

Role of regional anesthesia for placement of peritoneal dialysis catheter under ultrasound guidance: Our experience with 52 end-stage renal disease patients

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ABSTRACT

Aim: The number of patients with end-stage renal disease (ESRD) has shown a consistent rise in India in recent years. Continuous ambulatory peritoneal dialysis (CAPD) remains one of the safe and effective forms of treatment. In this study, we have tried to assess the effectiveness of field block technique for analgesia during catheter placement surgery until 24 h postoperatively, also, if it can obviate the need for general anesthesia in these high-risk patients. **Materials and Methods:** We studied 52 ESRD patients from 2010 to 2012 who were posted for CAPD catheterization in the Department of Urology, Care Hospital, Hyderabad, India. Under ultrasound guidance, "unilateral posterior" and "unilateral subcostal" transversus abdominis plane block anesthesia were given for the placement of CAPD catheter. Patient's intra-operative pain and post-operative pain were recorded with visual analog scores (VAS) and analyzed. **Results:** All patients in our study belonged to American Society of Anesthesiologists category 2 or 3 with multiple co-morbidities. 41 out of 52 patients required no supplemental analgesia during the procedure; 8 patients needed additional infiltration of local anesthetic during skin incisions. Three patients required supplemental analgesia and were considered as failure. A VAS of two was noted in 30 patients and 1 in 19 Patients. No Patient had significant pain 24 h post operatively. No local complication was noted in any patient. **Conclusion:** CAPD Catheterization under regional field block remains safe and effective options for ESRD patients.

Key words: End stage renal disease, peritoneal dialysis, transversus abdominis plane block

INTRODUCTION

The number of end-stage renal disease (ESRD) patients have documented continuous growth since the establishment of dialysis as a life-sustaining therapy.^[1] Continuous ambulatory peritoneal dialysis (CAPD) is an established alternate method to hemodialysis for treating ESRD. Patients with ESRD present a number of challenges to anesthesiologist and surgeons in

view of multiplicity and chronicity of systemic co-morbidities with organ dysfunction. Abdominal field blocks can provide effective intra and post-operative analgesia and avoidance of general anesthesia (GA) in these patients.

MATERIALS AND METHODS

This study was carried out on 52 patients with ESRD over a period of 2 years from 2010 to 2012 after obtaining clearance from Institutional Ethical Committee and patient and relatives informed written consent. Patients belonging to American Society of Anesthesiologists Grade 2 and 3 with ESRD scheduled for peritoneal dialysis were included in the study. Patient refusal, allergy to local anaesthetic and localized infection over the injection site, coagulopathy and surgery at injection site were excluding criterion.

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Operative procedure

After proper preoperative evaluation, all patients were placed in the supine position and standard monitoring (pulse oximetry, electrocardiogram, noninvasive blood pressure) instituted. Intravenous antibiotic injection vancomycin 15 mg/kg was given to all patients 30 min prior to surgery. It was planned to give “unilateral posterior” and “unilateral subcostal” transversus abdominis plane (TAP) blocks for the placement of CAPD catheter. The block was performed under ultrasonographic guidance using Sonosite Micromax machine with a 6-13 MHz linear transducer.

Posterior transversus abdominis plane block

Once the external oblique, internal oblique and transversus abdominis muscles were visualized by ultrasound sonography (USG) probe, at the level of anterior axillary line between the 12th rib and the iliac crest the block was performed using an insulated 21 Gauge 10.0 mm needle with an “in plane” technique as illustrated in the Figures 1a-c. Once the tip of the needle was placed in the space between internal oblique and transversus abdominis and negative aspiration confirmed, 20 ml of 0.375% bupivacaine was administered under direct ultrasonographic guidance.

Subcostal transversus abdominis plane block

It was performed after completion of posterior TAP block. The USG probe was placed under the costal margin, close to the midline, and upper portion of rectus abdominis muscle identified. The transversus abdominis muscle was seen on the lateral border of rectus abdominis muscle. 10 mm needle was inserted at the medial end of the transversus abdominis muscle to obtain in plane view. Once the tip of the needle was seen between the posterior rectus sheath and superficial border of transversus abdominis muscle 15 ml of 0.375% bupivacaine was injected.

In all patients, skin incision was given at least 10 min after placement of the block. If the patient complained of pain at the skin incision site, then 5 ml of 1% lignocaine as a local anesthetic was infiltrated at proposed incision site. If the patient continued to complain of pain, the block was considered as failure and injection fentanyl 1 mcg/kg was given as rescue analgesia.

A paraumbilical transverse incision was made. Anterior rectus sheath was incised at the same line as skin incision. Rectus muscle fibers were retracted from midline. Posterior rectus sheath with peritoneum was exposed. Peritoneum was opened in between stay sutures. The Peritoneal dialysis catheter was put in pelvis with help of introducer. The inner cuff of the catheter was fixed with posterior rectus sheath outside the peritoneal cavity by purse string suture with Prolene. The outer cuff was taken out through anterior



Figure 1a: Position of ultrasound sonography transducer in posterior transversus abdominis plane block

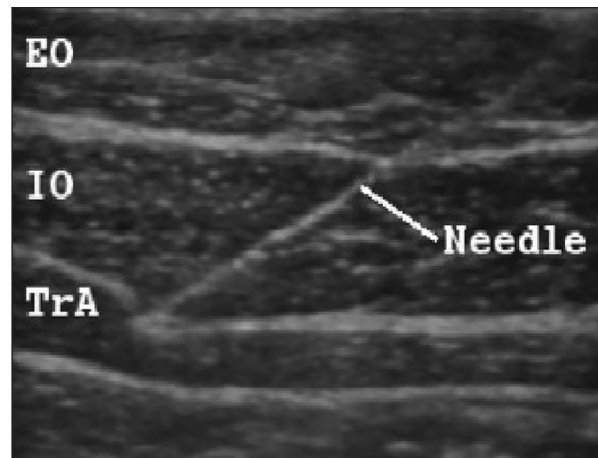


Figure 1b: Placement of needle under ultrasound sonography guidance



Figure 1c: Infiltration of local anesthetic under ultrasound sonography guidance

rectus sheath and placed in a subcutaneous plane. The catheter was taken out through a separate exit site from initial skin incision. Normal saline mixed with injection Heparin 5000 IU was infused into the peritoneal cavity

through the dialysis catheter and free drainage of fluid through catheter was ensured.

The efficacy of postoperative analgesia was documented using Visual analogue scale 2 and 4 h post procedure. Any local injection associated complications like Hematoma formation, skin infections or local anesthetic related toxicity were recorded.

RESULTS

There were 52 patients in the study, among them, 28 patients were male and 24 were females. Most common age of presentation was middle aged people (31-60 year), who constitutes 69.2% of the study population. Majority of the patients had associated co-morbidities such as diabetes (75%) and hypertension (84.7%).

Forty-one out of 52 patients required no supplemental analgesia during the procedure; but 11 patients complained of pain on skin incisions and were given 5 ml of 1% Lignocaine by operating surgeons. Eight of these patients did not require any other analgesia further; 3 patients continued to complain of pain and were given intravenous injection fentanyl 1 mcg/kg as additional analgesia. The block was considered failure in these three patients.

All the patients who had successful block were followed up 2 h and 24 h after surgery, and visual analogue score (VAS) was recorded. 30 patients had VAS of 2 and 19 patients had VAS of 1. None of the patients complained of any pain 24 h after procedure [Table 1]. No Patient had any local complication like Hematoma, Infection at injection site or local anesthetic related toxicity.

DISCUSSION

Patients of ESRD present a number of challenges to surgeon and anesthesiologist in view of the multiplicity and chronicity of systemic co morbidities with organ dysfunction. Abdominal field block anesthesia can provide effective intra and postoperative analgesia with avoidance of GA in these patients.

The anterior division of nerves from T6 to T11 travel along their relevant intercostals space, before passing under the costal cartilages where they enter into the fascial plane between transversus abdominis muscle and internal oblique muscle.^[2] TAP block allows sensory blockade of lower abdominal wall via local anesthetic deposition above transverse abdominis muscle.

We have used “in plane” technique for both posterior and subcostal TAP block which is similar to the technique

Table 1: Clinical profile of the study population (n = 52)

Characteristics	Number	Percentage
Sex		
Female	24	46.1
Male	28	53.9
Age		
5-15	3	5.8
16-30	7	13.4
31-45	18	34.6
46-60	18	34.6
>60	6	11.6
Co-morbidity		
Diabetes	39	75
Hypertension	44	84.7
Block		
Successful	49	94.2
Failure	3	5.8
VAS (n=49)		
2	30	61.2
1	19	38.8

VAS: Visual analog score

described by Walter *et al.*^[3] and Hebbard *et al.*^[4] respectively, which reliably provides analgesia for abdominal surgery extending above the umbilicus. As the key to success in regional anesthesia is to place correct dose of local anesthetic in the right plane, the USG guided needle tip placement, and infiltration of local anesthetic agent lignocaine between internal oblique aponeurosis muscle and transversus abdominis muscle has increased the rate of success in our study. Thus, in this study 41 patients had successful blocks and did not require any other analgesia. Eight patients however required skin infiltration as the TAP blocks does not provide visceral anesthesia. Three patients where block was inadequate were obese, and muscle layers not well-defined.

All our patients had decreased visual analogue acute pain post operative and at all times up to 24 h periods, similar to study by O'Donnell and McDonnell,^[5] he examined the efficacy of TAP block in randomized control trial of 32 patients undergoing large bowel resection via midline abdominal incision. The patients were randomized to receive Patient controlled analgesia and TAP blocks, and he found that the TAP Group has significantly decreased pain at emergence and also post operatively up to 24 h.

In another study done by El-Dawlatly *et al.*^[6] 42 patients undergoing laparoscopic cholecystectomy were randomized to receive standard GA either with or without TAP block. It was concluded that the groups that did not receive TAP block consumed more intra operative analgesic (Injection

sufentanyl) and postoperative analgesic (Injection morphine) as compared to TAP group.

As discussed above, most of the literature research reveals studies in which TAP blocks were given in conjunction with GA and analgesic requirements compared thereafter. However, our study is one of the few studies giving information regarding the block quality without the use of GA.

CONCLUSION

Patients of ESRD present number of challenges to the anesthetist and the operating surgeon for co-morbid illnesses. Our study has demonstrated the USG guided subcostal and posterior transversus abdominis muscle plane blocks are safe and effective methods of intra and postoperative analgesia for CAPD catheter placement in these sick patients, thus obviating the need for administration of GA in high risk patients.

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