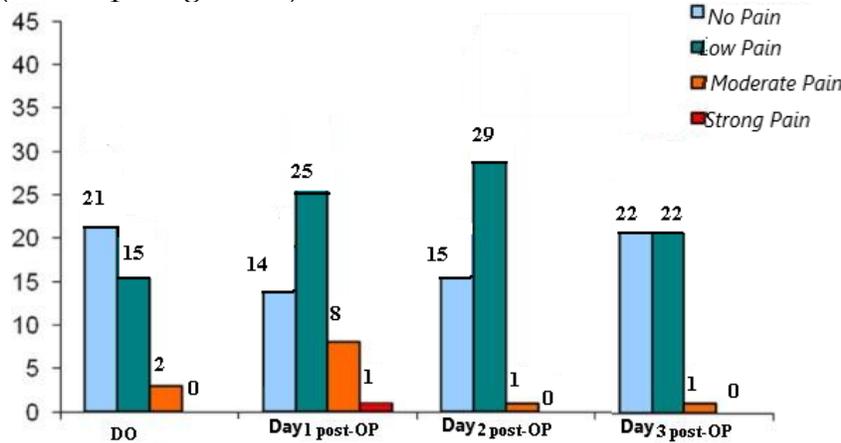


Figure 1: Grade of pain on post-operative days

None of the patients developed epidural hematoma or abscess . Bacterial colonization of the catheter was also not found in any of the patients . There weren't any neurological complications . The average time of keeping the epidural catheter after the intervention was 3 days (min 2 days, max 5, average 3.4 with a SD 0.98)

4 Patients (7 %) developed a pulmonary infection which was confirmed by radiology . 4 Patients developed wound infection . A patient died as a result of hepatic failure due to resection of a massive part of the right hepatic lobe and cholecyst because of cholecyst carcinoma . (1.4%).

Patients had a mean hospitalization period of 6 days (varying from 3 to 27 days , SD =4.6). There wasn't any

significant difference in the hospitalization time based on the age , sex, main surgery indication or epidural analgesia .The hepatic resection size had an important impact in the hospitalization time , the ones who resected a larger portion stayed more in hospital. Also pulmonary infections played an important role .

Discussions

The majority of operations in our country are realized by a big abdominal incision . In this study all the interventions were done from specialist through a standard bilateral subcostal incision . Even though the epidural thoracic catheter is considered to produce a bilateral sensorial block in the

upper abdominal part , it is seen that the upper the incision is done the less controlled pain is and the greater is the risk of pulmonary complications . The midline incision causes a major abdominal traction and a greater damage of the abdominal wall , that delays the pulmonary recovery . Anyway it should be noticed that this study analyzed the effectiveness of analgesia in standard incisions .

In our study epidural analgesia was productive in treating post operation pain in 92 % of patients . In different studies it has been reported of failure of this analgesia in 20 % of patients who had liver cancer. Our study showed that when the catheter was placed by a trained team with the lead of an anesthetist epidural analgesia was more productive .

Epidural analgesia is considered to be the gold standard post operative analgesia of upper abdominal operations , because it is thought that epidural analgesia is the best option of immediate analgesia .

Hypotension can be very often caused by epidural analgesia , which can be considered a priority when we want to reduce venous pressure to also reduce bleeding during hepatic surgery.

The administration of large amounts of IV fluids is well known in these kind of interventions , but could be easily prevented by a well prepared staff . Even though the grade of pulmonary infections in our study was low (7%), this complication was a very important factor that prolonged the days of hospitalization . Due to the reduction of opioids when we use epidural analgesia there is a better function of

gastrointestinal tract , pulmonary tract and an easier recovery after operation.

Neurological complications such as hematoma, abscess which can be life threatening and to worry about were very rare . Even though there was a patient with epidural contamination , there was no evidence of infection and no neurological complications

The well trained staff and the use of modern catheters was of a great help. The mean hospitalization period in this study was 6 days , prolonged by the size of liver resection .

The weakness of our study is still the standardization of the surgical incision , the operation technic , and the prospective collection of the data . Some limitations in our study could be the reduced number of patients and the fact that the stud was only conducted in one hospital center.

Conclussions

Our experience concludes that epidural analgesia is a safe and effective way of pain relief after abdominal surgeries. We have reache a 92% success rate in patients that were subject to large abdominal surgeries (standard subcostal incision excluding the central superior xiphoi process line). Neurological adverse effects might have great consequences, but since they are very rare, we have not encountered such complications in our study, neither have found these ones in similar studies.

The epidural catheter is very effective when it is inserted routinely from experienced anesthesiologists and it is managed by teams that are trained in pain control.

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