

Para-Iliopsoas Block: Anatomical Rationale, Technique, and Contemporary Clinical Perspective

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Abstract

The para-iliopsoas (PIP) plane block is a novel regional anaesthesia technique developed to enhance analgesia for hip and proximal thigh surgeries. By targeting the fascial plane between the iliopsoas complex and fascia iliaca at the level of the anterior superior iliac spine, the PIP block facilitates deposition of local anaesthetic near the lumbosacral trunk. This approach aims to achieve reliable blockade of the femoral nerve, lateral femoral cutaneous nerve, and potentially the obturator nerve, thereby improving hip joint analgesia while minimizing quadriceps weakness. Ultrasound guidance enables precise needle placement and visualization of spread, with volumes of 20–30 ml required to overcome fascial resistance and promote longitudinal distribution. Clinical applications include total hip arthroplasty, hip arthroscopy, femoral neck fractures, and anterior thigh procedures, with reported benefits of reduced opioid consumption and improved patient positioning for neuraxial anaesthesia. However, limitations include variable obturator coverage, anatomical variability, and risks of peritoneal or vascular injury with deep needle advancement. Current evidence is limited to cadaveric, imaging, and small clinical series, underscoring the need for further validation. The PIP block holds promise as part of multimodal, opioid-sparing analgesia strategies in hip surgery.

Keywords: Regional anaesthesia, Fascial plane blocks, Hip surgery

Anatomical Rationale and Target Fascial Plane

The iliopsoas (IP) complex, comprising the psoas major and iliacus muscles, is enveloped anteriorly by the fascia iliaca (FI) and represents an important anatomical target for interfascial plane blocks used in hip surgery [1, 2]. Several regional anesthesia techniques such as the suprainguinal fascia iliaca (SIFI) block, circumsoas block and the IP plane block have been described targeting the FI plane and IP complex [2, 3, 4]. (Table 1) Despite providing broader lumbar plexus spread, suprainguinal fascia iliaca approaches may be limited by inconsistent obturator nerve blockade, requirement for larger injectate volumes, and potential quadriceps motor weakness [2, 5]. In this context, the para-iliopsoas (PIP) plane block was developed as a fascial plane

approach targeting the space between the IP complex and FI at the level of anterior superior iliac spine (ASIS)[6]. This injection site is more cephalad and medial, corresponding to the L5-S1 level. (Fig. 1) By depositing local anaesthetic in this confined compartment, the PIP plane block technique potentially achieves:

- Proximal femoral nerve blockade
- Spread toward the lateral femoral cutaneous nerve
- Potential coverage of the obturator nerve

The PIP plane block may potentially improve perioperative hip analgesia while minimizing quadriceps weakness. However, the available evidence is currently limited to small clinical series and a single randomized trial [4, 6].

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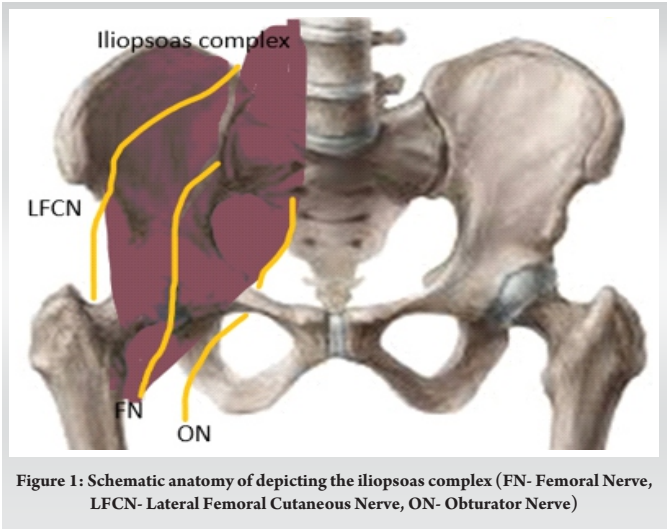
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Ultrasound Technique and Needle Trajectory

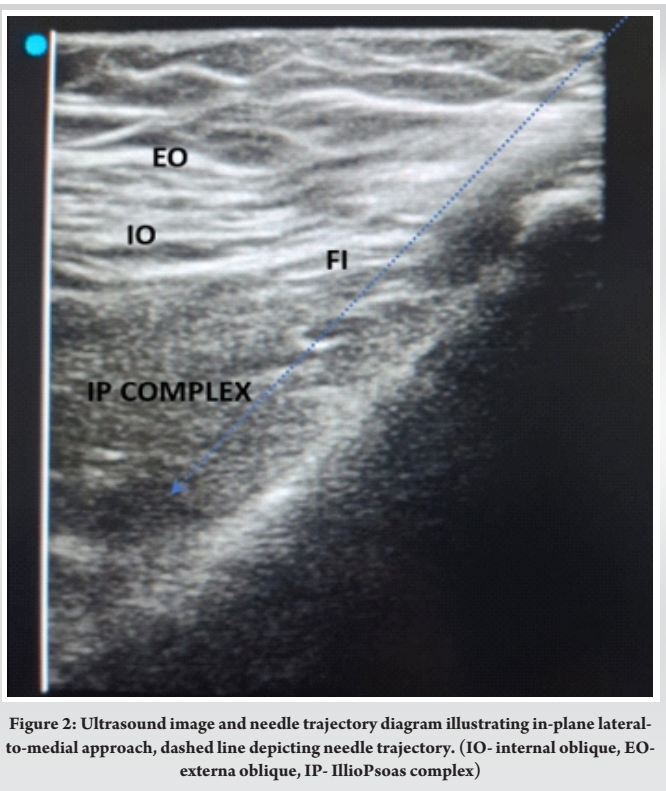
Supine position with slight external rotation of the hip facilitates probe placement and needle access.

Reviewer comment: The technical description is clinically practical and easy to follow.

A high-frequency linear transducer is placed in a transverse orientation just medial and approximately 1 cm inferior to the anterior superior iliac spine (ASIS), directed towards the umbilicus, to visualize the iliacus muscle, psoas major muscle, FI, IP plane, and occasionally the deep circumflex iliac vessels medially. An in-plane ultrasound-guided approach is employed to maintain continuous visualization of the needle shaft and tip throughout the procedure. The needle is advanced from lateral to medial direction into the fascial compartment. The needle tip is positioned deep to the FI while remaining superficial to the iliac bone and posterior to iliopsoas muscle belly. Initial hydrodissection with a small volume of local anaesthetic (LA) is performed to separate the FI from the IP complex, thereby confirming correct needle tip placement before administration of the full injectate volume.

Local Anaesthetic Volume and Spread

Cadaveric and imaging studies suggest that upto 20-30 ml of



LA is required to overcome fascial resistance and promote longitudinal spread along the iliacus fascia [7].

As with other fascial blocks, the para-iliopsoas block is also a volume-dependent interfascial technique. The effective volume of LA is not established yet, however based on the published literature 20–25 ml of LA volume has been considered sufficient for adequate hip analgesia [6].

Clinical Indications

The PIP approach may preferentially influence articular sensory branches while potentially reducing motor involvement compared with more proximal femoral nerve blockade.

The PIP approach may preferentially influence articular sensory branches while potentially reducing motor involvement compared with more proximal femoral nerve blockade [8, 9]. The PIP block can thus be considered as a

Table 1. Comparative table summarizing the three alternative techniques targeting the fascia iliaca (FI) plane and the iliopsoas (IP) complex. Anterior superior iliac spine- ASIS, FN- Femoral Nerve, LFCN- Lateral Femoral Cutaneous Nerve, ON- Obturator Nerve				
Technique	Approach	Target Structures	Advantages	Limitations / Considerations
Suprainguinal Fascia Iliaca (SIFI) Block	Injection above the inguinal ligament, at the level of ASIS	Terminal lumbar plexus branches, specifically the FN, LFCN, and ON	Wider, more complete sensory blockade of the hip capsule and thigh than traditional infra-inguinal blocks	High-volume requirement. Risk of motor blockade and quadriceps weakness.
Circumpsoas Block	Injection deep to the anterior psoas fascia and superficial to the psoas major muscle at L5/S1 intervertebral level.	Terminal branches of the lumbar plexus (including the genitofemoral, LFCN, FN, and ON)	Widespread dermatomal coverage (from T8 to S3) with less quadriceps motor weakness	Demands high ultrasound expertise and uninterrupted needle tip visualization to avoid vascular or bowel injuries
Para IP Plane Block	Uses an oblique scan starting from ASIS towards the umbilicus.	Anterior branches of the lumbar plexus	Motor-sparing. Selective targeting of the hip joint capsule nociceptors	Ultrasound expertise and accurate anatomical identification. Variable ON block

component of multimodal analgesia for various hip and thigh procedures (total hip arthroplasty, hip arthroscopy, femoral neck and intertrochanteric fractures, and anterior thigh surgeries) reducing postoperative opioid consumption, facilitating positioning for neuraxial anaesthesia and enhancing surgical recovery. However, the current clinical evidence remains limited.

Limitations

Despite their clinical utility, cranially directed needle advancement, particularly when excessively deep or aggressive, carries inherent risks, including inadvertent peritoneal breach with potential visceral injury, vascular trauma to the deep circumflex iliac vessels, and unintended intravascular injection that may precipitate local anaesthetic systemic toxicity (LAST), especially with larger volumes [10].

Furthermore, although designed as a technique in proximity to lumbosacral trunk, the PIP block should not be considered a substitute for a lumbar plexus block, as it does not consistently achieve complete lumbar plexus anaesthesia.

Also, the ON blockade remains variable, particularly for posterior hip capsule innervation [11].

It is also important to recognize that the current evidence base for the PIP block is still evolving, consisting primarily of

cadaveric studies, imaging data, and small clinical series, and its definitive clinical effectiveness has yet to be firmly established.

Conclusion

In conclusion, the para-iliopsoas plane block is an evolving technique for hip and proximal thigh analgesia, with potential for improved pain control and earlier mobilisation. However, inconsistent obturator blockade, and anatomical variability can affect reliability. Future studies are needed to establish its position within hip analgesia strategies, particularly in multimodal and opioid-sparing pathways.

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Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

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