ANATOMICAL, RADIOLOGICAL AND CLINICAL STUDY OF PARAVERTEBRAL ANALGESIA IN THORACIC SURGERY

Thesis

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LIST OF ABBERIVIATIONS

1.	CT	Computerized Tomographry
2.	C. S. F	Cerebro Spinal Fluid
3.	CABG	Coronary artery by pass surgery
4.	ECG	Electrocardiogram
5.	EP	Epidural
6.	FRC	Functional Residual Capacity
7.	IC	Intercostal
8.	ICNBS	Intercostal nerve blocks
9.	ICU	Intensive Care Unit
10.	MRI	Magenitic Rensonance Imaging
11.	MST	muscle Sparing thoracotomy
12.	NCI	National Cancer Institute
13.	OLV	One Lung Ventilation
14.	PACU	Post anesthetic Care Unit
15.	PEFR	Peak expiratory flow Rate
16.	PFM	Peak Flow meter
17.	PV	Paravertebral
18.	RCT	Randomized Controlled trial
19.	TEA	Thoracic epidural analgesia
20.	TPVB	Thoracic Paravertebral block
21.	TPVS	Thoracic Paravertebral
22.	VAS	Visual analogue scale
23.	VATS	Video assisted thoracic surgery
24.	VC	Vital Capacity

ABSTRACT

ANATOMICAL, RADIOLOGICAL AND CLINICAL STUDY OF PARAVERTEBRAL ANALGESIA IN THORACIC SURGERY

Introduction: Post-thoracotomy pain has long been recognized as a cause of post-operative morbidity, resulting n inadequate ventilation, and coughing which in turn leads to a teleecstasis, mucous plugging, hypoxia and pulmonary infection. The aim of this work is to study the paravertebral space anatomically, radiographically and clinically.Methodology : They study was conducted in National cancer institute on 80 patients of both sexes and was divided into two stages, stage I done on 40 patients having chronic thoracic pain stage II done on 40 patients after thoracotomy. Stage I: the 40 patient was randomly allocated into 2 groups each group 20 patients. One group underwent paravertebral single injection and 2nd group underwent intercostal single injection. Stage II: conducted on 40 patients, they were randomly allocated in to two groups, Each group 20 patients. One group for thoracic epidural continuous catheter technique and the other group paravertebral catheter technique. Resultes:The study showed in stageI for radiographic imaging of the intercostals space, the dye was confined to the intercostals space without any vertical spread, where in paravertebral space spread of the dye was to 2-4 spaces with both epidural and contralateral spread. There was no sympathetic blockade in cases of intercostals block meanwhile paravertebral block in all cases was associated with sympathetic blockade that lasts for 16-17 hours. There was no difference, between intercostals and paravertebral groups in cases of systolic, diastolic blood pressure and heart rate. Concerning pulmonary function measured by (PEFR). It was moderately higher in paravertebral group. There was low VAS score in paravertebral than intercostals group. Stage II; the results of the study, showed that immediate analgesic effect in epidural group was significantly higher early after recovery but there was no difference afterwards throughout the period of study. The use of rescue morphine was more in the paravertebral group. There was no difference between the two groups in post-operative pulmonary functions. Epidural technique was associated with hypotension. There was no difference in heart rate between the two groups. There was no difference between the two groups in pre-and post-operative blood glucose and plasma cortisol. Pulmonary catheter complications were recorded in paravertebral but not in epidural technique.

Key word: (Thoracotomy- Paravertebral- intercostals- epidural- pain- PEFR)

key -words

Thoracotomy

Paravertebral

intercostal

epidural

pain

PEFR

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INTRODUCTION

Pulmonary complications have been described in 20-37% of patients undergoing thoracic surgery and may significantly contribute to perioperative mortality, length of stay after surgery and consequently hospital cost ***(O'Chrock et al., 2002)***.

The pain following thoracotomy surgeries is particularly severe as the surgery involves muscle dividing incision of the chest wall, which moves during respiration. Normal and deep breathing results in stretching of the skin incision. This stretching during deep inspiration and active exhalation results in severe pain and results in reduced lung volume and capacities. Splinting leads to reduced active exhalation and failure to cough, resulting in retention of secretion, airway closure leading to atelectasis and pneumonia. Thus proper control of post thoracotomy pain in addition to providing comfort for the patient facilitates chest physiotherapy, effective expectoration and early ambulation ***(Perkins & Kehlet, 2000)***.

When choosing an approach to post-thoracotomy pain management, the thoracic surgeon and anesthesiologist must consider: the physician's experience, familiarity and personal complication rate with specific techniques, the desired extent of local and systemic pain control, the presence of contraindication to specific analgesic techniques and medications and availability of appropriate facilities for patient assessment and monitoring. Refinements in surgical technique including

limited or muscle-sparing thoracotomy, video-assisted thoracoscopic surgery and robotic surgery may lessen the magnitude of post-thoracotomy pain ***(Savage et al., 2002)***.

There are different techniques appear to be efficacious in controlling post-thoracotomy pain and reducing the amount of systemic opioids consumed: continuous intercostal blockade, paravertebral blockade, and epidural opioids with or without local anesthetics. The combination of thoracic epidural opioid and local anesthetic is very effective in relieving post-thoracotomy pain, however considerable experience is required for insertion of the thoracic epidural catheter and post-operative respiratory monitoring. Intercostal and paravertebral catheters can be inserted intra-operatively under direct visualization, to reduce complications of insertion. One-time intra-operative intercostals blockade may effectively reduce post-operative pain in the first day, but is not practical long term method for post-thoracotomy pain. The effectiveness of intrapleural analgesia, even with proper technique, appears inferior to epidural and other regional techniques ***(Pavies et al., 2006)***.

Thoracic paravertebral analgesia is used for surgical procedures of the thorax and upper abdomen. Its effectiveness has been shown to be equal or even superior to that of epidural analgesia. In experienced hands this block can be performed safely and effectively. Its failure rate of %10 comparable to that reported for epidural analgesia ***(Richardson et al., 1999)***.

Paravertebral block is an effective alternative to epidural analgesia in the management of post-thoracotomy pain, however, they are no established guidelines regarding what is the most suitable strategy when varying drugs and dosages between different groups ***(Fibla et al., 2008)***.

AIM OF THE WORK

This study will be done to evaluate paravertebral space anatomically, radiographically and clinically. It will evaluate, possible doses (concentrations and volumes) required to block the segments involved in the surgical field with minimal side effects. Also a continuous paravertebral block will be applied clinically for major thoracic surgery to ensure alleviation of pain and improve pulmonary function and maintain as much as possible the hemodynamic status.

PATIENTS AND METHODS

This prospective study was conducted from the period October 2006 to Marsh 2009 at National Cancer Institute (NCI), Cairo University after obtaining approval from the local Ethics Committee and informed patient consent. Eighty adult patients, ASA I – II, were included in this study.

We started a preliminary study on 40 patients to compare the efficacy of paravertebral blockade versus the classical intercostal blockade on chronic thoracic pain. Meanwhile a comparative study between paravertebral versus thoracic epidural blockade for postoperative analgesia was done on another 40 patients with bronchogenic carcinoma who underwent pneumonectomy operations.

The patients in the preliminary study were adults with age range between 20 and 50 years old, complaining of chronic thoracic pain involving the somatic thoracic region, receiving their treatment regularly from the pain clinic at the NCI and they must stop their medical treatment 24 hours before the procedure.

Exclusion criteria were:

- Lack of patient consent
- Sepsis systemic or local over thoracic vertebrae
- Empyema
- Coagulopathy

- Diabetes mellitus
- Allergy to amide local anesthetics
- Psychiatric disorders
- Inability to understand pain scoring or to use hand held peak flow meter.

Patients were randomly allocated into two equal groups of 20 patients using computer generated random numbers:

Group A-Pv:

Patients in this group received paravertebral blockade using nerve stimulator. With the patient in a sitting position and in standard sterile fashion, paravertebral blocks were placed with nerve stimulation guidance. An area of 2.5 cm to the right of the superior aspect of the spinous process of the entry site was anaesthetized with 1% lidocaine. A 100 mm 21-gauge insulated needle (Stimuplex; B Braun Medical, Inc., Bethlehem, PA) was then inserted at this point and advanced to the transverse process. The needle was ‘‘walked off’’ the transverse process cranially and advanced approximately 1.5 cm until a subtle loss of resistance was appreciated and a right abdominal wall twitch was elicited. The twitch disappeared at 0.3 mA. After negative aspiration, the prepared volume of anesthetic was injected incrementally.

Patients in this group were subgrouped randomly into two equal subgroups (10 patients each) to receive either 8 or 12 ml of the analgesic solution used: