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Case Report

The Role of Continuous Erector Spinae Plane Block in Prolonged Analgesia for Open Hepatopancreatic Surgery - A Case Series

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Summary

In this case series, we explore the use of the Erector Spinae Plane Block (ESPB) for pain management in hepatobiliopancreatic surgeries. Initially identified in 2016, ESPB has been effective in various surgeries, offering an alternative to traditional opioid-based analgesia. This study focused on 10 patients undergoing surgeries with subcostal incisions, assessing ESPB's impact on pain reduction and opioid consumption.

Results showed that ESPB significantly reduced postoperative pain, with most patients reporting low pain levels. Opioid use was minimal, and patient satisfaction was high. Notably, the study found ESPB to be safe, with minimal side effects and no significant complications. These findings suggest ESPB as a viable and effective technique for pain management in complex surgeries, supporting its broader application and further research.

Keywords: Erector spinae plane block; Hepatopancreatic surgery; Postoperative pain management; Analgesia; Opioid-sparing

Introduction

The Erector Spinae Plane Block (ESPB) is a novel regional block described by Forero et al. in 2016 [1]. It began to be used in both chronic and acute pain treatment, being reported with safety and success in reducing pain patterns also in thoracic, cardiac and abdominal surgery. Some of its mechanisms are still controversial, although the primary mechanism is probably related to neural diffusion along the fascial plane and to the direct effect of local anesthetic physical spread [2].

In hepatobiliary surgery, intravenous opioids are usually chosen in the postoperative period, but as they may not be properly metabolized, the epidural anesthesia, the gold standard technique, presents a heightened risk of bleeding, a concern that applies even to patients with no prior coagulation disorders. The usage of other analgesia techniques capable of reducing pain and Postoperative Nausea and Vomits (PONV) is required to reduce morbidity and recovery time, such as regional blocks, making ESPB a viable alternative for its suggested safety and effectiveness [3,4].

In this series of 10 patients, we describe ESPB usage in patients undergoing hepatobiliopancreatic surgery with subcostal incisions to evaluate its pain reduction potential, consumption of rescue opioids and safety.

Report

Followed by patient's consent, a ESP Block was performed in a series of ten elective open hepatic or pancreatic resections, with similar surgery time, similar "Inverted-L" surgical incision combining a horizontal cut along the right subcostal margin and a vertical extension towards the navel, both open hepatectomy (3 cases) and pancreatoduodenectomy (7 cases). Block was performed before induction of general anesthesia, it was administered in a solution of 20 ml of 0.3%-0.5% ropivacaine on each side at T7 level (Figure 1) and 30 minutes prior extubation, followed by the insertion of an 18 G epidural catheter for posteriorly local anesthetic administration. In surgery, all patients received Fentanyl 3 mcg/kg, 50 mcg bolus as needed and 30 mg/kg metamizole. It was used 0.15 mg/kg ondansetron and 0.15 mg/kg dexamethasone for PONV prophylaxis. Postoperative analgesia was maintained with Metamizole 1 g intravenous each 6 hours. Rescue with 20 mL of Ropivacaine 0.3% bilaterally through catheters was performed if patient Visual Analogue Scale (VAS) of pain was higher than 4. Opioid consumption, complications, VAS and patient satisfaction with analgesia were recorded within the first 48h.

We report the VAS scores during the first day and between the first and second day (displayed as mean± SD), the use of intraoperative opioids, and the use of rescue opioids in the first 48 hours of the postoperative period in intravenous morphine equivalents using a converter [5], and the satisfaction score (0-10) at the end of the second day of the postoperative period (Table 1).

Demographic and intraoperative profiles were collected (Table 1). Upon Post-Anesthesia Care Unit (PACU) admission, over 70% of patients had a VAS equal or lower than 3, and the highest mean intensity of pain was observed at PACU and 1h postoperatively, with an overall mean and standard deviation of 1.9 ± 0.76. The postoperative opioid consumption was relatively low overall with a max of 200 mg of Tramadol in the first 48 h, administered at patient's request. Patient satisfaction with analgesia was high, with an average score of 9.2 ± 1.62 out of 10. One case of PONV was reported. No other side effects or block-related complications were observed.

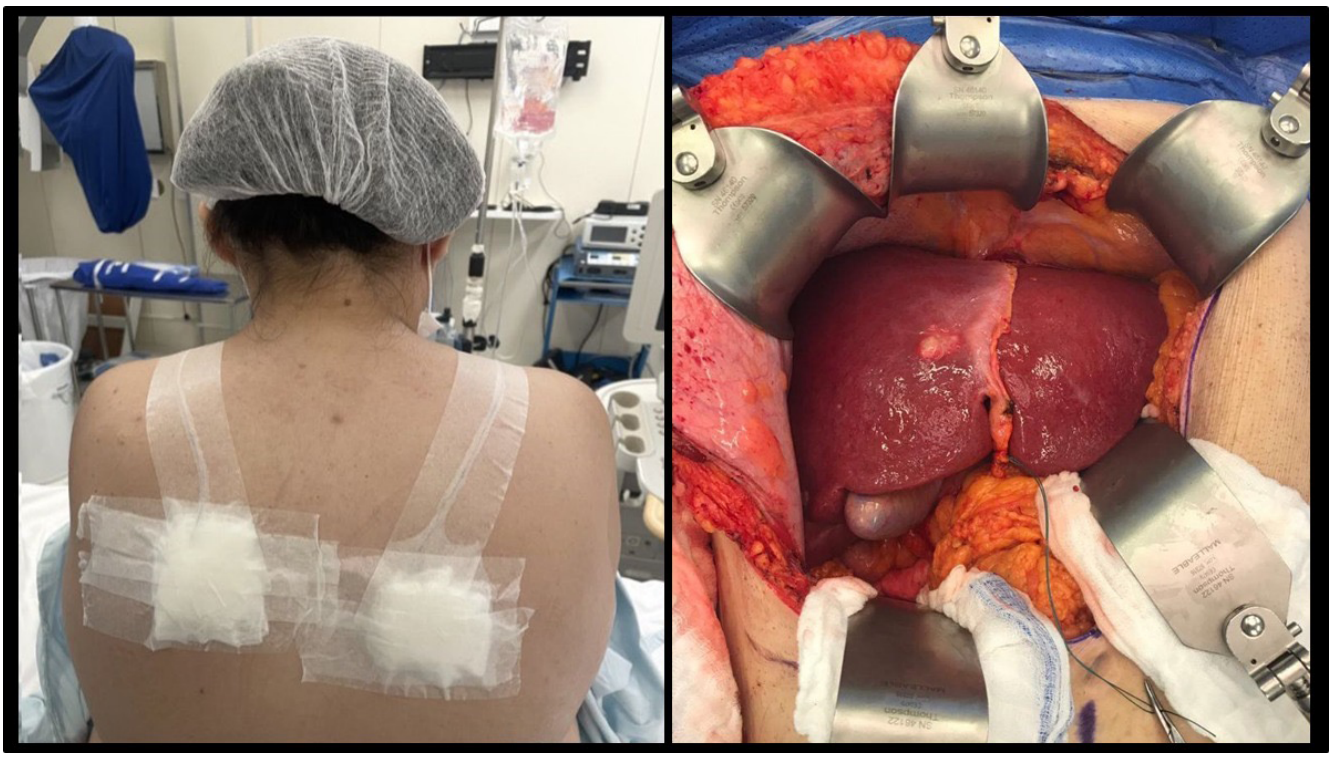

Figure 1: ESP Catheters, Open Hepatectomy and USG. A: ESP catheters in patient before surgery; B: Incision and retractors; C: USG image of the ESPB

Case	Age / Weight (kg)	Surgery and operative time (min)	1st Rescue analgesia	LA at beginning of surgery	LA at end of surgery	VAS day 1	VAS Day 2	MME at procedure	Rescue MME at 48h	Satisfaction
1	53 / 68	GDP (540)	-	Ropivacaine 0.3% 20 + 20 ml	Ropivacaine 0.3% 20 + 20 ml	3.0 ± 3.32	2.0 ± 2.83	16	-	8
2	43 / 60	GDP (480)	6h	Ropivacaine 0.3% 20 + 20 ml	Ropivacaine 0.3% 20 + 20 ml	1.0 ± 1.41	1.5 ± 2.12	14	20	10
3	44 / 55	GDP (600)	6h	Ropivacaine 0.3% 15 + 15 ml	Ropivacaine 0.3% 15 + 15 ml	2.0 ± 1.87	0.0 ± 0.00	14	20	9
4	56 / 47	GDP (540)	6h	Ropivacaine 0.3% 15 + 15 ml	Ropivacaine 0.3% 15 + 15 ml	2.6 ± 2.07	1.5 ± 0.71	14	10	10
5	40 / 60	GDP (500)	24h	Ropivacaine 0.4% 20 + 20 ml	Ropivacaine 0.3% 20 + 20 ml	4.4 ± 2.19	2.0 ± 1.41	22	20	10
6	35 / 65	PH (180)	-	Ropivacaine 0.5% 20 + 20 ml	Ropivacaine 0.3% 20 + 20 ml	0.0 ± 0.00	0.0 ± 0.00	14	-	10
7	40 / 78	PH (600)	PACU	Ropivacaine 0.3% 20 + 20 ml	Ropivacaine 0.3% 20 + 20 ml	3.6 ± 4.10	1.0 ± 1.41	16	14	10
8	40 / 65	GDP (300)	-	Ropivacaine 0.4% 20 + 20 ml	Ropivacaine 0.3% 20 + 20 ml	0.0 ± 0.00	0.0 ± 0.00	20	-	10
9	45 / 75	PH (540)	12h	Ropivacaine 0.5% 20 + 20 ml	Ropivacaine 0.5% 20 + 20 ml	0.4 ± 0.89	0.0 ± 0.00	25	20	10
10	43 / 80	GDP (600)	6h	Ropivacaine 0.4% 20 + 20 ml	Ropivacaine 0.3% 20 + 20 ml	3.0 ± 2.55	2.5 ± 3.54	10	20	5

Visual Analog Scale (VAS) values are displayed in Mean ± SD. GDP: Gastroduodenopancreatectomy. PH: Partial Hepatectomy MME: Morphine Milligrams Equivalent. LA: Local Anesthetics . ASA: American Society of Anesthesiologists.

Table 1: Summary of baseline characteristics, local anesthetics used and VAS scores.

Discussion

This case series aims to demonstrate the effects of the ESPB when applied as an intermittent on-demand bolus during hepatic and pancreatic surgeries with the use of subcostal retractors. We analyzed 10 patients who underwent surgeries of similar duration to evaluate the impact on postoperative pain control, nausea and vomits, and procedure-related complications. The ESPB provides analgesia while sparing the patient from the adverse effects of opioids, in both abdominal and thoracic surgeries [3,6]. Current evidence suggests additional action in the paravertebral space, with blockage of the ventral rami and dorsal root ganglia [2], providing some degree of somatic and visceral analgesia in the territory related to the congruent spinal nerves. Evidence consistently suggests the involvement of posterior rami, nevertheless the involvement of anterior rami is still controversial.

Part of the analyzed patients were submitted to partial hepatectomy. This procedure entails an increased risk of bleeding even in patients without previous coagulopathy [7], posing an additional, albeit theoretical, risk to the gold-standard technique of epidural analgesia.

Another common complication in hepatectomy is the delayed gastric emptying as a consequence of resection of the duodenum portion which produces motilin. This event may be associated with prolongation of hospital stay, which leads to economic impact and increased morbidity. It is also suggested that lower opioid consumption can lead to a reduction of this event in patients that underwent hepatectomy [8], which reinforces the usage of different methods of analgesia.

In our findings, it was possible to observe a low level of pain (VAS $\leq$ 3 in 70% of patients) in the first 48 hours after surgery and only one episode of PONV. The lowest average VAS occurred in the period between 24 to 48 hours, corroborating with data that shows the technique effectiveness in this period of time. Kang et al. reported, at 48h, VAS of 0 [0-2] in ESPB versus 3 [1-3] in control, in hepatectomy [3]. We believe that the pain caused by the subcostal spreaders is related to this pattern of time, since they are the common denominator among the procedures.

When compared to intravenous analgesia, data suggests ESP Block continues to be associated with lower opioid consumption, lower PONV incidence, despite the controversial evidence of the involvement of ventral rami [2], and better recovery in patients undergoing hepatectomy [4]. A reduction in mean VAS by 1.9 points in the first three hours was reported in Huang et al. In Kang et al., comparing ESPB with intrathecal morphine, no reduction in opioid consumption was observed, however, there was a lower PONV incidence in ESPB group (37.9% of vomiting in the intrathecal morphine group versus 3.3% in the ESPB group, within 48 h) [3].

The concern for PONV is justified by its potential to elevate morbidity, patient dissatisfaction and extend hospital stays. Despite the results in our sample, a meta-analysis by Viderman et al. reports no difference in the presence or absence of nausea and vomiting in the postoperative period compared to the control group, indicating the need for further studies [9].

In our series, no complications related to the procedure were observed, which may suggest its safety. This observation is consistent with data of other studies, in which no adverse events related to the ESPB were reported [6]. Its most significant risks are related to toxicity by systemic systemic absorption, without yet being possible to define the safe maximum dose. This collection of evidence suggests its reliability as a novel technique capable of providing a satisfactory analgesia with low risk of harm. The thoracic epidural is considered the gold standard in this scenario, despite the occurrence of minor complications being more frequent [10]. The increased risk of coagulopathy in hepatectomy is worth mentioning, which may be associated with the risk of epidural hematoma and neurologic deficit.

Many services have limited options for postoperative analgesia. By using intermittent boluses when certain high pain scores are presented, we can ensure satisfactory analgesia for the patient without relying on PCA or infusion pumps. Moreover, the decrease in opioid use for pain control in our hospital was significant in demonstrating to other services the possibility of alternative routes for multimodal analgesia that have improved both patient outcomes and morbidity.

Despite being a series of only 10 cases, the positive impact on the hospital culture regarding analgesia through fascial blocks has expanded to other procedures and techniques. This case series reports a viable alternative to epidurals for a common painful stimulus among different procedures, generating a satisfactory response in the analyzed patients. More studies are necessary to understand the effect of the ESPB in treating pain caused by open laparotomy and the use of subcostal retractors.

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