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Lumbar plexus block

Essay
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بسم الله الرحمن الرحيم

اقرأ باسم ربك الذى خلق﴿١﴾ خلق الإنسان من علق﴿٢﴾ اقرأ و ربك الأكرم ﴿٣﴾الذى علم بالقلم﴿٤﴾ علم الإنسان مالم يعلم﴿٥﴾

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(العلق :١ الى ٥)

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MOSTAFA KAMAL

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ACL: anterior cruciate ligament

CPNBs: Continuous peripheral nerve blocks

FNB: femoral nerve block

HRUS: High-resolution ultrasound

LFC: lateral femoral cutaneous nerve

NMDA: N-methyl D-asprtate

ONB: Obturator nerve block

ORIF: open reduction and internal fixation

PABA: para-aminobenzoic acid

PCA: patient-controlled analgesia bolus

PCA-BI: patient-controlled analgesia plus background continuous infusion

PCB: Psoas compartment block

PNB: peripheral nerve block

PSNB: The parasacral nerve block

SNB: sciatic nerve block

THA: total hip arthroplasty

TKA: total knee arthroplasty

INTRODUCTION

Regional Anesthesia is the application of a local anesthetic agent to a part of the nerve causing block of the nerve impulses to the part innervated. This interruption may be sensory or motor or both. Medical application requires that no damage occurs to the tissue and that the nerve block is reversible. Such method may be used either to relive postoperative pain or the management of painful diseases.

Regional anesthesia is of great value for patients with various diseases when general anesthesia may be risky to the patients e.g. hypertension, coronary artery disease, arrhythmia, decompensated heart disease, cerbrovascular accidents, respiratory disease whether acute or chronic, renal and liver impairment (***Jankowski et al,*** ***٢٠٠٣***).

So regional anesthesia is the best choice for any surgical risk patient and also when patient's cooperation is needed.

Over the past decade, several developments have led to an increased interest in lower extremity peripheral nerve block including: transient neurological symptoms associated with spinal anesthesia, also increased incidence of epidural hematoma specially with the introduction of new antithromboembolic prophylaxis regimens, and evidence of improved rehabilitation

outcome with continuous lower extremity peripheral nerve blocks and because of the increased interest several developments in the lower exterimity peripheral nerve bock techniques led to easier performance and better outcome (***Iskander et al, ٢٠٠٣).***

Before discussing lower extremity peripheral nerve blocks it is pertinent to review physiology of nerve conduction and to discuss the pharmacology of local anesthetic drugs used commonly to perform these blocks ***(Strichartz and Berde, ٢٠٠٥).***

Anatomy of the lumbar plexus

The lumbar and sacral plexuses innervate the lower limb. The lumbar plexus lies deep within psoas major anterior to the transverse processes of the first three lumbar vertebrae. The sacral plexus lies in the pelvis on the anterior surface of the piriformis deep to the pelvic fascia, which separates it from the inferior gluteal and pudendal vessels. The lumbosacral trunk (L_4-L_5) emerges medial to psoas major and lies on the ala of the sacrum before crossing the pelvic brim to join the anterior primary ramus of S_1 ***(Bannister et al, ٢٠٠٥).***

Lumbar plexus

Location: *figure(٣)* The lumbar plexus lies within the substance of the psoas major (at the junction of the posterior third and the anterior two thirds of the muscle), and anterior to the transverse processes of the lumbar vertebrae.

Origin: lumbar plexus is formed by the first three, and most of the fourth lumbar vertebrae rami. The first lumbar ramus receives a branch from last thoracic ventral ramus ***(Mays, ١٩٩٨).***

The most common arrangement of the plexus:

The first lumbar ventral ramus joined by a branch from the twelvth thoracic ventral ramus, bifurcates into:

١) The upper and larger part which divides again into iliohypogasteric and ilioinguinal nerves.

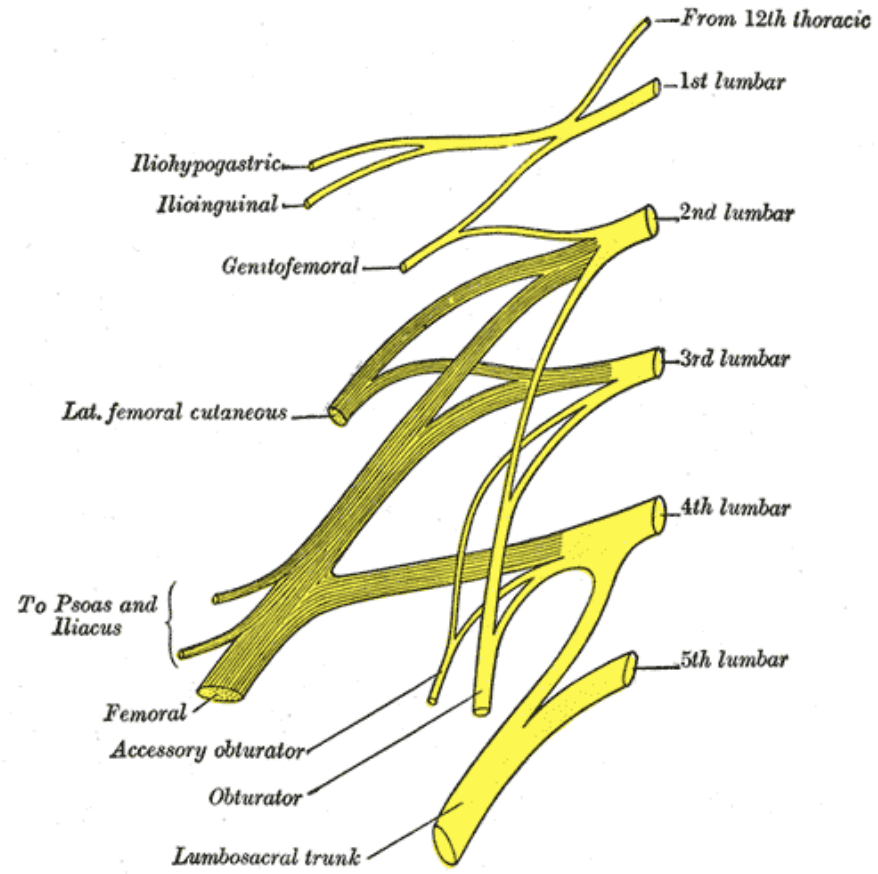
٢) The smaller lower part which unites with a branch from second lumbar ventral ramus to form genitofemoral nerve.

The remainder of the second, third and part of the fourth lumbar ventral rami join the plexus and divide into ventral and dorsal branches. Ventral branches join to form the obturator nerve. The main dorsal branches join to form the femoral nerve. Small branches from the dorsal branches of the second and third rami join to form the lateral femoral cutaneous nerve ***(Bogduk, ١٩٩١)***

The lumbar plexus is supplied by the lumbar vessels which supply the psoas major ***(Crock, ١٩٩٦).***

The branches of lumbar plexus: *figure(١)*

-Muscular	T١٢, L١-٤
-Iliohypogastric	L١
-Ilioinguinal	L١
-Genitofemoral	L١, L٢
-Lateral femoral cutaneous	L٢, L٣
-Femoral	L٢- L٤ dorsal divisions
-Obturator	L٢- L٤ ventral divisions
-Accessory obturator	L٢, L٣



figure(١): Branches of lumbosacral plexus ***(Bannister et al, ٢٠٠٥).***

١) Muscular branches:

They are small branches from all five lumbar roots.

٢) Iliohypogastric nerve:

Distribution: The Iliohypogastric nerve originates from the L١ ventral ramus. It emerges from the upper lateral border of Psoas major, crosses obliquely behind the lower renal pole in front of Quadratus lumborum above the iliac crest It enters the posterior part of transversus abdominis and internal oblique. The iliohypogastric nerve is connected to with the subcostal and ilioinguinal nerves ***(Burkillhand and Healy, ٢٠٠٠).***

It divides into lateral and anterior cutaneous branches and also supplies both muscles.

The lateral cutaneous branch runs through internal and external oblique above iliac crest, a little behind the iliac branch of twelfth thoracic nerve and is distributed to the posterolateral gluteal skin.

The anterior cutaneous branch runs between and supplies internal oblique and transversus abdominis. It runs through internal oblique ٢ cm medial to anterior superior iliac spine, and through external oblique aponeurosis ٣ cm above

superficial inguinal ring and is then distributed to suprapubic skin ***(Mays, ١٩٩٨).***

It is occasionally injured during an oblique surgical approach to the appendix. However because the suprapubic skin is innervated from several sources there is rarely any detectable sensory loss. Division of the iliohypogastric nerve above superior iliac spine weakens posterior wall of the inguinal canal and predispose to direct inguinal hernia ***(Burkillhand and Healy, ٢٠٠٠).***

Motor:

The iliohypogastric nerve supplies a small motor contribution to transversus abdominis and internal oblique including the conjoint tendon.

Sensory:

The Iliohypogastric nerve supplies sensory fibers to transversus abdominis, internal oblique and external oblique and innervate the posterolateral gluteal and suprapubic skin ***(Crock, ١٩٩٦).***

٣) Ilioinguinal nerve:

Distribution : the ilioinguinal nerve originate from ventral ramus of L١ , it is smaller than the iliohypogastric nerve and arises with it from the first lumbar ventral ramus , to emerge from the lateral border of psoas major with or just inferior to iliohypogastric nerve, It passes obliquely across the quadratus lumborum and the upper part of iliacus and enters transversus abdominis near the anterior end of iliac crest, it sometimes connected to iliohypogastric nerve at this point ***(Newell, ١٩٩٧).***

It pierces internal oblique and supplies it and then transverses the inguinal canal below the spermatic cord, it emerges with the cord from the superficial inguinal ring to supply the proximal medial skin of the thigh and skin over the root of the penis and upper part of scrotum in males or the skin covering the mons pubis and the adjoining labium majus in females ***(Bannister et al, ٢٠٠٥).***

The nerve may be injured during hernia operation leading to paraesthia over the skin of genitalia.

Motor:

It Supplies the transversus abdominis and internal oblique.