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Evolution of the transversus abdominis plane block and its role in postoperative analgesia

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Since it was first described by Rafi in 2001, the transversus abdominis plane (TAP) block can be best described as a peripheral nerve block to the anterior abdominal wall (T6 to L1). The TAP block is specifically a local anesthetic injection into the fascial plane superficial to the transversus abdominis muscle and deep to the internal oblique muscle. The TAP block has been a subject of controversy with regard to utility, to indications, and more fundamentally, how best to place the block and its precise mechanism of action. The evolution of thinking with regard to this block, or more correctly family of interrelated blocks, includes knowledge of underlying anatomy, as well as an appreciation of its varied approaches. The TAP block affords excellent analgesia for abdominal procedures. In summary, the TAP block affords effective

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analgesia with opioid sparing effects, technical simplicity, and long duration of action. Some disadvantages include the need for bilateral block for midline incisions and absence of effectiveness for visceral pain.

Practice points

- Understanding underling anatomy is fundamental to choosing a correct block for abdominal surgery.
- Different blocks with similar names, some ultrasound-based and other landmark based, are not equally effective for specific procedures.
- The more posterior truncal block approaches exert some of their effects via local anesthetic reaching paravertebral spaces.

Research agenda

- Standardization of names for blocks for abdominal surgeries would aid practitioners.
- Randomized control trials comparing different approaches for specific surgical procedures are needed.

Introduction

As anesthesia practice evolves, there has been an increasing trend toward regional anesthesia with an aim toward improving both safety and patient satisfaction. While not as commonplace as neuraxial anesthesia or peripheral nerve blocks, abdominal field blocks have been administered for decades. Though owning a good safety profile with few case reports of morbidity, the deposition of local anesthetic into the fascial plane superficial to the transversus abdominis muscle, and deep to the internal oblique, commonly called the "Transversus Abdominis Plane" (TAP) block, has been a subject of significant controversy in regards to utility, to indications, and more fundamentally how best to place the block and its underlying mechanism of action. The evolution of thinking with regard to this block, or more correctly family of interrelated blocks, is a testament to the fundamental importance of anatomy and equivalence of varied approaches.

Landmark-based approach

While regional anesthesia for abdominal surgery dates at least to the beginning of the 20th century [1], abdominal field blocks took a quantum leap forward with the introduction of a blind landmark technique pioneered by Dr. Rafi [2]. The "double pop" technique of advancing a needle through the triangle of Petit, the anatomical area formed by the iliac crest inferiorly, the margin of the latissimus dorsi posteriorly, and the margin of the external oblique anteriorly – results in safe, reliable anesthesia of the anterior abdominal wall above and below the umbilicus [3–5]. A blunt needle has been found clinically to make the "pops" of passing through the fascial layers underneath the external oblique and internal oblique easier to appreciate and local anesthetic is deposited between the internal oblique and transversus abdominis. Surgical literature describes significant variability in the size and even presence of the triangle, the dissection of 80 cadavers by Loukas et al. found that 17.5% of specimens had no triangle identifiable secondary to the external oblique covering the latissimus dorsi [6] (Fig. 1).

In studies of the landmark-based TOP approach, McDonnell et al. described dye spread from the costal margin (T9 at anterior axillary line) to iliac crest (L1) in cadaveric dye studies with rostral