ROLE OF PSOAS COMPARTMENT BLOCK IN LOWER BACK PAIN

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ABSTRACT

Objective: To compare the clinical and cost effectiveness of Psoas compartment block (PCB) and lumbar epidural over a period of one month in patients suffering from low back pain and radiclupathy.

Methods: This study was conducted at Railway Hospital Rawalpindi over a period of one year from September 2011 to September 2012. Patients of either sex between 30 to 80 years of age, full filling the study diagnostic criteria were selected by non probability purposive sampling. Patients were divided into two treatment groups. One received epidural analgesia and other received psoas compartment block. Relevant history was recorded on proforma. Pre and post treatment pain scores were recorded using VAS and Pakistan Coin Scale (PCS) at day 1, week 1, and at the end of 1 month. In group 1 PCB was administered and in group 2 lumbar epidural was given under strict aseptic measures. In each group dose of depomedrol with lignocaine was injected according to patient's weight.

Data Analysis and Result: At baseline, average VAS for group-I was 7.209 (SD = 0.640) while in group-II it was 7.310 (SD=0.680). Both the groups had similar VAS at baseline with insignificant difference (p = 0.438).
At day 1, average VAS was significantly lower (p < 0.001) in group-I as compared to group-II i.e. 2.030 ± 0.491 vs. 3.357 ± 1.008. After one week, average VAS for group-I was 2.851 (SD = 0.609) while in group-II it was 3.810 (SD= 1.087). Group-II had significantly higher VAS as compared to group-I (p < 0.001). After one month, average VAS for group-I was 3.060 (SD=0.625) while in group-II it was 4.333 (SD=1.004). VAS of group-II was significantly higher as compared to group-I (p <0.001).

Conclusion: Patients who were given Psoas compartment block were more satisfied as compared to epidural. Their VAS was significantly lower, at day one, but after one week and at the end of one month VAS/PCS was still lower in group I and it was significant. So PCB is easy to apply and it is cost effective as compare to lumbar epidural.

Keywords: Psoas compartment block, epidural, low back pain.

INTRODUCTION

Low Back Pain (LBP) and sciatica continue to be a leading cause of disability in Pakistan with socio economic impact. In most cases the pain will resolve on its own within a few weeks but there is significant incidence of recurrence, usually in less than a year[1].

Low back pain is usually due to disc herniation, radiculopathy or spinal stenosis[2]. The patient complains of pain usually on one side or both legs. Lumbar epidural with steroids are commonly used for such patients, but the response is variable[3]. The Psoas compartment block (PCB) is easy to employ as compare to epidural, it is also cost effective. PCB has successfully been used in postoperative pain relieve for total hip replacement[4]. The psoas muscle is the muscle involved with the curve of the pelvis and spine, which starts at the thoracic vertebrae to connect with lower vertebral body and transverse process. It goes past the pelvis and extends up the lesser trochanter[5]. When standing, it pulls the spine forward, while keeping the balance of the body when sitting, so it has an important role during walking motion. Therefore, when the psoas muscle continuously contracts from injury or stress, the vital dynamics of the pelvis, lumbar, and even the cervical vertebrae can be disturbed. This incongruity can cause pain in the lower back, pelvis, buttocks, and the femoral region. Also there, could be a

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Received: 24 Jan 2013; Accepted: 05 April 2013

transformation in the hip joint curve, and as a result, movement can be limited when using the hip joint. Thus, when there is a problem in the psoas muscle, it can trigger a distinctive psoas gait, where the patient drags his leg while walking as the leg cannot be strongly pushed forward[6].

The psoas compartment is the space located between the psoas muscle and quadratus lumborum, and is surrounded by the psoas muscle and its fascia in the front, the lumbar, and the transverse process of the lumbar, ligament, muscle, and quadratus lumborum in the back[8]. Within this compartment, the lumber plexus, the ventral ramus of the sacral plexus, iliohypogastric nerve, ilioinguinal nerve, genitofemoral nerve, lateral femoral cutaneous nerve, femoral nerve, obturator nerve, and parts of the sciatic nerve pass through[7]. The psoas compartment block is generally performed on the L3 or L4 disc and serves to block the lateral femoral cutaneous nerve, femoral nerve, and the obturator nerve, so the block is also known as the posterior lumbar plexus block. The iliohypogastric, ilioinguinal, and genitofemoral nerve can be further blocked if medication is expanded toward the cephalic and within the fascia[9]. The PCB has successfully been used but very scanty literature is available regarding therapeutic effectiveness of local anaesthetic with steroids in lumbar paravertebral injections in patients with spinal stenosis, low back pain and painful lower limb radiculopathies[11].

The psoas compartment block has successfully been used in low back pain however its therapeutic effectiveness compared to epidural, using local anaesthetic with steroids needs further investigation.

METHODS

This clinical trial took place at Railway Hospital Rawalpindi in collaboration with Riphah International University over a period of one year. Patients of low back ache, sciatica, radiculopathy and spinal stenosis from three teaching hospitals of Rawalpindi were selected. Patients with diabetes, hypertension or any associated disease such as caries spine and hepatitis were excluded from the study. Patients were selected by non probability purposive sampling technique. They were thoroughly examined. The written consent for the procedure was taken. A total of 120 patients were enrolled and were divided two equal groups. To group-I PCB was given and the group-II lumbar epidural was given. Relevant history was recorded on proforma. VAS (0-no pain 10-maximum pain) was explained to the patients those who could not understand VAS were offered Pakistan Coin Scale[10]. Pre and post treatment responses were recorded on day 1, week one and at the end of one month. Cost of required equipment for both procedures was calculated for each patient.

Technique of PCB

A number of approaches exist for psoas compartment block[12], however, the approach by Capdevila and colleagues, using a nerve stimulation technique is reliable and thus employed in current study.

Intravenous access, ECG, pulse oxymetry, and blood pressure were monitored. Emergency equipment and medications were checked. The patient was placed in the lateral (Sims) position with the side to be blocked uppermost. The hip on the side to be blocked was flexed to 30^0 and the ipsilateral knee flexed to 90^0. The skin was prepared with antiseptic solution.

The site of needle insertion was determined by drawing a line connecting the iliac crests (intercristal line i.e, Toffier line). The spinous process (SPs) were marked and PSIS was identified. A line through the PSIS was drawn parallel to the line joining the SPs. The site of needle insertion became at the junction of the lateral third and medial two thirds of the line between the SPs and the PSIS and 1 cm cephalad to the intercristal line (L4). The needle was inserted perpendicular to all planes. A 100 mm stimulating needle was inserted connected to a nerve stimulator with a starting output of 1.5 mA

and 2 Hz. The needle was advanced until quadriceps twitches were elicited or bony contact (presumed to be transverse process of L4) was made. If bone was encountered, the needle was withdrawn and directed caudally under the transverse process and advanced no further than 15–20 mm, until twitches of the quadriceps muscles were elicited with currents between 0.3 and 0.5 mA. After negative aspiration, 10–15 ml 0.5% of lignocaine with 80 mg depo medrol was injected incrementally over 3-5 min with regular aspiration for blood or cerebrospinal fluid (CSF).

In some patients fluoroscope had to be used to locate L4 transverse process.

Technique for Epidural:

In lumbar epidural 18 gauge Tuohy needle was used. Third and 4th lumbar space was located and after ensuring aseptic measures Tuohy needle was passed in the inter space. Loss of resistance was tested and desired amount of local anaesthetic and depo medrol was given.

Data Analysis:

Data were subjected to SPSS version 17. Means and average values were calculated. Difference in pain relief and cost effectiveness in the two study groups was considered significant if p value was found less than 0.05 using paired sample t test.

RESULTS

Out of 120 enrolled patients, 67 patients from group I while 42 from group-II completed the study. No significant adverse effects of both procedures were observed. Demographic data regarding age, sex and type of disease is shown in table 1.

Table-1: Demographic data showing age, sex and type of disease in both treatment groups.

Demographic variables	Group-I (n = 67)	Group-II (n = 42)	*p*-value
Gender			
Male	35 (52.2%)	23 (54.8%)	0.797
Female	32 (47.8%)	19 (45.2%)	
Age	27 (40.3%)	24 (57.1%)	0.8
Average Weight	74 kg	72.5kg	0.7
Mechanical Backache	21 (31.3%)	10 (23.8%)	0.531
Facet Joint Pain	18 (26.9%)	10 (23.8%)	
Radiculopathy	15 (22.4%)	9 (21.4%)	
Spondylosis	13 (19.4%)	12 (28.6%)	
Spinal Stenosis	0 (0%)	1 (2.4%)	

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Epidural procedure (Approx Rs 1000/ procedure) was found more expensive compared to procedure adopted for psoas block (Rs 200/ procedure) (p=0.00).

It is important to mention that 65% patients in group-I used analgesics while in group-II, 84% of the patients used analgesics. Difference in

intake of analgesic in the two groups was found to be significant (p = 0.522).

DISCUSSION

Spinal pain usually arises from damage to or degenerative changes in the spinal nerves,

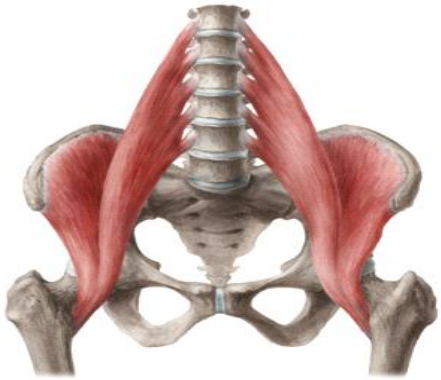

Figure-1: Showing origin and insertion of ilio-psoas musce.

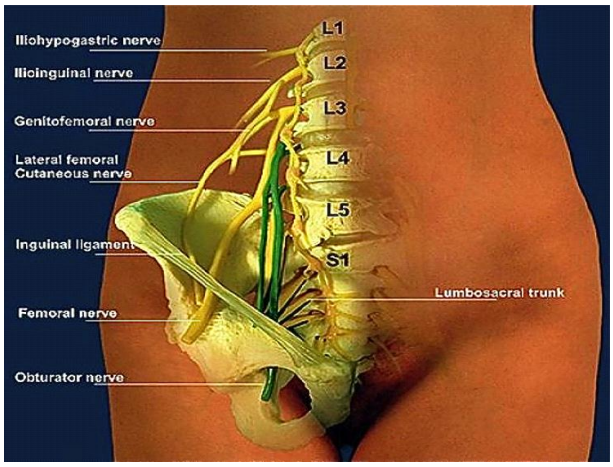

Figure-2: Lumbar plexus.

intervertebral discs, facet joints, muscle/fascia, and dural tissue surrounding the spinal nerve roots. Facet joints may be responsible for 14-45% of cases of LBP, most often as a result of degenerative changes or trauma that causes inflammation of the joint capsule from overloading. Degenerated and herniated discs are other common causes of LBP and sciatica. Though the mechanism is still not certain, animal studies indicate that when there is nucleus pulposus tissue in the epidural space, it induces an inflammatory response, neurotoxicity, and thrombosis, all of which can lead to nerve root ischemia and irritation. Fissured, degenerative discs are thought to cause pain by allowing growth of sensory fibers from the sinuvertebral

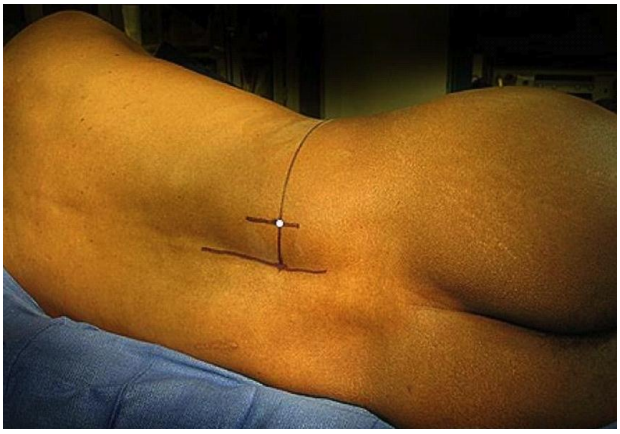

Figure-3: Landmarks for Psoas block.

Figure-4: Technique of needle insertion

nerve into the inner layer of the annulus fibrosis and nucleus pulposus which are normally not innervated[13,14].

It remains unclear to what degree nerve root compression or irritation is responsible for radicular pain and LBP. In general, sciatica type pain is most-likely due to nerve root compromise (radiculopathy), while axial back pain is more indicative of a "mechanical origin" such as facet syndrome, discogenic pain, or muscular pain. Radicular-dominant pain is many fold more likely to respond to epidural steroid injections than back-dominant pain. Caudal and transforaminal ESIs provide strong short term relief and moderate long term relief. All

techniques have limited benefit in managing post laminectomy syndrome and spinal stenosis.

Although the actual mechanism of action is not fully known, there is evidence that corticosteroids achieve pain relief by inhibition of pro-inflammatory mediators (e.g. neural peptides, phospholipase A, acid hydrolases, histamine, and kinin) and by causing a reversible local anesthetic effect (decreased sensitivity of nerve roots to irritants)[12].

The epidural space is a potential space that surrounds the thecal sac circumferentially from the foramen magnum to the sacral hiatus. It is bordered anteriorly by the posterior longitudinal ligament, posteriorly by the ligamentum flavum, and laterally by the intervertebral foramina and pedicles. Its contents include neural tissue (spinal cord and nerve roots), as well as fat and vascular tissue. The posterior epidural space is highly compartmentalized with connective tissue planes and a medial divider (plica mediana dorsalis), all of which influence the direction of flow of injectate within the epidural space. In one study, 84% of interlaminar injections resulted in unilateral flow,[13] which can be critical issue when treating unilateral or bilateral symptoms. Blind injections cannot confidently be placed on the right or left, or at a specific level, let alone in the epidural space[14,15]. Contrast enhanced, image-guided, fluoroscopic injections are the only reliable method to place injected agents accurately in the epidural space.

Psoas muscle takes its origin proximally on the borders of the vertebrae T12 to L4. It crosses a total 8 joints including the sacroiliac joint and is attached distally on the lesser trochanter of the femur. The eight joints crosses over are from T12-L1, L1-L2, L2-L3, L3-L4, L4-L5, L5-Sacrum, Sacroiliac joint and last the hip joint. The psoas can have an effect on all of these vertebrae joints and lead to back pain. Psoas muscle often goes into spasm whenever there is any pathological change in the vertebral disc. It can create stronger lordotic curve. PCB releases the spasm and relaxes the muscle leading to relieve from back pain. Our results show the positive effects of psoas compartment block as compare to epidural. Efficacy, patient's satisfaction and safety with psoas compartment block were assessed in terms of overall reduction of pain relief and amount of analgesics, duration of pain relief and overall improvement in daily activities. In our study majority of the patients reported either a marked relief in pain or their pain remained below three VAS for more than one month.

We used local anaesthetic (Lignocain) and depomadrol. The reason for corticosteroid therapy is preliminary from the evidence that biochemical and neurochemical inflammatory mediators may play a role in the occurrence of lumbar radiculopathy[16,17]. Corticosteroid also known to inhibit prostaglandin synthesis, and to repair cell mediated and immunologic responses. The other postulated actions of corticosteroids includes membrane stabilizing, suppression of neuropathies, blocking phospholipase A2 activity, and blocking nociceptive C-fibers conduction. Psoas block with steroid and local anaesthetic in patients had shorter lasting lumbar radicular pain[18].

Epidural block is commonly used for low back pain. It is technically difficult as compared a to PCB. Psoas block is cost effective and can easily be learned. In our study results were slightly better in PCB as compared to epidural.

The literature is full with descriptions of epidural corticosteroid injections providing a certain level of efficacy by their anti-inflammatory, immune-suppressive, anti-edema effects, as well as the inhibition of neurotransmission within the C-fibers[22-25]. Local anesthetics also have been described as providing long-term symptomatic relief, even though the mechanism of action continues to be an enigma[26-28]. Local anesthetics have been postulated to provide relief by various mechanisms including suppression of nociceptive discharge,[29] the blockade of the axonal transport, the block of the sympathetic reflex arc and sensitization,[30-31] and

anti-inflammatory effects[32]. The long-term effectiveness of local anesthetics has been shown in many previous studies as a result of local anesthetic nerve blocks or epidural injections[33].

Lumbar plexus blocks produce anesthesia of most of the lumbar nerve roots and some of the sacral nerve roots. It therefore produces anesthesia to the lower extremity in the distribution of the femoral nerve, the obturator nerve and the lateral cutaneous nerve of the thigh. If anesthesia to the lower leg or posterior thigh is needed for the procedure, sacral nerve roots block must be added, typically in the form of a sciatic nerve block. The psoas compartment is a relatively large and well-defined compartment and the psoas muscle is a loosely compacted muscle. A large volume of local anesthetic agent is therefore needed to fill this compartment to produce surgical anaesthesia. We have used small doses of local anaesthetic to relieve pain of radiculopathy.

CONCLUSION

Patients given psoas compartment block were more satisfied compared to epidural as depicted by their VAS after 1 day, 1 week and 1 month duration. PCB was found easy to apply and cost effective as compare to lumbar epidural.

ACKNOWLEDGEMENT

We are grateful to HEC for their financial support (project no. 2029/R & D/HEC 2011) to conduct this study.

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