REGIONAL ANESTHESIA OF LOWER LIMB SURGERY BY NERVE BLOCK

Essay

Submitted for Partial Fulfillment Of Master Degree in Anesthesiology

By

Osama Mohamed Taha El-Khateeb
M.B., B.Ch.
Faculty of Medicine,
Ain Shams University

Under Supervision Of

Prof. Dr. Mostafa Kamel Fouad
Professor of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Dr. Heba Bahaa El Din El Serwi
Assistant Professor of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Dr. Hend Youssef Mohammed
Lecturer of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
2012

التخدير الموضعى لجراحات الطرف السفلى عن طريق سد الأعصاب

رسالة

توطئة للحصول على درجة الماجستير
في التخدير

مقدمة من

الطبيب/ أسامه محمد طه الخطيب
بكالوريوس الطب والجراحة
جامعة عين شمس

تحت إشراف

الأستاذ الدكتور /مصطفى كامل فؤاد
أستاذ التخدير والرعاية المركزة وعلاج الألم
كلية الطب - جامعة عين شمس

الدكتورة/ هبة بهاء الدين السروي
أستاذ مساعد التخدير والرعاية المركزة وعلاج الألم
كلية الطب - جامعة عين شمس

الدكتورة/ هند يوسف محمد
مدرس التخدير والرعاية المركزة وعلاج الألم
كلية الطب - جامعة عين شمس

كليــة الطــب
جامعة عين شمس
٢٠١٢

SUMMARY

The ideal in the practice of regional anaesthesia is the ability to deliver to the target nerve exactly the right dose of local anaesthetic without incurring any risk of damage to the nerve or its related structures. Currently, this aim is achieved by using needles and catheters, guided mostly by knowledge of anatomy supplemented by electrical nerve stimulation or the elicitation of paraesthesia. Knowledge of anatomy takes the needle to the general area of the nerve and helps avoid other structures. The specific nerve location technique allows a close approach, hopefully without the risk of nerve damage. Unfortunately, this is essentially a blind process, but modern imaging techniques might be used to overcome this.

So, technical aids like radiography, thermography, and photoplethysmography were tried to visualize the target nerve. The limitation of all these techniques has always been the unsatisfactory success rate as well as the specific involved risks. The introduction of the peripheral nerve stimulator into clinical practice was a major advance. Unfortunately, even with this tool, the performance is still far from perfect.

Ultrasonography seems to be most suitable for regional anesthesia. Perhaps the most significant advantage of ultrasound technology is the ability to provide anatomic examination of the area of interest in real-time. Ultrasound imaging allows one to

List of Contents

List of Tables

List of Figures

List of Figures (Cont…)

INTRODUCTION

Regional anesthesia by nerve block means the interruption of impulse conduction in the nerves using specific, reversibly acting drugs (local anesthetics) ***(Jankovic, 2004).***

Peripheral nerve blockade can be an excellent alternative to general anesthesia for many surgical procedures especially in critically patient; also it provides prolonged postoperative analgesia. Patient safety, satisfaction, and quicker initial recovery are among the benefits of regional anesthesia ***(Hurford et al., 2007).***

In performing lower extremity blocks, some familiarity with the lower extremity neuroanatomy is vital. The lumber 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 ***(Roy, 2006).***

Complications of regional anesthesia are relatively minor, easily managed but can occur such as bruising, hematoma, local anesthetic toxicity, peripheral nerve damage ***(Staurt and Dara, 2005).***

AIM OF THE WORK

The aim of this essay is to increase the awareness of the anesthesiologists for the benefits of peripheral nerve block techniques of lower limb and how these techniques are used in postoperative analgesia in different surgeries.

ANATOMY

In performing lower extremity blocks, some familiarity with the lower extremity neuroanatomy is vital. 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 ***(Roy, 2006).***

The lumbar plexus:

The **lumbar plexus** is a nervous plexus in the lumbar region of the body which forms part of the lumbosacral plexus. It is formed by the ventral rami of the first four lumbar nerves (L1, 2, 3, 4) and from contributions of the subcostal nerve (T12), which is the last thoracic nerve. Additionally, the ventral rami of the fourth lumbar nerve pass communicating branches through the lumbosacral trunk to the sacral plexus. The nerves of the lumbar plexus pass in front of the hip joint and mainly supply the anterior part of the thigh ***(Andreas, 2011).***

The plexus is formed lateral to the intervertebral foramina and pass through psoas major muscle. Its smaller motor branches are distributed directly to psoas major, while the larger branches leave the muscle at various sites to run obliquely downward through the pelvic area to leave the pelvis under the inguinal ligament, with the exception of the obturator nerve which exits the pelvis through the obturator foramen ***(Keith, 2009).***

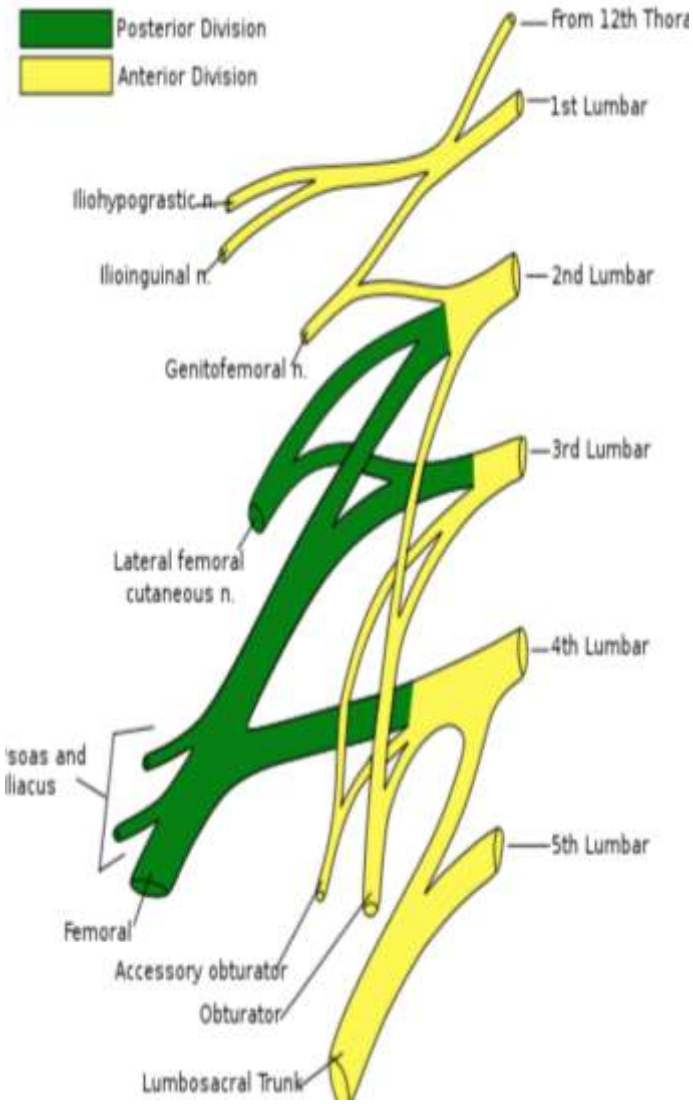

Figure (1): Plan of lumbar plexus.

(Ellis, 2006).

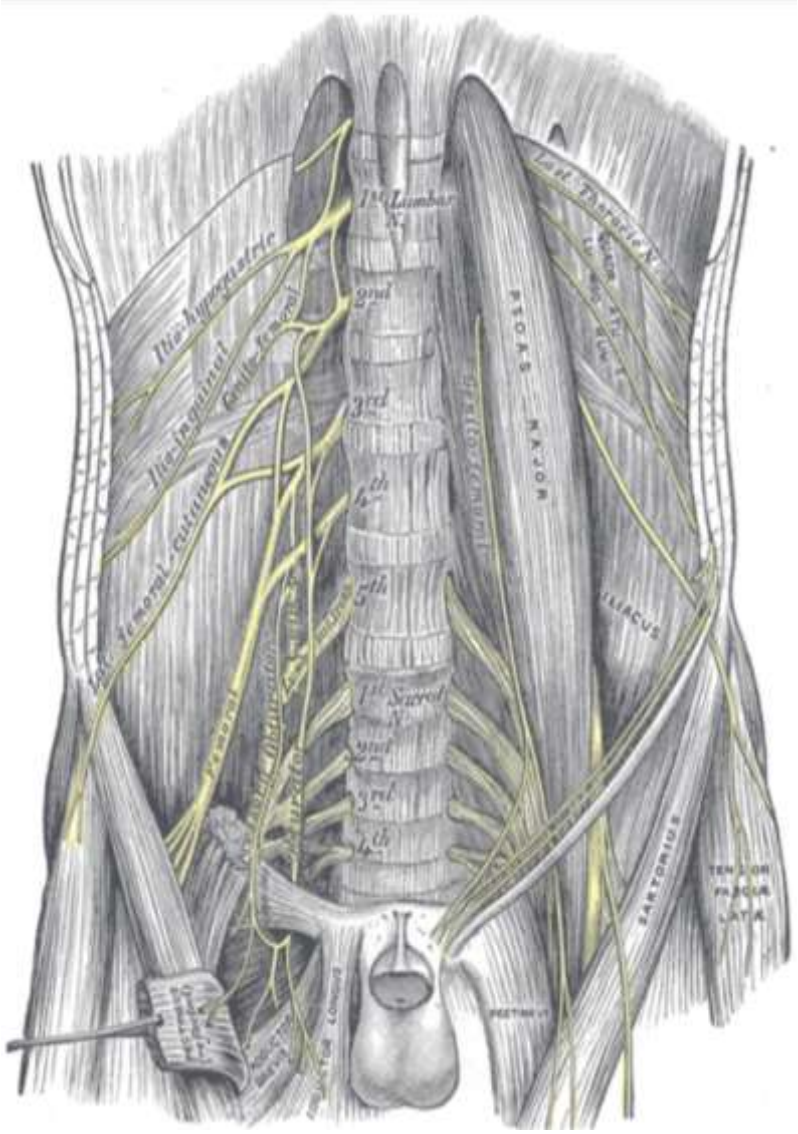

Figure (2): Lumbar plexus and its branches.

(Thieme, 2006).

Table (1): Branches of the lumbar plexus.

(Philip, 2009).

Nerves of the lumbar plexus			
Nerve	**Segment**	**Innervated muscles**	**Cutaneous branches**
Iliohypogastric	T12,L1	• Transversus abdominis • Abdominal internal oblique	• Anterior cutaneous ramus • Lateral cutaneous ramus
Ilioinguinal	L1		• Anterior scrotal nerves in males • Anterior labial nerves in females
Genitofemoral	L1, L2	• Cremaster in males	• Femoral ramus • Genital ramus
Lateral femoral cutaneous	L2, L3		• Lateral femoral cutaneous
Obturator	L2,L3,L4	• Obturator externus • Adductor longus • Adductor brevis • Gracilis • Pectineus • Adductor magnus	• Cutaneous ramus
Femoral	L2,L3,L4	• Iliopsoas • Pectineus • Sartorius • Quadriceps femoris	• Anterior cutaneous branches • Saphenous
Short, direct muscular branches	T12,L1, L2,L3, L4	• Psoas major • Quadratus lumborum • Iliacus • Lumbar intertransverse	

Iliohypogastric nerve:

Runs anterior to the psoas major on its proximal lateral border to run laterally and obliquely on the anterior side of quadratus lumborum. Lateral to this muscle, it pierces the transversus abdominis to run above the iliac crest between that muscle and abdominal internal oblique. It gives off several motor branches to these muscles and a sensory branch to the skin of the lateral hip. Its terminal branch then runs parallel to the inguinal ligament to exit the aponeurosis of the abdominal external oblique above the external inguinal ring where it supplies the skin above the inguinal ligament (i.e. the hypogastric region) with the anterior cutaneous branch ***(Richard, 2007).***

Ilioinguinal nerve:

Closely follows the ilihypogastric 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).***

Genitofemoral nerve:

The **genitofemoral** nerve originates from the upper part of the lumbar plexus of spinal nerves. Its roots are L1 and L2 (lumbar).

The genitofemoral nerve is responsible for both the efferent and afferent limbs of the cremasteric reflex. The ilioinguinal nerve (L1) is also involved in the afferent limb of the reflex.

It emerges on the anterior surface of the psoas major muscle and divides into two branches:

- The femoral branch, or lumboinguinal nerve, supplies skin anterior to the upper part of the femoral triangle.
- The genital branch, in males, it travels through the inguinal canal, along with the spermatic cord, and supplies the cremaster muscle and the scrotal skin, in females, it ends in the skin of the Mons pubis and labia majora.

(Zachary et al., 2011).

Lateral cutaneous femoral nerve:

The **lateral cutaneous nerve of the thigh** (also called the **lateral femoral cutaneous nerve**) is a cutaneous nerve that innervates the skin on the lateral part of the thigh.

Structure

The lateral cutaneous nerve of the thigh is a nerve of the lumbar plexus. It arises from the dorsal divisions of the second and third lumbar nerves. It emerges from the lateral border of the psoas major at about its middle, and crosses the iliacus muscle obliquely, toward the anterior superior iliac spine. It then passes under the inguinal ligament and over the sartorius muscle into the thigh, where it divides into an anterior and a posterior branch.