



Case Report

Ultrasound-guided abdominal wall blocks as sole anesthetic technique in a high-risk patient undergoing CAPD catheter insertion with umbilical hernia repair: A case report

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Abstract

Background: Patients with End Stage Renal Disease (ESRD) often present with complex comorbidities that significantly increase perioperative morbidity and mortality. General anesthesia in such patients may result in haemodynamic instability, delayed drug clearance and postoperative pulmonary complications. Regional anesthesia techniques in such patients provide an effective alternative with minimal systemic effects. We report a case of a 55-year-old female patient with ESRD on maintenance haemodialysis complicated by ischemic heart disease, right ventricular dysfunction and recurrent episodes of atrial fibrillation and chronic pulmonary embolism was scheduled for CAPD (Continuous Ambulatory Peritoneal Dialysis) catheter placement with concurrent umbilical hernia repair. Considering the high anesthetic risk, the procedure was successfully performed using bilateral rectus sheath block and transversus abdominis plane (TAP) block. The patient remained hemodynamically stable intraoperatively and had an uneventful postoperative recovery with adequate analgesia. This case highlights the feasibility and safety of ultrasound-guided abdominal wall blocks as the sole anesthetic technique in high-risk patients with significant cardiopulmonary comorbidities undergoing abdominal procedures.

Key words: End Stage Renal Disease (ESRD); Transversus abdominis plane (TAP) block; CAPD (Continuous Ambulatory Peritoneal Dialysis)

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1. Introduction

ESRD is frequently associated with multiple systemic comorbidities, including cardiovascular disease, electrolyte imbalance, anemia and altered pharmacokinetics of drugs all of which contribute to increased perioperative morbidity and mortality (1). Patients requiring renal replacement therapy often undergo procedures such as CAPD catheters insertion necessitating careful anesthetic planning. General anesthesia in ESRD patients

with cardiac compromise may further increase the risk of haemodynamic instability and postoperative ventilation. Central neuraxial anesthesia may be contraindicated in anticoagulated patients or those with haemodynamic fragility.

Ultrasound-guided abdominal wall blocks such as rectus sheath block and transversus abdominis plane (TAP) block provide effective somatic analgesia for anterior abdominal wall surgeries while avoiding systemic drug effects [2]. These techniques can offer adequate surgical anesthesia, while also maintaining hemodynamic stability, opioid-sparing analgesia and avoidance of airway manipulation. Here, we report a case of a ESRD patient with multiple comorbidities and who underwent CAPD catheter placement and umbilical hernia mesh repair under successful bilateral rectus sheath block and TAP block as the primary anesthetic modality.

2. Case Presentation

A 55-year-old female patient with End Stage Renal Disease on maintenance hemodialysis was scheduled for CAPD catheter insertion along with umbilical hernia repair. She is also known for hypertensive, ischemic heart disease on regular medication. Patients had recurrent episodes of intradialytic hypotension and pulmonary edema, inadequate ultrafiltration. Electrocardiography revealed atrial fibrillation with fast ventricular response (heart rate around 140 beats per minute). 2D echocardiography showed severe tricuspid regurgitation, dilated inferior vena cava, and right ventricular dysfunction with severe PAH, global hypokinesia of left ventricle, dilated LA, RA, RV with LVEF <30%. CT pulmonary angiogram confirmed eccentric hypodense thrombus in the segmental branches of the right pulmonary artery, suggestive of pulmonary embolism. On assessment it was revealed that hypotension was secondary to marked RV dysfunction with severe PAH rendering the patient unfit for regular conventional hemodialysis.

Hence CAPD was planned as it is associated with less hemodynamic instability. Since the patient had umbilical hernia (USG abdomen revealed features suggestive of chronic medical renal disease with moderate ascites and umbilical hernia with a defect of 2 cm, with herniation of omental fat), which required repair prior to starting CAPD.

After optimization, she was scheduled for CAPD catheter insertion with concurrent umbilical hernia repair, and the decision was made to proceed with ultrasound guided abdominal wall blocks considering the anticoagulation status limiting neuraxial anesthesia and high cardiac risk and haemodynamic instability associated with general anesthesia. The patient was informed about the high cardiac risk, and consent for anesthesia was obtained.

Inside the operating room, an 18 G intravenous cannula was placed, and ASA standard monitors were instituted. Plan of anesthesia was regional anesthesia with ultrasound-guided bilateral rectus sheath block (RSB) and left lateral transversus abdominis plane (TAP) block. The rectus muscle was imaged with the high-frequency linear transducer in a longitudinal orientation above the level of the umbilicus with the patient in supine position. A 21G 50mm Stimuplex-A needle was advanced in-plane approach from lateral to medial direction and 10 ml of 0.25% bupivacaine was injected after negative aspiration for blood in the plane between the rectus muscle and posterior rectus sheath. The same procedure was repeated on the opposite side. Left sided lateral TAP block was then administered after identifying the plane between internal oblique muscle and transversus abdominis muscle over the left mid-axillary line. The needle was then advanced in-plane, in medial to lateral direction and 20 ml of 0.25% bupivacaine in the fascial plane between internal oblique and transversus abdominis muscles after negative aspiration

for blood. The intraoperative and postoperative period was uneventful, with the patient maintaining stable hemodynamics, adequate analgesia, and no evidence of respiratory compromise.

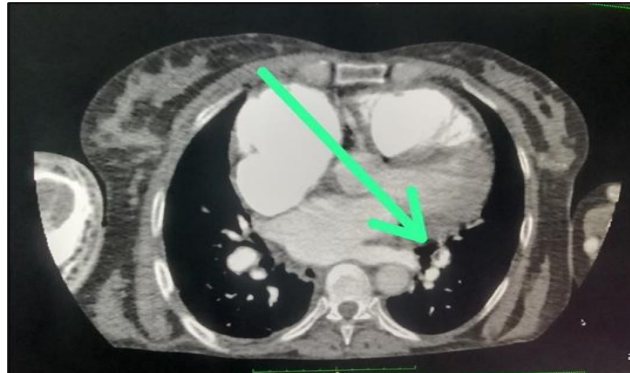


Fig (1): Eccentric hypo dense filling defect seen in left lower lobe posterior segmental pulmonary artery suggestive of pulmonary embolism.



Fig (2): Showing the sonoanatomy of posterior Rectus sheath block. RAM: rectus abdominis muscle, * (Asterix): LA deposition in the layer between RAM and posterior rectus sheath. Δ: posterior rectus sheath, +: peritoneum.

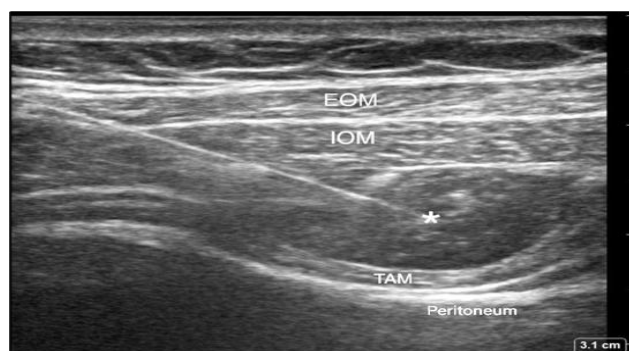


Fig (3): Showing sonoanatomy of Transverse Abdominal plane block post injection. EOM: external oblique muscle, IOM: internal oblique muscle, TAM: transverse abdominis muscle, * (asterisk) denoting needle tip with LA deposition.

3. Discussion

The administration of safe anaesthesia to elderly with multiple comorbidities is a major challenge for anaesthesiologists. Regional nerve blocks involving the thorax and abdominal wall are being explored as possible alternatives, if and when feasible, especially in high-risk patients.

3.1. Anatomical basis for regional technique

The anterolateral abdominal wall receives its nerve supply from the anterior rami of spinal nerves ranging from T7 to L1 nerve roots. These include the intercostal nerves (T7–T11), the subcostal nerve (T12), and the iliohypogastric and ilioinguinal nerves (L1). After leaving the intercostal spaces, the intercostal nerves course within the neurovascular plane situated between the internal oblique and transversus abdominis muscles. Similarly, the subcostal and L1 nerves traverse this same fascial plane, providing motor innervation to these muscle layers. As they proceed anteriorly, nerves from T7 to T12 pass through the transversus abdominis plane, penetrate the rectus sheath, and terminate as anterior cutaneous branches. The T7–T11 nerves supply sensation to the rectus abdominis muscle and the overlying skin, with dermatomal distribution corresponding to the epigastric region (T7), the umbilical level (T10), and the inguinal region (L1).

Rectus sheath block is a fascial plane block that involves injection of local anesthetic between the rectus abdominis muscle and the posterior rectus sheath. The medial aspect of the anterior abdominal wall is innervated by the ventral branches of the T7–T11 spinal nerve roots, which lie between the rectus abdominis muscle and the posterior rectus sheath and enter the rectus muscle near the midline. Berna Caliskan et al. reported 3 cases of simple periumbilical surgery performed solely under an ultrasound-guided rectus sheath block [3]. Two patients tolerated the surgery well with minimal sedation, and one required dissociative anesthesia to complete the procedure. They concluded that the rectus sheath block was an underused technique and that it would be wise to use it whenever feasible. Nicholas et al. reported a case of obstructed umbilical hernia performed under bilateral rectus sheath block for a high-risk patient with minimal sedation [4]. They concluded that the rectus sheath block not only eliminates the risks to high-risk patients but also favors daycare surgery because it preserves motor power, thus allowing the patient to be discharged early, and reduces opioid consumption.

Transverse abdominal plane block is a fascial plane block that involves depositing local anesthetic in the plane between the internal oblique muscle and transversus abdominis muscle. The lateral TAP approach provides analgesia to the T10–T12 segments of the anterior abdominal wall. This provides adequate analgesia to the anterior abdominal wall below the umbilicus in order to facilitate CAPD catheter insertion. In a meta-analysis published in 2023, anesthetic efficacy of TAP block versus local anesthetic infiltration (LAI) in peritoneal dialysis catheter (PDC) insertion was compared, and it was found that TAP block was more effective than LAI at reducing intraoperative and postoperative pain scores. They concluded that TAP block could be used as the primary anesthetic technique for PDC insertion. [5]

4. Conclusion

To conclude, Rectus sheath block combined with Transverse abdominal plane block can serve as an alternative to central neuraxial blockade in high-risk patients undergoing abdominal surgeries.

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