

# Thoracic Paravertebral Block and Morphine versus Morphine Alone for Post Thoracoscopy Pain

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## ABSTRACT

**Objective:** To evaluate the effect of thoracic paravertebral block and morphine versus morphine alone for thoracoscopic surgeries during the first 4 hours.

**Methods:** This study was conducted at King Hussein Medical Center-Amman between August 2009 to August 2010. In this study, 60 patients, were divided into two groups: Group P (paravertebral and morphine) (n=30), patients received thoracic paravertebral block with bupivacaine 0.25% in addition to an intravenous single-injection of morphine, 0.1 mg/kg. Group M (control group) (n=30), patients received morphine; 0.1 mg/kg injection. Pain scores were recorded during the first 4 hours after surgery using visual analogue scale. Also cumulative morphine consumption was recorded during the first 4 hours. The data was analyzed using student's t-test

**Results:** Sixty patients were included in this study, 30 in the paravertebral group (P) and 30 in the control group (M). Pain scores during the first 4 hours postoperatively were lower in group P than group M. The quantity of morphine administered per patient in the first 4 hours was 10mg (range 0-18mg) in group M and 6mg (range 0-12mg) in group P.

**Conclusion:** Preoperative paravertebral block combined with intravenous morphine improves postoperative pain outcome after thoracoscopic surgeries.

**Keywords:** Anaesthesia, Postoperative pain; Thoracic paravertebral block, Thoracoscopic surgery.

JRMS September 2012; 19(3): 19-22

## Introduction

Post operative pain management after thoracic surgery is important because of the potentially serious respiratory complications which may lead to significant mortality and morbidity. Several modalities have been used for postoperative pain management, however, every one has its own advantages and disadvantages, for example: opioids, one of the most important drugs used for postoperative pain management, associated with potentially serious respiratory depression, which

should be considered when anesthetizing patient for thoracic surgeries.<sup>(1)</sup> Non steroidal anti-inflammatory drugs have their opioids sparing effect but they are not without side effects,<sup>(2)</sup> however, thoracic surgeries are amenable to several forms of regional anesthesia by which, several side effects of opioids may be avoided, these techniques include intercostal, intrapleural, epidural and paravertebral blockade.<sup>(3)</sup> Video-assisted thoracoscopic surgery (VATS), a less invasive procedure than thoracotomy is still associated with significant postoperative pain.<sup>(3)</sup>

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Manuscript received March 3, 2011, Accepted September 15, 2011

Thoracic paravertebral analgesia seems to be an effective modality of postoperative pain management in such patients, with an effect similar to epidural analgesia but with even less complications and side effect profile.<sup>(4)</sup> Single-shot preoperative paravertebral block improves postoperative pain control after thoracoscopic surgery in a clinically significant fashion.<sup>(5)</sup> The aim of the study to evaluate the effect of thoracic paravertebral block and morphine versus morphine alone for thoracoscopic surgeries during the first 4 hours

## Methods

This study was conducted at King Hussein Medical Center in Amman during the period between August 2009 to August 2010. Sixty patients with American Society of Anesthesiologists classification I-III (ASA I-III), who underwent thoracoscopic procedures were included. The study was approved by the Institutional Ethical Committee.

The exclusion criteria were:

Patient refusal or lack of patient cooperation, Local sepsis at the site of injection, full anticoagulation, hypersensitivity to bupivacaine or morphine, after explaining the procedure to the patient, 20 Gauge canula was placed in the dorsal vein of each hand. Anesthesia was conducted using Fentanyl (1-2 mcg/kg), Propofol (1-2mg/kg) and Atracurium (0.5mg/kg). Endobronchial intubation was performed with a left-sided double-lumen tube (Broncho-Cath) 37-41 French Gauge. After induction of general anaesthesia, randomization was performed as follows: A paper from a bag with letters P & M written on equal size papers was drawn, if letter P was drawn the patient was allocated to group P if letter M was drawn the patient allocated to group M. After positioning the patients in the lateral position, patients in group P received a single-injection thoracic paravertebral block in the following manner (5): the upper edge of the spinous process of the sixth thoracic vertebral body was identified by bony landmarks, C7 and scapula the injection point was identified 3 cm lateral to the midline. With an epidural needle (Tuohy 18 G; Braun, Melsungen, Germany) the transverse process of the sixth thoracic vertebra was contacted, the needle then partially withdrawn and redirected caudally to slide under the transverse process and advanced 1 cm past the depth of the transverse process in to the paravertebral space where it was punctured by Tuohy needle with loss of resistant to saline. Then 0.4 ml/kg bupivacaine 0.25% (2.5 mg/ml), was injected after aspiration to ensure no blood or cerebrospinal fluid. All Patients in

both groups were given 0.1 mg/kg IV morphine after induction of anesthesia. Patients were monitored using an electrocardiogram, non-invasive arterial blood pressure device (one measurement every 5 min), pulse oximeter (SPo2) and capnograph (ETco2). After finishing the paravertebral block, all patients left the operating room and remained in the recovery room for at least 4 hours or as long as indicated. Supplementary oxygen 2–4 liters/ min via face mask was administered to all patients during this period to maintain oxygen saturation greater than 93%. Using the visual analogue pain scale (VAS; 0 mm=no pain, 100 mm=worst pain imaginable), patients were asked to rate their pain every hour after arrival in the recovery room, VAS was recorded for both groups every hour for the first 4 hours. Adequate analgesia was defined as a VAS <30 mm. Inadequate analgesia was defined as VAS at >30 mm despite proper use of morphine. In this case, additional morphine 2mg IV by were given by nurse and recorded, the total amount of morphine given was recorded for both groups. The data was analyzed using student's t-test

## Results

Sixty patients were considered for analysis, 30 in the paravertebral group (P) and 30 in the control group (M). The characteristics of the patients, duration of surgery are similar for 2 groups as shown in Table I. Distribution of types of Video-Assisted Thoracoscopic surgery for both groups is similar as presented in Table II. Pain scores during the first 4 hours postoperatively are shown in Table III, they are significantly lower in group P than group M over the 4 hours  $p < 0.05$ . The average quantity of morphine administered per patient in the first 4 hours was 10mg (range 0-18mg) in group m and 6 mg (range 0-12mg) in group P ( $P < 0.05$ ).

## Discussion

The paravertebral space is a wedge shaped space that located to the side of the vertebral column it contains the spinal intercostal nerves, the dorsal ramus, the rami communicants and the sympathetic chain placement the local anesthetic within the paravertebral space produce unilateral sympathetic and somatic block. Our results indicate that Paravertebral blockade decreased the intensity of pain following thoracic laparoscopic procedures during the first 4 hours postoperative. These results go with the findings of other studies showing that single injection paravertebral block reduced pain scores after similar surgeries or other types of

**Table I:** Demographic characteristics, duration of surgery in both groups Data are mean (range), mean (SD)

	Paravertebral Group(P)n=30	Control Group(M)n=30
Sex (F/M)	12/18	13/17
Age (yr)	45(16-74)	48(18-76)
Weight (kg)	70(16.3)	65(12)
ASA class	4/18/8	5/16/9
(I/II/III)	64(31)	60(26)
Duration of surgery (min)		

**Table III:** Mean (SD) pain scores for 2 groups

Time	Group (P)	Group (M)	P value
1h	24(1.5)	36(1.6)	< 0.05
2h	20(1.0)	36(1.1)	< 0.05
3h	16(1.4)	32(1.2)	< 0.05
4h	11(1.2)	28(1.4)	< 0.05

surgeries such as breast surgeries.<sup>(6,7)</sup> There was a significant difference in cumulative morphine consumption between the groups. This is inconsistent with the findings of the study of Vagot A *et al*,<sup>(5)</sup> the reason could be calculating morphine consumption over 48 hours in comparison to this study where it was calculated over 4 hours. Vogt *et al*, investigated the effect of paravertebral block over longer period (48 hours), in comparison, our investigation was over only 4 hours due to limited personnel and facilities required to extend our investigation beyond recovery room. However, in their findings the main effect of thoracic paravertebral block was on VAS scores at rest and on coughing in the first 2 hours after the operation. They found, the scores on coughing were still lower after 24 and 48 hours in the paravertebral block group, in spite of the fact that the pharmacological effect of bupivacaine cannot be expected to cover this time, they suggest that this finding may be explained by a pre-emptive effect of the thoracic paravertebral block (reducing the nociceptive input to the central nervous system in the first hour after surgery may have attenuated central sensitization, thereby leading to less postoperative pain, but we think that this is a debatable issue.<sup>(8)</sup> The spread of single injection paravertebral block has been studied by several workers and found to be ranging from two dermatomes sensory level above and two dermatomes below the level of injection which is sufficient to block pain sensation after thoracoscopic and breast surgeries. Thus we agree with other workers in that, injections in a multi level fashion would unnecessarily expose patients to additional risks related to punctures.<sup>(5)</sup> A variety of local and regional anesthetic procedures for Pain

**Table II:** Distribution of types of video-assisted thoracoscopic surgery in the Paravertebral and control groups (number of patients).

	Paravertebral group	Control group
Biopsy	10	11
Sympathectomy	7	6
Pleurodeses	2	3
Resection	6	7
Intrathoracic tumor	5	3

control after thoracic surgery has been described with the goals of providing optimal pain control and avoiding complications. These include intrathecal opioids, intercostal nerve blocks, brachial plexus blocks, thoracic epidural, intrapleural and paravertebral block.<sup>(4,9,10,11)</sup>

Paravertebral block has the important advantage of low complication rates reported in several studies<sup>(12)</sup> the reported complications are, epidural spread, pneumothorax, rare drug toxicity.<sup>(13)</sup> In our study we have not reported any clinically complications, probably due to the type of procedures; e.g mild pneumothorax will not be noticed due to the thoracic procedures and inserting chest drain.

## Conclusion

We conclude that single thoracic paravertebral block and morphine is an effective way to improve pain after thoracoscopic procedures in comparison to morphine alone. Further larger analytical studies are required to evaluate the effect of thoracic paravertebral block after thoracoscopic on clinically important outcomes, such as complication rate and the incidence of chronic pain syndrome.

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