



## **Bilateral Transversus Abdominis Plane Block as a Sole Anaesthetic Technique in Emergency Surgery for Huge Irreducible Incisional Hernia in a High Risk Patient**

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**Abstract:** A 46-year old male, a known case of IHD, hypertension with dilated cardiomyopathy, post CABG and double valves replacement, peripheral vascular disease with past history of failed aorto-femoral bypass, DM with nephropathy and neuropathy, Budd Chiari syndrome with significant ascites, bed ridden with multiple bed sores was admitted for huge irreducible obstructed incisional hernia. He was conscious and oriented but dyspnoeic and tachypnoeic. He was categorized as ASA IV/E. The surgery - abdominal double layer repair was successfully conducted under Bilateral Transversus Abdominis Plane (TAP) block. Though the TAP block is mostly used for post operative analgesia in first 24 hrs, we could use it as a sole anaesthetic technique for abdominal surgery for a very high risk patient avoiding the complications of both General and Regional Anaesthesia.

**Keywords:** ultrasound, TAP Block, Incisional hernia, anaesthetic technique, high risk patients

**Introduction:** A reversible blockade of nerve impulses can be made when the local anaesthetic agents are injected into the regional nerves blocking the afferent pathway, thus rendering the area temporary painless. The transversus abdominis plane block is a recent regional anaesthetic technique that provides effective post operative analgesia after abdominal surgery. This technique was first described by Rafi<sup>1</sup> who injected local anaesthetic through the iliolumbar triangle of Petit within the TAP between the internal oblique muscle and transversus abdominis muscle utilizing the double-loss of resistance technique. Virtually, the ultrasound-guided TAP block is highly effective and easy technique for rendering analgesia for post anterior abdominal incision as supported by

many published literatures<sup>2-5</sup> but it can also be used as a sole anaesthetic technique for abdominal incision as well as operation where the autonomic innervation is partly or not involved.

**Case Report:** A 46-year old male was admitted for huge irreducible and strangulated paraumbilical (incisional) hernia planning for emergency surgery. He was a known case of ischaemic heart disease (IHD), hypertension, with dilated cardiomyopathy on treatment, and Budd Chiari syndrome with marked ascites. His past medical history included CABG, double valves replacement and failed aorto-femoral bypass. He was bed ridden with bed sores near coccyx. On examination he was conscious but dyspnoeic and tachypnoeic. His heart rate was 82/min, BP 132/82 mmHg, respiratory rate 22/min and SpO<sub>2</sub> 94% with room air. Chest auscultation revealed bilateral basal crackles with normal heart sounds. He complained of pain in abdomen. Abdominal examination revealed a marked ascites with irreducible and strangulated paraumbilical hernia (18 X 6 X 8) cm. Biochemical and haematological investigations were within normal values. He was categorized as ASA IV/E and was planned for emergency, water tight double layer repair of hernia operation.

Considering his all multi-medical problems and present status with ASA IV/E, we planned to avoid general or spinal anaesthesia, so we opted for TAP block under ultrasound guidance as sole anaesthetic technique. After proper explanation to the patient about the technique of TAP block he was taken to OT (Operation Theatre) table and vital parameters were monitored securing a 16G (Gauge) needle on the right dorsum of the hand. He was sedated with intravenous Midazolam 2mg and was laid supine with the anterolateral abdominal wall exposed bilaterally from iliac crest to the sub-costal margins and scrubbed aseptically.

A Logiq (GE Medical system, USA) portable ultrasound machine with a 12L-RS linear probe (7-13 MHz) covered with sterile plastic sheath was used for TAP block. The ultrasound probe was positioned on the right sub-costal margin cephalad to the iliac crest and the initial image was optimal by sliding antero-posteriorly, tilting, or both in a cephalad-caudal direction until the lateral abdominal wall muscles and the TAP were clearly distinguished in the ultrasound screen (Fig. 1).



**Figure 1:** Transverse sonoanatomy of the lateral abdominal wall.

An 80mm 20G needle (B.Braun stimuplex, Melsungen, Germany) was inserted and gradually advanced from the right side anteromedial position in a posterior and lateral direction

using a real time ultrasound guidance and an in-plane technique with the skin entry 1-2 cm away from the transducer probe to improve the visibility in the long axis (Fig.2). Under direct vision the needle was advanced into the TAP fascial plane between the internal oblique muscle (IOM) and the transversus abdominis muscle (TAM) (Fig.2). The needle tip position was confirmed by injecting 1-2 ml of 5% Dextrose in water and observing a hypoechoic pocket between the muscles (IOM and TAM) (Fig.2). When the needle tip position is within the TAP neurofascial plane a mixture of 20ml of 0.25% Bupivacaine, 20ml of 1% Lidocaine and 0.2mg Adrenaline was injected slowly through the needle. The injectate was seen spreading within the TAP as a hypoechoic, dark oval shape distending the IOM and TAM upwards and downwards respectively (Fig.3).



**Figure 2:** The sonographic image of the needle advancing in plane towards the TAP. The tip of the needle is located below the fascial layer



**Figure 3:** The sonographic image of incoming local anaesthetic (LA) from the tip of the needle within the TAP distending the IOM and TAM

The same steps were repeated on the contra-lateral side. After 20-25 minutes, the abdominal incision was carried out without pain. Oxygen 6l/min with Oxygen mask was given to the patient and the vital signs remained normal intraoperatively. After opening the hernial sac it was found that the small intestinal loop which was inside the sac was found viable. When the surgeons manipulated bowel the patient complained of mild and bearable retching and discomfort which was managed with small dose of opioid (Sufentanil 5µg i/v). About 4 litres of ascitic fluids was aspirated and abdominal wall was closed in double layers; duration of surgery lasted about 1 and half hours. The patient was transferred to ICU for closed observation and monitoring. VAS (Visual Analogue Scale) pain scores at rest and on coughing were recorded every 6 hours and he experienced pain relief (VAS at rest 0/10 and 1/10 on coughing). The vital signs were stable. Postoperatively, the patient was pain free for about 16-17 hrs without supplementing with any narcotic or NSAID drugs. 17 hrs later the patient complained mild bearable pain in the abdomen and the pain was relieved by inj. Pethidine 50mg i/m stat lasting for another 16 hrs. The patient did not use any more opioid and he was pain free almost 33hrs. He was transferred to the surgical ward on day two.

**Discussion:** It has been elucidated in various literatures during the last 12-14 years that TAP block provides highly effective postoperative analgesia, when used as part of multi-model analgesic

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regimen, in patients requiring abdominal wall incisions for total abdominal hysterectomy (TAH), lower segment caesarean section (LSCS), prostatectomy, appendectomy and open cholecystectomy.<sup>2-8</sup> To our knowledge the use of ultrasound-guided bilateral TAP for a sole anaesthetic technique for upper abdominal surgery in a very high risk patient has not been reported so far. The skin, muscles and parietal peritoneum of the anterior abdominal wall are innervated by the lower six thoracic nerves and the first lumbar nerve. After leaving the respective intervertebral foramina the anterior rami (sensory afferents) of these nerves course around the transverse process, then pierce the musculature of the lateral abdominal wall to course through a neurovascular plane superficial to the transversus abdominis muscle. In the midaxillary line the sensory afferents branch out as a lateral cutaneous branch and continue within the TAP to perforate anteriorly supplying the skin as far as the midline. The TAP plane thus provides a space into which the local anaesthetic can be deposited to achieve myocutaneous sensory blockade.<sup>9,10</sup>

In our patient for bilateral sub-costal TAP block under ultrasound guidance the needle was directed inferolaterally to progressively distend the TAP parallel to the costal margins blocking the intercostals nerves as they emerge to run into the TAP thereby resulting highly effective myocutaneous sensory blockade. As the patient was associated with multiple medical problems he was categorized as ASA IV/E. To give general anaesthesia or central neuraxial blockade for the emergency operation for such a high risk case would have more chances of resulting with more untoward and fatal complications both intra-operatively and postoperatively.<sup>11-17</sup> The abdominal wall sensory afferents which course through the TAP plane could be blocked successfully and effectively by abdominal field blocks or TAP block under ultrasound guidance then the abdominal incision and operation could be carried out without patient's discomfort.<sup>18-20</sup> When the surgeons manipulated the contents of the obstructed paraumbilical hernia, the patient complained of pain but bearable due to stimulation of autonomic nervous system through celiac plexus (vagus). After getting inj. Sufentanil 5µg i/v the patient got relieved the pain or retching sensation. As the loop of the small bowel in the hernial sac was found viable, the operation could complete without resection of bowel within 1.30 hrs. Though the patient was categorized as a very high risk one the operation could complete under ultrasound –guided bilateral TAP block without any untoward complication. He was given Pethidine 50 mg i/m about 16-17 hrs after the operation especially when he complained of mild pain. Otherwise, he was pain free for about 33 hrs.

Anatomically, sympathetic and somatic innervation are closely related near the neuraxis, but become separated peripherally. Thus, spinal, epidural or paravertebral blocks will cause significant sympathetic block, resulting in major cardiovascular changes and other physiological effects. On the other hand, peripheral nerve blocks only affect somatic innervation and leave the sympathetic efferent intact. If complete denervation of viscera is required, vagal afferents have to be blocked by celiac plexus block.<sup>21-23</sup> The extent and spread of the local anaesthetic solution in the TAP affecting anterior abdominal wall sensory afferents depend on time factor. It seems that full effect of analgesia takes at least 20 –25 minutes after injection of local anaesthetic solution. McDonnell et al suggest that local anaesthetic spreads within the TAP plane progressively over the several hours and early assessment of the extensive TAP block may miss.<sup>23</sup>



In conclusion, as ultrasound-guided bilateral transversus abdominis neurofascial plane block is quite simple, quick, safe and effective especially for a very high risk patient with multi-medical problems and geriatric patients needing an elective or emergency abdominal surgery, the surgeons and anaesthesiologists should encourage this technique, even in this advanced era, when it is deemed suitable.

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