

Lumbosacral Block Techniques For Lower Limb Surgeries

Essay

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Anesthesiology*

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INTRODUCTION

The lumbar and lumbosacral plexi are the major nerve distributions in lower extremities that form four major nerves, the lateral femoral cutaneous, femoral, obturator and sciatic nerves. Lumbar plexus blockade arises as a valid single-injection, which is capable of blocking all roots in the origin of the plexus. The first description of this blockade was made by Winnie in 1974. Since Winnie's original description of the posterior approach to the lumbar plexus in 1974 there have been several alternative descriptions, which will be described and discussed (*Moreno and Casalia, 2006*).

Regional anesthesia by nerve block means the interruption of impulse conduction in the nerves using specific, reversibly acting drugs (local anesthetics). Local anesthetics interrupt neural conduction by inhibiting the influx of sodium ions through channels or ionophores within neuronal membranes. The molecular structure of all local anesthetics consists of 3 components: lipophilic aromatic ring, intermediate ester or amide linkage and tertiary amine. Each of these components contributes distinct clinical properties to the molecule(*Daniel and Kenneth, 2012*)

Lower extremity blocks can be performed with the patient in various positions (lateral, prone, or supine). Because lower extremity surgery usually requires at least two blocks (sciatic and lumbar plexus or a part of it), and because mobilization of the patient may be difficult or painful (e.g. morbid obesity, arthritis, trauma), the choice of technique takes into consideration the need to limit the mobilization of the patient. For surgery at the knee requiring sciatic and femoral

blocks in a trauma patient who can not be mobilized, anterior approaches to these two nerves are indicated. In contrast, when the patient can assume a prone or lateral position, a parasacral, posterior, or subgluteal approach to the sciatic nerve combined with a lumbar plexus approach is possible. Although the arthroscopic knee diagnostic procedure may be performed under a single femoral nerve block, any knee surgery involving the posterior aspect of the knee also requires block of the sciatic nerve. This is accomplished using a parasacral, posterior, gluteal, sub-gluteal, anterior, and lateral or popliteal approach to the sciatic nerve. Complications of regional anesthesia such as bruising, hematoma, local anesthetic toxicity, peripheral nerve damage are relatively minor and easily managed (*Horlocker, 2010*).

AIM OF THE WORK

The aim of this essay is to have an overview on the indications of lumbosacral plexus blockade, different block approaches and techniques and complications.

APPLIED ANATOMY OF THE LUMBAR PLEXUS

ANATOMY OF THE LUMBAR PLEXUS

The lumbar plexus is derived from the anterior primary rami of the 1st, 2nd, 3rd and part of the 4th lumbar nerve roots. About 50% of subjects receive an additional contribution from the twelfth thoracic root {T12}. The same way as the brachial plexus, the lumbar plexus may be pre-fixed, with its lowest contribution from the third lumbar nerve root {L3}, or post-fixed, when it extends to the fifth lumbar root {L5}. The plexus assembles in front of the transverse processes of the lumbar vertebrae within the substance of the psoas major. The first lumbar nerve root {L1}, joined in 50% of cases by a branch from T12, divides into an upper and lower divisions. The upper division gives rise to the iliohypogastric and ilio-inguinal nerves; the lower division joins a branch from the second lumbar root {L2} to form the genitofemoral nerve. The rest of L2, together with L3 and the contribution to the plexus from the fourth lumbar root {L4}, divide into dorsal and ventral divisions (table 1) (*Enneking et al., 2005*).

Table 1: Branches of the lumbar plexus

Roots	Branches
L1	Iliohypogastric and Ilio-inguinal nerves
L1, L2	Genitofemoral nerve
L2, L3 (dorsal divisions)	Lateral cutaneous nerve of thigh
L2, L3, L4 (dorsal divisions)	Femoral nerve
L2, L3, L4 (ventral divisions)	Obturator nerve
L3, L4 (ventral divisions)	Accessory obturator nerve
Muscular branches	Psoas major, psoas minor, iliacus and quadratuslumborum muscles

(Lennon and Horlocker, 2006)

The nerves of the lumbar plexus pass in front of the hip joint and mainly supply the anterior part of the thigh. The intimate relations of the plexus to the psoas major muscle are shown in (fig.1). The obturator nerve and the accessory obturator (when present), emerge on its medial border. The genitofemoral nerve pierces the muscle to lie on its anterior surface and the remaining nerves appear along the lateral border (**Andreas, 2011**).

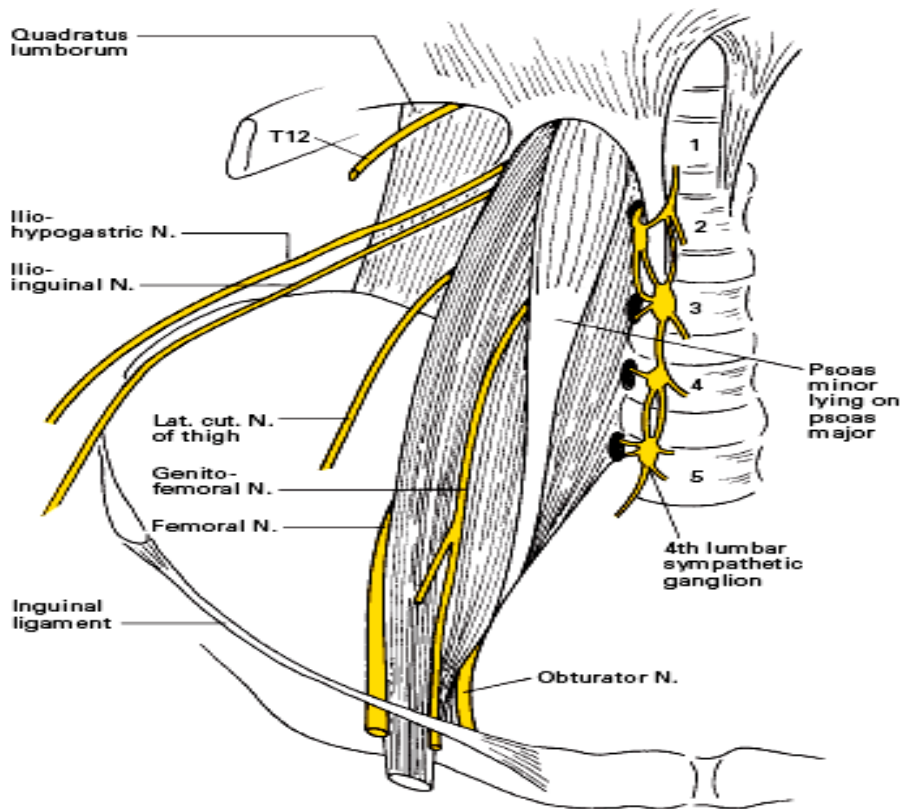


Figure (1): The relationships of the lumbar plexus to the psoas major muscle (*Ellis et al., 2008*).

Distribution of the lumbar plexus

1- The iliohypogastric and ilio-inguinal

The 1st lumbar nerve divides in front of the quadratus lumborum into the iliohypogastric and ilio-inguinal nerves which penetrate the transversus abdominis to lie between the transversus and internal oblique muscles. The *iliohypogastric nerve* pierces the internal oblique immediately above and in front of the anterior superior iliac spine, runs deep to the external oblique, just superior to the inguinal canal, and ends by supplying the suprapubic skin. The *ilio-inguinal nerve*

closely follows the iliohypogastric nerve on the quadratus lumborum, but then passes below it to run at the level of the iliac crest. It pierces the lateral abdominal wall and runs medially at the level of the inguinal ligament where it supplies motor branches to both transversus abdominis and sensory branches through the external inguinal ring to the skin over the pubic symphysis and the lateral aspect of the labia majora or scrotum (*Chummys, 2011*).

2-The femoral nerve (L2-4):

The femoral nerve is the largest nerve of the lumbar plexus and it supplies the muscles and the skin of the anterior compartment of the thigh (fig. 2). The nerve emerges from the lateral margin of the psoas major muscle, passes downwards in the groove between the psoas and the iliacus muscles (to both of which it sends a nerve supply), then enters the thigh beneath the inguinal ligament. At the base of the femoral triangle, the nerve lies on the iliacus muscle, a finger breadth lateral to the psoas muscle. Almost at once within the triangle the nerve breaks up into its terminal branches which stem from an anterior and posterior division (table2) (*Ellis et al., 2004*).