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Erector spinae plane block for postoperative analgesia after total laparoscopic hysterectomy: case series and review of the literature

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Abstract. – OBJECTIVE: Total laparoscopic hysterectomy (TLH) is associated with significant postoperative pain that worsens outcomes and prolongs hospital stay. Ultrasound guided erector spinae plane block (ESPB) is a new technique for thoracic analgesia. Few cases have been described for postoperative analgesia in laparoscopy. We describe the use of preoperatory bilateral ESPB at level T10 to provide postoperative analgesia following THL.

PATIENTS AND METHODS: We enrolled 10 ASA 1-2 patients scheduled for TLH. After written informed consent we performed bilateral ESPB at T10 level in sitting position, with a linear probe and in plane cranio-caudal approach and ropivacaine 0.5% 20 for each side. The sensitive block was tested by pinprick. Standard general anesthesia was administered. Patient controlled analgesia (PCA) with morphine 1 mg/ml was delivered. We measured postoperative pain by visual analogue scale (VAS).

RESULTS: Five patients (50%) underwent simple TLH, 5 women (50%) had TLH plus salpingo-oophorectomy. VAS scores was <4 in all cases but one, and PCA morphine consumption was 4.1 ± 3.5 mg (mean ± SD). Pinprick was positive bilaterally in 3 patients (30%).

CONCLUSIONS: ESPB was an effective and safe procedure for postoperative pain control after TLH. Future research should compare ESPB to other techniques to assess its role on perioperative management of THL.

Key Words:
Erector spinae plane block, Total laparoscopic hysterectomy, Postoperative pain.

Introduction

Patients undergoing total laparoscopic hysterectomy (TLH) experience significant postoperative pain, with an average of 6 out of 10 on numeric rating scale[1]. Pain associated with hysterectomy can also worsen patient's outcome and prolong hospital length of stay[1]. Current options for pain relief include systemic opioids, infiltration of local anesthetic to port sites, thoracic epidural analgesia, transverse abdominis plane (TAP) block, quadratus lumborum block (QLB), use of reduced port calibre, paracervical block[1-4].

The ultrasound-guided erector spinae plane block (ESPB) is a recently described effective technique for thoracic analgesia[5]. Few authors described preliminary clinical evidence to investigate the use of bilateral ESP blocks for postoperative analgesia following laparoscopic abdominal surgery (bariatric surgery, ventral hernia repair, cholecystectomy and urologic surgery)[6-8].

In this case series we describe the successful use of preoperatory bilateral ESPB at the level of the T10 transverse process to provide postoperative analgesia following THL.

Patients and Methods

We present a case series, therefore we obtained a written informed consent to the procedures and to treatment of personal data by the patients; an approval by IRB was not required. In 10 patients scheduled for TLH. After sedation with midazolam 2 mg, we performed ultrasound guided bilateral ESPB at T10 level according to the technique described by Forero et al[5]. In sitting position, using a linear high-frequency ultrasonographic probe (Sonosite M-Turbo®, HFL38-x, 6-13 MHz; Fujifilm Sonosite Europe, Amsterdam, The Netherlands) covered in a sterile sleeve with transverse orientation, the T10 spinous process was identified. The probe was

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shifted about 3 cm lateral to the spinous process until identification of the transverse process. The probe was then rotated with longitudinal orientation, and a neural block needle (Ultraplex 360 22G ×90 mm, B Braun®, Melsungen, Germany) was inserted with craniocaudal direction after infiltration with Lidocaine 2% 3 ml. The needle was visualized in plane along its entire length until the contact with the transverse process, then, 20 ml of ropivacaine was injected slowly, verifying hydrodissection of the plane between the erector spinae muscle and the transverse process. The same procedure was repeated controlaterally.

After 15 min general anesthesia was inducted with 2 mg/kg propofol, 15 mcg sufentanil, and 0.6 mg/kg rocuronium. After orotracheal intubation, anesthesia was maintained with Sevoflurane 1.6-2.2% in air-oxygen mixture, titrated by Bispectral Index Monitor (Shenzhen Mindray Bio-Medical Electronics Co., Shenzhen, China) to achieve a patient state index of 40-50. Additional sufentanil was administered according to the anesthesiologist's judgment. Further intraoperative analgesics included ketorolac 30 mg IV at induction and acetaminophen 1 g IV. Acetaminophen 1 gr every 8 h for the next 24 h was continued.

All hysterectomies were performed with the same surgical technique. The operations were performed using an initial 12-mm umbilical trocar and 3 accessory 5-mm trocars inserted under direct laparoscopic visualization. A uterine manipulator (Clermont-Ferrand®; Karl Storz, Tuttlingen, Germany) was inserted. The pneumoperitoneum was maintained at 13 mm/Hg. The retroperitoneal space was dissected to identify the ureters, and the uterine arteries were ligated at the origin bilaterally. Every colpotomy was performed using monopolar energy and closed horizontally using barbed suture in a running fashion. All patients were extubated before the transfer to the recovery room (RR). A patient control analgesia (PCA) device with morphine 1 mg/ml was used for postoperative analgesia. Patients' pain was assessed by an 11-point visual analogue scale (VAS; 0 = no pain, 10 = worst pain imaginable).

Results

All patients were subjected to TLH, with (5 cases) or without (5 cases) salpingo-oophorectomy. No complications occurred during the surgery in none of the patients. Patients' characteristics are shown in Table I. A summary of postoperative pain and Morphine PCA requirements is shown in Figure 1. VAS scores was < 4 in all cases but one, and PCA Morphine consumption was 4.1 ± 3.5 mg (mean ± SD), < 9 mg/24 h in all patients.

Patient 1

A 48-yr-old female underwent THL for uterine fibromatosis. She suffered from bronchial asthma and glucose intolerance, treated with metformine. The duration of surgery was 55 min, and she received i.o. sufentanil 30 mcg. Neurologic examination in the PACU revealed normal sensation to pinprick bilaterally in the abdominal field. Her VAS ranged from 2 to 5/10 during the first 24 h, and total amount of Morphine PCA was 6 mg. The patient was discharged home on the third postoperative day.

Patient 2

A 44-yr-old healthy female underwent THL for uterine fibromatosis. The duration of surgery was 80 min, and she received i.o. sufentanil 35 mcg. Neurologic examination in the PACU revealed decreased sensation to pinprick in the abdominal field from T4 to T9 on the right side and from T4 to T10 on the left side (Figure 2). Her VAS ranged from 2 to 4/10 during the first 24 h, and total amount of Morphine PCA was 4 mg. The patient was discharged home on the third postoperative day.

Table I. Patients' demographic characteristics.

Patient	1	2	3	4	5	6	7	8	9	10
Age (years)	48	44	74	47	50	45	53	56	46	48
Weight (kg)	79	60	70	80	80	64	73	86	65	65
Height (cm)	1.65	1.8	1.73	1.7	1.6	1.75	1.72	1.64	1.6	1.65
BMI	29	18.5	23.3	27.6	31.2	23.8	24.7	32	25.4	23.9

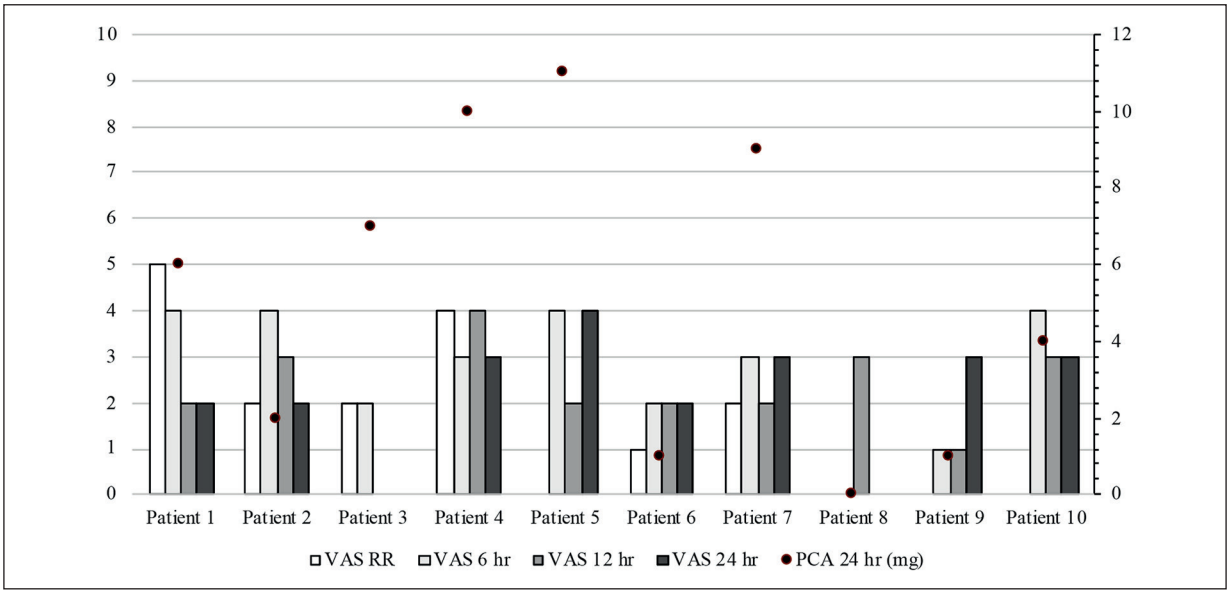

Figure 1. VAS score at recovery room, at 6 h, at 12 h, and 24 h (*left vertical axis*); black spot represent total morphine PCA use (*right vertical axis).*

Patient 3

A 74-yr-old female underwent THL plus bilateral oophorectomy for abnormal uterine bleeding. She suffered hypothyroidism and arterial hypertension, treated with Levotiroxin, Telmisartan, and Pregabalin. The duration of surgery was 115 min, and she received i.o. sufentanil 40 mcg. Neurologic examination in the PACU revealed normal sensation to pinprick bilaterally in the abdominal field. Her VAS ranged from 0 to 3/10 during the first 24 h, and total amount of Morphine PCA was 7 mg. The patient was discharged home on the second postoperative day.

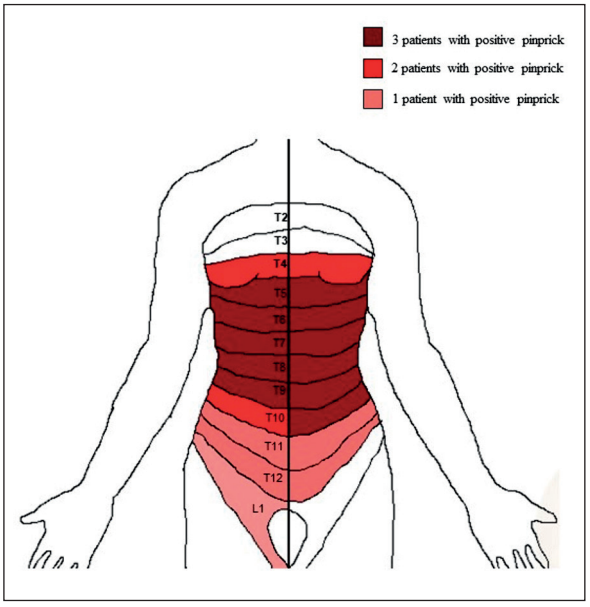

Figure 2. Dermatomes with positive pinpricks (3 out of 10 patients). Each dermatome is represented with different shadows of red depending on the patients in which the pinprick resulted positive.

Patient 4

A 47-yr-old healthy female underwent THL for uterine fibromatosis. The duration of surgery was 120 min (due to several visceral adhesions from endometriosis), and she received i.o. sufentanil 50 mcg. Neurologic examination in the PACU revealed normal sensation to pinprick bilaterally in the abdominal field. Her VAS ranged from 0 to 4/10 during the first 24 h, and the total amount of morphine PCA was 10 mg. The patient was discharged home on the third postoperative day.

Patient 5

A 50-yr-old healthy female underwent THL for leiomyoma. The duration of surgery was 85 min, and she received i.o. sufentanil 30 mcg. Neurologic examination in the PACU revealed normal sensation to pinprick bilaterally in the abdominal field. Her VAS ranged from 0 to 4/10 during the first 24 h, and total amount of morphine PCA was 9 mg. The patient was discharged home on the third postoperative day.

Patient 6

A 45-yr-old healthy female underwent THL for cervical dysplasia. The duration of surgery was 140 min, and she received i.o. sufentanil 35 mcg. Ketorolac was avoided due to allergy to NSAIDS. Neurologic examination in the PACU revealed normal sensation to pinprick bilaterally in the abdominal field. Her VAS ranged from 1 to 2/10 during the first 24 h, and total amount of morphine PCA was 1 mg. The patient was discharged home on the second postoperative day.

Patient 7

A 53-yr-old healthy female underwent THL plus bilateral oophorectomy for suspicious pelvic mass. The duration of surgery was 70 min, and she received i.o. sufentanil 30 mcg. Neurologic examination in the PACU revealed normal sensation to pinprick bilaterally in the abdominal field. Her VAS ranged from 2 to 3/10 during the first 24 h, and total amount of morphine PCA was 9 mg. She experienced PONV 12 h after the end of surgery. The patient was discharged home on the second postoperative day.

Patient 8

A 56-yr-old healthy female underwent THL plus bilateral oophorectomy for uterine fibromatosis. The duration of surgery was 127 min, and she received i.o. sufentanil 30 mcg. Neurologic examination in the PACU revealed decreased sensation to pinprick in the abdominal field from T5 to L2 on the right side and from T5 to L1 on the left side (Figure 2). Her VAS ranged from 0 to 3/10 during the first 24 h, and she did not use morphine PCA. The patient was discharged home on the second postoperative day.

Patient 9

A 46-yr-old healthy female underwent THL plus bilateral oophorectomy for uterine fibromatosis. The duration of surgery was 64 min, and she received i.o. sufentanil 30 mcg. Neurologic examination in the PACU revealed normal sensation to pinprick bilaterally in the abdominal field. Her VAS ranged from 0 to 3/10 during the first 24 h, and total amount of Morphine PCA was 1 mg. The patient was discharged home on the second postoperative day.

Patient 10

A 48-yr-old female underwent THL plus bilateral oophorectomy for pelvic mass. She suffered hypothyroidism, treated with levotiroxine. The duration of surgery was 186 min, and she received i.o. sufentanil 40 mcg. Neurologic examination in the PACU revealed decreased sensation to pinprick in the abdominal field from T4 to T10 bilaterally (Figure 2). Her VAS ranged from 0 to 4/10 during the first 24 h, and total amount of Morphine PCA was 4 mg. The patient was discharged home on the third postoperative day.

Discussion

Our case series showed that bilateral ESPB at T10 allows a satisfactory postoperative pain control in the first 24 hours after TLH.

Intravenous opioids, especially if administered by PCA, are effective in controlling acute pain due to TLH[9]. However, adverse effects, such as nausea, vomiting, and decreased level of consciousness, are relatively common[2]. In a study[10] reviewing pain control strategies, intraperitoneal local anesthetic infusion for TLH showed low quality evidence of benefit, with a likely scarce clinical significance. Intrathecal morphine showed small benefits in laparoscopic surgery, and thoracic epidural anesthesia appeared to prolong hospital stay without improving outcomes[9,11]. TAP block showed to decrease early postoperative pain scores and opioids consumption[2]. On the other hand in literature 24-hour morphine consumption after TLH arise from 10 to 11.9 mg in TAP patients and 10.6 and 17.7 mg in control group[2]. Our results show that the mean total amount of 24-hours morphine consumption was 4.1 mg; this preliminary data seem promising compared to other studies. The recently published PROSPECT recommendations[12] provide circumstantial arguments in favor and against the use of analgesic interventions for TLH. Although considered less painful than open abdominal hysterectomy, TLH requires careful postoperative pain management in the postoperative period[12]. Currently there is no evidence supporting the use of regional anesthesia techniques[12].

Choi et al[13] described the pain characteristics in the first postoperative hours in patients undergoing TLH. Incisional and visceral pain was most intense 30 min after surgery, gradually decreasing thereafter[13]. Shoulder pain increased during the first postoperative 24 h[13]. TLH showed different dominance of visceral, incisional, and shoulder pains, compared with other laparoscopic procedures. Shoulder pain is described as severe;

visceral pain is intense, associated with intestinal exceeding mobility and strong muscle tightness[13]. Moreover, patients referred perineal pain and one-third of them showed higher pain scores in the perineum than in the abdomen[13]. We agree with this statement, indeed 2 of our patients complained mostly pelvic pain (patients 1 and 5).

The cephalo-caudal local anesthetic spread deep to the erector spinae muscle potentially reaches the paravertebral space[5,6,14]. How the local anesthetic achieves somatic and visceral blockade remains unclear. Magnetic resonance imaging study suggested that the visceral and somatic analgesic effects provided by the ESPB likely result from transforaminal and epidural spread of local anesthetic[15]. This could explain the visceral pathway blockade and the multiple spinal segmental blockade through the circumferential epidural spread[15].

Also, the lack of correlation between the effectiveness of analgesia and motor or sensory block is not well understood. Tsui et al[16] noted that, in ESPB literature, sensory changes resulting in diminished pinprick and cold sensation were reported in 34% of the patients. Our data (sensory blockade observed in 30% of the patients, as shown in Figure 2) endorse this result.

In summary, ESPB performed at low thoracic level provides abdominal somatic and visceral analgesia and could result more effective than other abdominal wall blocks. Furthermore, ESPB presents other advantages: easy to perform, high efficacy, good safety profile, distance between the procedure area and the operation site, and absence of motor block.

Conclusions

Our results suggest that pre-incision bilateral ESPB performed at the T10 level may be a suitable option for the postoperative analgesia management in patients undergoing TLH.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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Institutional Review Board Approval

We presented a case series, therefore we obtained a written informed consent to the procedures and to treatment of personal data by the patients, and we provided communication to IRB.

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