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Original Article

Lower limb orthopedic surgery in geriatric patients under paravertebral blocks: A prospective feasibility study

Col Rajesh Kumar Singh [a,*], Col J.P. Chaturvedi [b], Brig H.S. Agrawal, VSM [c], Lt Col Nitesh Agrawal [d]

[a] Senior Adviser (Anaesthesiology), Military Hospital Kirkee, Pune 411040, India
[b] Classified Specialist (Anaesthesiology), Military Hospital Allahabad, Uttar Pradesh, India
[c] Consultant (Surgery & Orthopaedics) & Commandant, Military Hospital Kirkee, Pune 411040, India
[d] Graded Specialist (Anaesthesiology), 187 Military Hospital, C/O 56 APO, India

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ABSTRACT

Background: Aging causes progressive deterioration of all the organ systems. Physiological changes of aging and co-morbidities make regional anesthesia a preferred technique for this age group. Regional anesthesia with risk of hypotension and its consequences is fraught with dangers. Peripheral nerve blocks (PNBs) are much safer and give much superior post-op analgesia. The present study was undertaken to perform major lower limb orthopedic surgeries PNBs in geriatric settings.

Methods: A feasibility study was undertaken in patients above age of 60 years admitted for lower limb surgeries to undertake these surgeries under para-vertebral blocks for a period of one year from Mar 2011 to Feb 2012.

Results: The responses and results of 203 eligible patients averaging 69.5 years. Mean duration of surgical procedure was 174.6 min and surgical analgesia was 334.5 min. Mean time of analgesic supplementation postoperative 398.3 min. The incidence of adverse effects (hypotension) requiring intervention was 5 out of 203, failure rate 2 out of 203.

Conclusion: All major lower limb surgeries can be done under combined lumbar and sacral plexus block with additional supplementation for the skin at the line of incision especially in case the surgery involving hip with intercostal block at 11th ICS. The study strongly recommends it as a technique of choice in geriatric cases rather than reserving it for only moribund cases.

* *Corresponding author*. Tel.: +91 9158133633.
E-mail address: drrksingh@gmail.com (R.K. Singh).

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Introduction

As life expectancy is increasing, the number of geriatric patients requiring surgery and anesthesia is increasing proportionately, in day-to-day practice. Advancing age, co-morbidities, altered pharmacokinetics and dynamics increase the morbidity and mortality of these patients.[1] In the geriatric settings fracture neck femur, total hip arthroplasty (THA), and total knee arthroplasty (TKA) are among the common lower limb surgeries.[2,3]

Anesthetic and analgesic relief during and after lower limb surgeries, traditionally has been provided through central neuraxial (spinal or epidural) techniques, along with intravenous patient-controlled analgesia using opioids.[3–6] One of the studies has compared peripheral regional analgesia with femoral catheter and intravenous patient controlled analgesia using morphine after TKA.[7]

The central neuraxial anesthesia can be a risky affair in these cases because of the risk of hypotension. Grossly reduced hemodynamic safety window, stiff or less compliant capacitance vessels cause exaggerated response to peripheral pooling and decreased responsiveness to catecholamines. Co-morbidities such as hypertension and IHD add fuel to the fire.[8,9] Thus the side effects of these techniques, and of the administered opioids, make their use somewhat undesirable.[5,8] These drawbacks have led to a shift toward redefining the effectiveness and utility of regional anesthesia, specifically, of peripheral nerve blocks (PNBs) in intraoperative anesthesia and postoperative analgesia.[3,10,20]

There are very few studies, which claim to have done or which advocate PNBs for lower limb surgery in the elderly especially the surgeries for fracture neck femur and total hip and knee arthoplasties. Most of the studies advocate these blocks for post op pain relief. Very few recommend it as a primary technique for surgery[11–13] or recommend it only for moribund patients.[14,18,19] But these are the very group of patients with extremes of age and co-existing physiological derangements, who are likely to derive most benefits from these blocks.[2,4]

With this background, the present study was undertaken at one of the Orthopedic centers of Armed Forces, where the lower limb surgeries and joint replacements of lower limb among the elderly were being carried out. These surgeries were performed under PNBs anticipating superior intraoperative and postoperative outcomes, particularly in terms of better hemodynamics, adequate analgesia, lower blood loss, and transfusion exposure.

Materials and methods

A feasibility study was undertaken in patients above age of 60 years, who were admitted with lower limb fractures or for joint replacements at a tertiary care hospital of Armed Forces. The study was carried out by enrolling all eligible patients for a period of one year from Mar 2011 till Feb 2012. Total of 203 eligible patients were enrolled for the study and informed consent was obtained from them.

The study patients were placed on standard monitoring devices in the pre-operative room and were administered a mixture of 0.75% ropivacain 20 ml, 0.5% bupivacain 10 ml, 2% lignocain with adrenalin 10 ml, diluted with saline to 60 ml. 30 ml of the mixture was used for the lumbar plexus block, 20 ml in sacral plexus block using paravertebral approach with a 21/22G, 100 mm nerve stimulator needle while 10 ml was reserved for intercostal block at 11th ICS.

Peripheral nerve block techniques

Lumbar plexus blocks (LPBs) or femoral nerve blocks (FNBs) and sacral plexus or sciatic nerve blocks (SNBs) are the most useful of the lower extremity nerve blocks.[10–12] Over the years, several techniques have been described for each of these blocks.[3] Intercostal nerve block was added to above blocks for superior outcomes to overcome the problem of inadequate analgesia at the site of incision because of overlapping dermatomes.[16] In the present study, the contemporary techniques for LPBs, SNBs, and intercostal nerve blocks were used, which are described as under. We chose the plexus blocks for our study because the femoral nerve block and sciatic nerve block were inadequate for the hip surgery. In the knee surgery, the area under the tourniquet was likely to be missed by them and were likely to cause tourniquet pain

Lumbar plexus block

The site of injection was on the intercrestal line (line joining the highest points of both iliac crests) 3–5 cm from midline. The nerve stimulator was kept at 1 mA and frequency at 2 Hz. The stimulator needle was introduced parallel to the ground and slightly in caudal direction and attempt was made to hit the transverse process and walk off superiorly over it and go 1.5–2 cm deeper and look for quadriceps contractions and the bring down the current to 0.4 mA or lower and then inject 30 ml of local anesthesia (LA) mixture.[3]

Sacral plexus block

The point of entry was on the line joining posterior superior iliac spine (PSIS) and ischeal tuberosity about three finger breadths (6 cm) from PSIS parallel to the floor and in slightly cephalad direction. An attempt was made to hit the under surface of sacro-iliac joint and the walk off inferiorly, go 3–4 cm deeper and look for contractions in gastrocnemius muscle or anterior compartment in the leg and when movement was still seen below 0.4 mA, 20 ml of drug was given.

Intercostal block

The eleventh rib was followed posteriorly and at a point 3–5 cm from midline and entry was made with the same needle. An attempt was made to hit the rib and then go inferiorly 1 cm deeper. Attempt was made to obtain contractions in the flank and 10 ml of the mixture was injected.

Failure

If surgical analgesia was not achieved after 45 min of the block it was declared a failure and case was done under spinal anesthesia.