

Case Report

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Postoperative Analgesia by Transmuscular Quadratus Lumborum Block Catheters

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Abstract

Ultrasound guided Quadratus lumborum (QL) block is a relatively new regional anesthetic technique which provides effective postoperative analgesia for abdominal surgeries as a part of multimodal analgesic regimen. We report a case of hysterectomy where effective postoperative analgesia was provided by ultrasound guided bilateral QL-3 block and infusion of local anesthetic through catheters inserted postoperatively.

Keywords: Local anaesthetic; ropivacaine; Postoperative analgesia; Quadratus lumborum blocks; type-1, 2 and transmuscular (type-3); Truncal blocks; Ultrasound guided blocks

Introduction

Postoperative analgesia is an integral part of successful surgical outcome. Epidural analgesia with catheter technique remains the most effective analgesic technique after abdominal surgery. However, it has limitation in patients who are either on anticoagulants and have cardiac morbidity due to significant hemodynamic changes which may be detrimental to such patients [1,2]. Ultrasound guided Quadratus lumborum block (QLB) block is a new technique of regional analgesia [3,4]. There have been reports of excellent post-operative pain management with the QLB for both abdominal and retroperitoneal surgery [5,6]. However, postoperative analgesia by bilateral transmuscular quadratus lumborum blocks (TQLB) or QL-3 block with catheter is rarely reported. We present a case report where postoperative analgesia was provided by bilateral transmuscular quadratus lumborum blocks (TQLB) and infusion of local anaesthetics through inserting catheters in a patient who had cardiac disease and underwent hysterectomy operation.

Case

A female aged 58yrs posted for abdominal hysterectomy with bilateral oophorectomy for dysfunctional uterine bleeding

and fibroid. She had coexisting morbidities of rheumatic heart diseases (mitral valve replacement in 1983 for mitral stenosis), hemiplegia of left side 1990 (completely recovered), diabetes mellitus, hypertension, persistent chronic atrial fibrillation and pulmonary hypertension. Preoperative 2D echocardiography showed moderately stenotic prosthetic valve, moderate tricuspid regurgitation, mild mitral regurgitation, and mild aortic regurgitation, dilated left atrium, pulmonary hypertension and left ventricular ejection fraction 40%. X-rays showed Lower Zone haziness. Her blood pressure was 160/70 mm Hg, pulse 98/minute irregular. On auscultation diastolic murmur with metallic clickoff prosthetic mitral valve was present. She was on oral warfarin which was changed to unfractionated heparin 5000 International units twice daily 5days before the day of surgery. She was also taking antihypertensive, digoxin, oral hypoglycemic and human act rapid insulin. Laboratory investigations regarding haemogram, coagulation profile and other biochemical parameters were within normal limits. An informed consent about anaesthesia and postoperative analgesia plan was taken. After overnight fasting on the day of surgery all oral medicines and intravenous prophylactic antibiotics were given. Blood sugar levels were monitored 6hrly and insulin dosage were used according to sugar levels.

In operation theatre non-invasive monitoring (ECG, Oximeter, Noninvasive Blood Pressure) were attached. Under local anaesthesia and using ultrasound guidance right sided internal jugular central venous line was inserted (Linear 6-13 MHz M-Turbo® SonoSite ultrasound system) taking all aseptic measures. General anaesthesia was induced with intravenous fentanyl (100 µgm) and 100mg propofol. A size#3 proseal LMA was inserted and anaesthesia was maintained with 1% isoflurane, 50-50% oxygen-nitrous mixture and vecuronium for muscle relaxation. Operative course was uneventful except patient required positive end expiratory pressure (PEEP) of 6 to maintain saturation above 95%.

After the surgery bilateral ultrasound guided transmuscular quadratus lumborum (TQL) block was given using curved array transducer 5-2 MHz (M-Turbo® SonoSite ultrasound system). In lateral position, the side to be blocked was kept up and probe was placed in the midaxillary line in the transverse plane immediately above the iliac crest and then it was slid dorsally till the Shamrock sign was clearly identified [7]. In “Shamrock sign” The quadratus lumborum (QL) muscle is seen as a superior leaf of the Shamrock at the apex of the transverse process (TP) of L4, erector spinae (ES) muscles make up the posterior leaf, psoas major (PM) muscle makes the anterior leaf and the transverse process (TP) represents the stem connecting the 3 leaves (Figure 1). 18 G Tuohy needle was inserted from the posterior end of the probe and directed for the fascial plane between the QL and PM muscles through the QL muscle (Figure 2). Once needle was confirmed at correct location 25mL 0.3% ropivacaine was injected [8] (Figure 3) and 18G epidural catheter was inserted 3cm beyond the tip and fixed at skin through subcutaneous tunnel. Other side catheter was also inserted in similar manner. Catheter position was confirmed by injection of local anaesthetic and using color doppler mode (Figure 4). After reversal patient was shifted to recovery room. Both the catheters were connected together using a y-connection to a volumetric pump and infusion of ropivacaine 0.1% and fentanyl 1µg/mL was started @ 14ml/hour. Additional analgesia was provided by injection paracetamol 1G intravenous 8hrly for first 48 hours and then 12hourly for next two days. Injection Tramadol 50 mg IV as an when required was advised for rescue analgesia. Pain scores using Visual Analogue Scale (VAS) were monitored two hourly for 24 hours and then 4hrly for next 2days. VAS score remain 0-2 on rest (where 0=no pain and 10=maximum pain) and 0-4 on movement for 3days. No rescue analgesia was required. Patient also reported high satisfaction from this technique of pain relief compared to two previous caesarean section surgery. A contrast study was done with injection of 5mL contrast (Omnipaque-300®) mixed with 15mL 0.3% ropivacaine which showed spread up to the thoracic paravertebral space (Figure 5). Catheters were removed after 3days, heparin was tapered and oral anticoagulant was started. On 5th day patient was discharged home after check dressing.



Figure 1: “Shamrock sign” The quadratus lumborum (QL) muscle is seen as a superior leaf of the Shamrock at the apex of the transverse process (TP) of L4, erector spinae (ES) muscles make up the posterior leaf, psoas major (PM) muscle makes the anterior leaf and the transverse process (TP) represents the stem connecting the 3 leaves.



Figure 2: 18 G Tuohy needle was inserted from the posterior end of the probe and directed for the fascial plane between the QL and PM muscles through the QL muscle.



Figure 3: Needle is seen entering from posterior side between Quadratus lumborum (QL) and Psoas muscle (PM). Erector spinae (ES), Transverse process (TP).

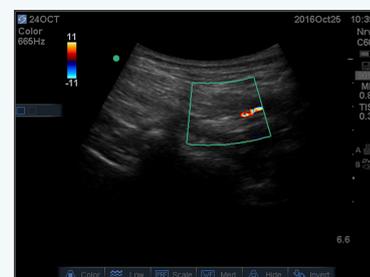


Figure 4: Color flush (White arrow) is seen during injection of local anaesthetic through catheter.

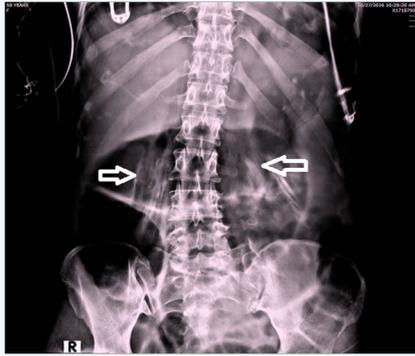


Figure-5: Postoperative X-ray (Anterior-Posterior View) after contrast injection showing bilateral contrast spread close to spine (paravertebral space)

Discussion

QL block was described by Blanco where injection was given anterior to the QL (QL block type-1) and later he modified his approach by injecting local anesthetic posterior to QL (QL block type-2) [9]. He postulated that, injection of local anesthetic in the facial plane over QL results in extended spread up to thoracic dermatomes. Carney et al documented through contrast enhancement from T4 to L2 that, the QL block as an extension of the local anaesthetic beyond the TAP-plane spreading into the thoracic paravertebral space with the provision of both visceral and somatosensory blockade of the abdominal wall [10]. Kadam RV [11] observed the sensory spread from T8 to L1 in a case of laparotomy done for tumor excision and have suggested that sensory analgesia is variable and dependent on many factors including the volume of the drug and site of injection.

Single injection QL block has been used successfully for the management of postoperative pain relief after caesarean section [12] for sub-total gastrectomy in a septic patient [13], laparotomy for duodenal tumour excision and to manage chronic back pain [14]. The effective pain relief lasted for 12-14 hours. Prolonged and continuous pain relief has been reported with catheter techniques for acute abdominal pain management [15] breast reconstruction [16] and laparotomy [11]. However, they all have used type-2 quadratus lumborum block.

In our case we used a transmuscular approach (QL block type-3) suggested by Borglum et al. [4] where the local anaesthetic is injected in the fascial plane between the QL and Psoas Major (PM) muscles. This technique has more definitive endpoint of injection and injection into this fascial plane ensured a reliable spread in to the thoracic paravertebral space (TPVS) [4]. The presence of psoas muscle ahead of needle point also works as safeguard to prevent inadvertent entry in to the peritoneal space and injury to kidneys.

Transmuscular quadratus lumborum or QL type-3 block has been used successfully for pain management after caesarean section [17]. Where 14 hours of effective analgesia was provided by this block. QL type-3 with catheter has been used effectively to manage pain of hip arthroplasty in place of epidural analgesia

[18]. To our understanding bilateral catheter technique to provide continuous analgesia is not reported earlier.

Epidural was an option in our case but on evaluation a relative risk of serious complication we preferred this technique [1,2].

We could achieve effective analgesia by insertion of bilateral catheter to control visceral as well as somatic pain postoperatively. However, it would have been interesting to observe analgesia influence on intraoperative hemodynamics if, catheter would have been inserted preoperatively.

The unanswered question remains that, which QL block is more effective? The efficacy of QL block is correlated with spread of local anesthetic up to the paravertebral space and we have experienced (unpublished data) that posterior spread of QL-3 is more consistent than QL-1 and QL-2. This happens because fascia transversalis (FT) covers the thoracolumbar fascia (TLF), anterior surface of the QL as well as the antero-lateral surface of the PM [19]. The FT splits in two sheets at the level of the diaphragm. One sheet becomes the inferior diaphragmatic fascia and the other sheet passes behind the lateral and medial arcuate ligaments and continue as endothoracic fascia [20]. Thus, LA injected in the lumbar region between the PM and QL can spread up to TPVS [21].

However, there has been no comparative study to suggest one's superiority over other for safety and efficacy.

Although, QL-3 seems more invasive than QL-2 however, entry through QL muscle and presence of psoas as a guard in front of needle make it as a safer choice.

Contrary to QL-1 and QL-2, which can be given in supine or wedge under hip position. QL-3 requires a lateral decubitus position and become the major limitation for the procedure even if used preoperatively because, extra helping hands are required.

We monitored the clinical effect in terms of pain relief however, sensory spread was not recorded. We feel it was a miss on our part as it would have helped further studies. This we consider a limitation of our case report.

Conclusion

In this case report we observed that QL-3 block is an effective technique for postoperative pain relief after hysterectomy surgery in a high risk patient. Infusion of local anaesthetic through catheters inserted during block further helped in continuous pain relief for desired period. We did not face any complication however, more studies are required to prove its efficacy and safety in high risk patients.

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