The Indian Anaesthetists' Forum – (http://www.theiaforum.org) Online ISSN 0973-0311
August 2011(1)

Paravertebral and Brachial Plexus Block for Abdominal Flap to cover the Upper Limb Wound

Narendra kumar[1], Neelam Dogra[2]
1 Ex Post graduate student, 2 Associate professor
SMS Medical College & Attached Hospitals, Jaipur, Rajasthan.
Correspondence: Dr. Narendra kumar (dr.narendra.mehta@gmail.com)

About the Author: Dr. Narendra Kumar graduated from Bangalore Medical College, Bangalore, where he got four Gold medals from the college and six university ranks from Rajiv Gandhi university of Health Science(RGUHS), Karnataka. He did his post-graduation in Anaesthesia from SMS Medical College, Jaipur and was awarded the best outgoing post graduate of year 2011. He is presently working in local private hospital, Jaipur. His areas of interests are: Regional nerve blocks, Regional anaesthesia in Paediatric patients, Critical Care and Pain Management.

Abstract: Peripheral nerve blocks are increasingly being used as primary and sole anaesthetic technique to facilitate painless surgery. We used thoracic paravertebral block and brachial plexus block (supraclavicular approach) in a sick elderly patient with poor cardiopulmonary reserve, to cover a post traumatic raw area of the upper limb by raising flap from lateral abdominal wall. The residual raw area of abdomen was then covered with the split skin graft taken from thigh.

Keywords: Abdominal flap cover, Thoracic paravertebral block, elderly patient.

Introduction: Regional anaesthesia is becoming increasingly utilized in clinical practice. With nerve stimulator and sono-guidance, the success rate of the blocks is increased and the total anaesthetic dose and incidence of complications are reduced. Here, by performing two blocks anaesthesia was given for three surgical sites: Supraclavicular brachial plexus block was used to anaesthetise right upper limb while thoracic paravertebral block was used to anaesthetise thorax, abdomen and right lower limb. Thoracic Paravertebral Block (TPVB) is the technique of injecting local anaesthetic drug adjacent to the thoracic vertebra close to intervertebral foramina, where the spinal nerves emerge. This results in ipsilateral somatic and sympathetic nerve blockade in multiple contiguous dermatomes above and below the site of injection.

Case Report: A 58-year-old farmer weighing 55 kg presented with a post traumatic raw area in the ventral aspect of the right upper limb extending from 5cm from the olecrenon process to 2cm above the styloid process of the radius. The raw area covers almost two-third of the circumference of the forearm. There was no element of bony injury as confirmed by the X-ray. The patient was smoker, with complaints of breathlessness on doing routine household activities, but was not dyspneic at rest. Blood investigations were: Hb 10g/dl, TLC 10,000/mm^3, blood urea 45mg/dl, Serum creatinine

2.2mg/dl, SGOT 33 and SGPT 34. ECG showed right ventricular strain, right Ventricular hypertrophy and poor progression of R waves in chest leads. Chest X-ray was suggestive of COPD with prominent reticulonodular markings and cardiomegaly. 2D-echo showed global hypokinesia, diastolic dysfunction and ejection fraction of 45%. Spirometry showed moderate restrictive lung defect not improved by bronchodilator therapy. FeV1 and FRC was 40% less than the predicted value.

The patient was planned for a ipsilateral abdominal flap to cover the raw area of the forearm and the residual area of abdomen was to be covered with the spit skin graft from the anterior aspect of the same side of the thigh. The area of the abdomen from where the flap was being taken involved dermatome T - 9 to L- 1 area (well within the midline). The area of thigh from where the split skin graft was being taken also involved the L – 1 to L – 2 dermatomes. The right supraclavicular area and back of the patient was prepared with 10% povidone Iodine solution.

For the right upper limb, single shot brachial plexus block from the supraclaviclar approach was given. After eliciting the paraesthesia, 20 ml of local anaesthetic was injected. This contained 6ml of 2% lignocaine with 1:200000 epinephrine and 6 ml 0.5% Bupivicaine with 1:200000 epinephrine, both diluted with normal saline to make a total volume of 20 ml.

For the abdominal and thigh area, thoracic paravertebral block was performed in sitting position. The landmarks were identified. The spinous processes of T9 to L1 were marked. The needle insertion site, 3 cm lateral to superior aspect of spinous process of T 10 and L 1 were marked. 2 ml of local anaesthetic containing 1% lignocaine was infiltrated in these two points. A 22G spinal needle (Quincke type) was introduced in the same area perpendicular to the skin, till the transverse process was hit (usually at 3–4 cm). The needle was withdrawn up to the skin and the distance noted. The needle was introduced again to the same distance making an angle of 10 degree cephalad direction avoiding medial angulations to prevent pleural injury. The stylet was removed and a LOR syringe was attached. The needle was introduced slowly till the loss of resistance to the air was observed (not more than 1–2 cm). 6 ml of 0.5% ropivicaine with clonidine was injected in both the T- 10 and L- 1 segments. The effect was checked after 15-20 minutes by pin prick method in both the upper limb, abdominal and thigh (anterior aspect from where the graft is to be taken) area.

The surgery was completed in 90 minutes successfully without any complications and no analgesic was required intraoperatively. The vital parameters of the patient remained normal throughout the surgery. Post operative analgesia was noted up to 10 hours. Later the pain was successfully managed with NSAIDS. The patient became ambulatory soon after the surgery.

Discussion: The choice of anaesthesia in an elderly patient with poor cardiopulmonary reserve is a challenge for anaesthesiologists. General anaesthesia in such patients may be associated with hemodynamic instability and post-operative respiratory complications. Neuraxial anaesthesia without intravenous sedation may reduce the likelihood of post operative delirium and respiratory impairment commonly seen in elderly after general anaesthesia but hypotension, bradycardia and infusion of large intravenous fluids associated with neuraxial anaesthesia may be a problem in elderly patient with poor cardio-respiratory reserve. Though epidural anaesthesia causes less hemodynamic changes as compared to spinal anaesthesia, some clinicians avoid it in elderly patients

with spinal stenosis, fearing the mass effect of drug might compromise spinal cord perfusion. Peripheral nerve blocks are safer in patients with poor cardiopulmonary reserve, where both neuraxial and general anaesthesia can be hazardous.

`The conventional technique of TPVB involves inserting the needle perpendicular to all planes, contacting the transverse process, and then walking off in cephalad direction with an angle of 10 degrees with the needle. The commonly-used endpoints for needle insertion include loss-of-resistance to air or saline,[1,2] advancing a pre-determined distance,[3] neurostimulation[4,5] or it could be sono-guided. TPBV offers several technical and clinical advantages and is indicated for anaesthesia and analgesia when the afferent pain input is predominantly unilateral from the chest and/or abdomen. Bilateral TPVB has also been used peri-operatively during thoracic, major abdominal vascular, and breast surgeries. It is a very simple and easy to learn technique which is safer and easier than thoracic epidural. It is also safe to perform in sedated and ventilated patients. In TPVB, single injection produces multidermatomal ipsilateral somatic and sympathetic nerve block, maintains hemodynamic stability, reduces opioid requirements, preserves bladder sensation, preserves lower limb motor power and promotes early mobilization.

The failure rate associated with PVB is less than 13%. Naja and Lonnqvist (2001) prospectively evaluated the failure rate and complications following PVB in 620 adults and 42 children. They reported a failure rate of 6.1% in adults and none in children. Inadvertent vascular puncture (6.8%), hypotension (4%), epidural or intrathecal spread (1%), pleural puncture (0.8%) and pneumothorax (0.5%) were the recorded complications. Likelihood of vascular puncture and pneumothorax was reported to be higher in bilateral compared to unilateral block[6]. Pulmonary haemorrhage has been reported after thoracic PVB in a patient with previous thoracic surgery[7]. Burlacu et al (2005)[6] reported contralateral harlequin and ipsilateral Horner's syndrome after unilateral paravertebral anaesthesia for breast cancer surgery, attributable to spread to ipsilateral stellate ganglion[8]. Postoperative nausea and vomiting are significantly lower in patients given PVB compared to GA.

In our case, thoracic paravertebral block was given calculating the dose of local anaesthetic agent as 2ml per segment. Thus 6ml of local anaesthetic was injected each at T10 and L1 level to cover 6 dermatomes for surgery. By administering multiple regional blocks in a patient simultaneously, there is a possibility of local anaesthetic toxicity. Therefore the total dose of should be calculated carefully. Though the use of a nerve stimulator and/or ultrasound decreases the dose of local anaesthetic drug required, we do not have these facilities in our operation theatres to facilitate the nerve blocks.

The total dose of local anaesthetic agent used in our case was: 6ml 2% lignocaine, 6ml 0.5% bupivicaine (for upper limb) and 12 ml of 0.5% ropivicaine (paravertebral block). So, a total of 24 ml of local anaesthetic (well below the toxic range) was used. Thus, with only three pricks the anaesthesia was managed for three surgical sites mentioned above.

Conclusion: By using multiple regional blocks, we can prevent administrating general anaesthesia in many cases obviating the need of intubation, decreasing sedation requirements and need for post

operative ventilation in an elderly patient with poor cardiopulmonary reserve. The total dose of local anaesthetic administered should be calculated carefully to prevent the toxicity.

References:

1. Karmakar MK. Thoracic paravertebral block. Anesthesiology 2001;95(3):771.
2. Greengrass R, O'Brien F, Lyerly K, et al. Paravertebral block for breast cancer surgery. Can J Anaesth 1996;43(8):858.
3. Lang SA. The use of a nerve stimulator for thoracic paravertebral block. Anesthesiology 2002;97(2):521; author reply 521.
4. Naja MZ, Ziade MF, Lonnqvist PA. Nerve-stimulator guided paravertebral blockade vs. general anaesthesia for breast surgery: a prospective randomized trial. Eur J Anaesthesiol 2003;20(11):897.
5. Thomas PW, Sanders DJ, Berrisford RG. Pulmonary haemorrhage after percutaneous paravertebral block. Br J Anaesth 1999; 83: 668-9.
6. Burlacu CL, Buggy DJ. Coexisting harlequin and Horner syndromes after high thoracic paravertebral anaesthesia. Br J Anaesth 2005; 95: 822-824
7. Naja MZ, Lonnqvist PA. Somatic paravertebral nerve blockade: incidence of failed block and complications. Anaesthesia 2001; 56: 1184-8.
8. Ravinder K.B, Krithika K, Anil A.Paravertebral block:Jour Anae Clin Phar 2011;27;5-11.