



# Ultrasound-guided transversus abdominis plane block in combination with ilioinguinal-iliohypogastric block in a high risk cardiac patient for inguinal hernia repair: a case report

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## Abstract

**Background and Purpose:** A high risk cardiac patient, ASA IV, was planned for inguinal hernia repair. Since general anaesthesia presented a high risk, anaesthesia was conducted with a transversus abdominis plane (TAP) in combination with ilioinguinal-iliohypogastric (ILIH) block.

**Material and Methods:** A 70-year old male patient with severe CAD and previous LAD PTCA, AVR, in situ PPM and severe MR and TR 3+, was planned for elective inguinal hernia repair. The preoperative ECHO showed IVS dyskinesia with apicoseptal hypokinesia, global EF 42% and grade III diastolic dysfunction. The patient also suffered from hypertension, diabetes mellitus and had severe stenosis of both femoral arteries.

Preoperative preparation included IBP monitoring while the TAP block was carried out under ultrasound guidance using an 8 Hertz linear probe. The ilioinguinal and iliohypogastric nerves were identified with ultrasound and peripheral nerve stimulator. Local anaesthetic [0.5% levobupivacaine (Chirocaine®, Abbott Laboratories)] was applied in two locations: in the upper right fascia of the transversus abdominis muscle (15 ml) and around the right ilioinguinal and iliohypogastric nerves (10 ml), totalling a volume of 25 ml. Skin infiltration was performed with 5 ml 2% lidocaine [Lidocaine®, Belupo] and 5 ml of normal saline.

**Results:** Sensory block onset was at 28 minutes after administration and lasted for approximately 18 hours. There were no haemodynamic disturbances and the perioperative course was uneventful.

**Conclusion:** During the first 18 postoperative hours, the patient was comfortable and satisfied with the anaesthetic procedure.

## INTRODUCTION

Transversus abdominis plane (TAP) block has been used as a component of multimodal analgesia for postoperative pain relief following various abdominal surgeries such as for e.g. hernia repair (1). To improve intraoperative anaesthesia, a combined ultrasound-guided ipsilateral TAP block with ilioinguinal-iliohypogastric (ILIH) block was performed.

## Case report

A 70-year old male, high risk cardiac patient, categorized as American Society of Anesthesiologists' (ASA) IV, was scheduled for an elective inguinal hernia repair procedure. He was 84 kg of weight, had a height of 175 cm and a BMI of 27.4, with severe multivessel coronary artery disease (CAD), confirmed by coronary angiography 3 months earlier when he underwent left anterior descending artery (LAD) stenting. Due to severe stenosis of the aortic valve, he also had a biological aortic valve implant with a remaining severe mitral and tricuspid valve regurgitation and a right ventricular systolic pressure of around 50 mmHg. The preoperative ECHO showed an intraventricular septal dyskinesia with apico-septal hypokinesia and a left ventricular ejection fraction (LVEF) of 42% with grade III diastolic dysfunction. He also had an in situ permanent pacemaker due to third degree AV block. The patient had multiple comorbidities such as long term uncontrolled hypertension, diabetes mellitus and had severe stenosis of both femoral arteries, with a previous femoro-distal bypass from the common femoral artery and the superficial and deep femoral arteries of the left side. He also suffered from chronic kidney disease, nephrotic syndrome, hypothyroidism and normocytic anaemia. Medication included a beta-blocker, amiodarone, a calcium channel antagonist in combination with an angiotensin receptor antagonist, moxonidine, aspirin and a high dose diuretic.

## MATERIAL AND METHODS

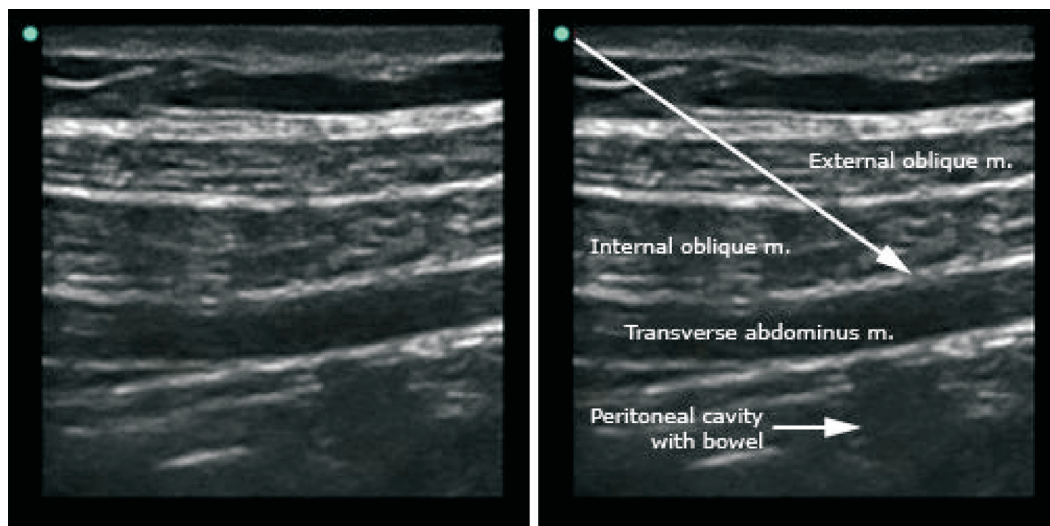
Preoperative preparation included invasive blood pressure monitoring (IBP), continuous electrocardiography (ECG), and pulse oxymetry (SpO<sub>2</sub>). As with many other regional anaesthetic techniques, the use of ultrasound

guidance should be considered to ensure correct needle position and to improve the accuracy of the TAP block technique while limiting the potential for inadvertent damage to the intraperitoneal structures (Figure 1).

The TAP block was performed between the internal oblique and transversus abdominis muscles, using a 22-gauge, 10 cm neurostimulating needle [Stimuplex DÖ, Braun, Melsungen] with one attempt. It was carried out under ultrasound guidance using a linear probe of 8 Hz and a neurostimulator. After that, the ilioinguinal and iliohypogastric nerves were identified medially from the cristae iliacae anterior superior with ultrasound and a neurostimulator set at 1 mA. Local anaesthetic [0.5% levobupivacaine (Chirocaine®, Abbott Laboratories)] was applied in two locations: in the upper right fascia of the transversus abdominis muscle (15 ml) and around the right ilioinguinal and iliohypogastric nerves (10 ml), totalling a volume of 25 ml. Skin infiltration was performed with 5 ml 2% lidocaine [Lidocaine®, Belup] and 5 ml of normal saline.

## RESULTS

Following the administration of the TAP block in the upper fascia of the transversus abdominis muscle, onset of sensory blockade occurred after 28 min. The sensory blockade of the ILIH block occurred earlier, 18 min after the administration of the anaesthetic around the nerves. The testing of the blocks was done with pick prick technique and a temperature discrimination test from the right side of Th 10 to L 1 dermatome. During the operative procedure, the patient was sedated with midazolam 3 mg intravenously (iv). All measured vital parameters such as IBP, ECG/HR and SpO<sub>2</sub> were of correct values. The surgical procedure lasted 45 min and was without any



**Figure 1.** Sonographic view of the three lateral abdominal muscles. The orientation of the probe was perpendicular to a line joining the anterior superior iliac spine and the inferior rib to obtain a transverse view of the abdominal layers.

accompanying complications, after which the patient was sent to the post anesthesia care unit (PACU) for continued perioperative monitoring of vital parameters. After one hour in the PACU, all the vital parameters remained within normal values, the arterial cannula was removed and the patient was discharged to the surgical ward. During the first 24 postoperative hours, the patient's pain level was visually monitored using analgesic scales (VAS, 0 = no pain, 10 = worst pain imaginable) every three hours. Sensory block lasted for 18 h postoperatively with a VAS scale value of 2 and after block regression, there was no need for any further analgesia. At the postoperative follow up sessions, the patient reported his experience as without objections and was very satisfied with the anaesthetic treatment. His further course of recovery was also without any complications.

## DISCUSSION

Patients with coronary artery disease and multiple co-existing diseases, posted for major abdominal surgery are unquestionably at a high risk for perioperative complications (2). We presented a high risk cardiac patient undergoing inguinal hernia repair, with significant comorbidities among which was multivessel CAD, severe mitral valve and tricuspid valve regurgitation, a decreased LVEF and diastolic dysfunction. Local infiltrative anaesthesia or regional blocks are the most suitable techniques in high-risk patients and patients with ASA II–IV status. Since general anaesthesia presented a high risk, a combined ultrasound-guided ipsilateral TAP block along with ILIH block was the technique of choice, with the intention of reducing the possibility of failed block if only one of the blocks was attempted by itself. There is no data thus far to support this combined approach in such a high risk case. Although, TAP was introduced in anaesthesia practice by Rafi (3) in 2001., our understanding of the TAP block and its role in contemporary practice remains limited, especially in high risk cardiac patients such as patients with severe multivessel CAD. On the other hand, the ILIH block is safer and easier to perform in order to provide analgesia for inguinal surgical procedures, but the drawbacks are that it has a relatively short duration and a relatively high failure rate of 10–25%, even in experienced hands (4, 5). Even though the TAP block provided effective analgesia during the first 24 h after surgery, there are no studies to confirm that this block is superior to other

techniques of analgesia (6, 7). The confirmation of effectiveness of a combination of a TAP block and an ILIH block has been presented previously in other high risk groups such as those with cirrhosis of the liver who were undergoing inguinal hernia repair procedures (8). In high-risk patients with CAD, there is always a possibility for deleterious intraoperative tachycardia and significant fluctuations in arterial blood pressure, which may precipitate acute myocardial ischemia if the anaesthesia of choice is not an opioid based technique. In this patient there were no undesired haemodynamic disturbances related to the performed TAP and ILIH blocks.

In conclusion, ultrasound-guided ipsilateral TAP block in combination with an ILIH block in this case, was administered in a high risk cardiac patient, resulting in a successful sensory block, which lasted for 18 h after block administration. After block regression, there was no need for any further analgesic therapy from the side of the patient, neither were there any other complications.

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