Comparative Study Between Ultrasound Guided Femoral Nerve Block Versus Ultrasound Guided Saphenous Nerve Block After Total Knee Replacement

Thesis

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Ahmed Saoudy Abdelghafour Mohamed

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List of Abbreviations

Abb.	Full term
ACB	Adductor canal block
AMM	Adductor magnus muscles
ASA	American Society of Anesthesiologists
BMI	Body Mass Index
CPNB	Continuous peripheral nerve block
FA	Femoral artery
FNB	Femoral nerve block
FV	Femoral vein
GM	Gacilis muscle
LIA	Local infiltration analgesia
LOS	Length of stay
MRN	Medial retinacular nerve
PCA	Patient controlled analgesia
ROM	Range of motion
SaN	Saphenous nerve
SM	Sartorius muscle
TKR	Total knee replacement
TUG test	Timed UP-and- GO test
US	Ultrasound
VAS	Visual analogue scale
VM	Vastus medialis muscle

INTRODUCTION

Total knee replacement (TKR) is a very common orthopedic procedure in our daily practice. It provides a definitive treatment for patients with degenerative disease of the knee joint (Osteoarthritis) and can relieve joint pain, improve mobilization, and improve quality of life. This procedure is associated with severe agonizing early postoperative pain which results in immobilization and immobility related complications, thus an effective analgesia is mandatory. Patients are usually elderly with multiple comorbidities and it is important to choose an analgesic regimen that will minimize side effects as well as providing suitable postoperative pain relief ***(Fischer et al., 2008).***

Variety of regional nerve blocks provide an effective postoperative analgesia after total knee replacement such as lumbar plexus block, femoral nerve block FNB and adductor canal block ACB (Saphenous nerve block) ***(Jenstrup et al., 2012).***

However, femoral nerve block reduces quadriceps muscle power by about 80% which leads to delayed mobilization. This adverse effects of FNB is unaccepted especially following this type of surgery after which an early mobilization is very important for early functional recovery of

the joint and to reduce immobility related complications ***(Charous et al., 2011).***

Adductor canal (Hunter's canal) contains a group of nerves and nerve branches including the saphenous nerve, the nerve to vastus medialis, posterior branch of the obturator nerve and medial cutaneous nerve (in the some cases). All these nerves are pure sensory nerves (except the nerve to vastus medialis) and play a major role in sensory supply of the knee region. Adductor canal block (Saphenous nerve block) will provide an effective postoperative analgesia after TKR and less motor impairment ***(Lund et al., 2011).***

In this study, saphenous nerve block is compared to femoral nerve block as regard postoperative analgesia and ambulation ability following total knee replacement. Postoperative analgesia will be assessed by visual analogue scale VAS and opioid consumption. Postoperative ambulation ability will be assessed by Timed UP-and- GO test 'TUG test' and 10 minutes walking test. Nausea, vomiting and Sedation will be assessed. Sedation will be assessed using Ramsay sedation score.

Visual analogue scale VAS is 10 cm scale in which scale 0=No pain, 10=intense severe agonizing pain. Timed UP-and-GO TUG test is a validated test that measure the seconds consumed from the time to stand up from a chair and walk 3 meters distance and then turn back and go to the chair. The 10

minutes walking test measures the distance the patient will walk for 10 minutes ***(Jenstrup et al., 2012).***

AIM OF THE WORK

This study aimed at shedding lights on the value of preserving the motor function in the immediate postoperative period after total knee replacement. That was illustrated by comparing femoral nerve block (mixed motor and sensory nerve) versus saphenous nerve block (pure sensory nerve) in the adductor canal, and the effect of either blocks on the analgesia and ambulation of the patients postoperatively.

Chapter 1

ANATOMY

Anatomy of the Femoral Nerve

The femoral nerve is one of the major peripheral nerves of the lower limb and is the largest branch of the lumbar plexus . Its root value is L2-L4.

- **Motor functions**: Innervates the anterior thigh muscles that flex the hip joint (pectineus, iliacus, sartorius) and extend the knee (quadriceps femoris: rectus femoris, vastus lateralis, vastus medialis and vastus intermedius).
- **Sensory functions**: Supplies cutaneous branches to the anteromedial thigh (anterior cutaneous branches of the femoral nerve) and the medial side of the leg and foot through saphenous nerve **(www.teachmeanatomy.info).**

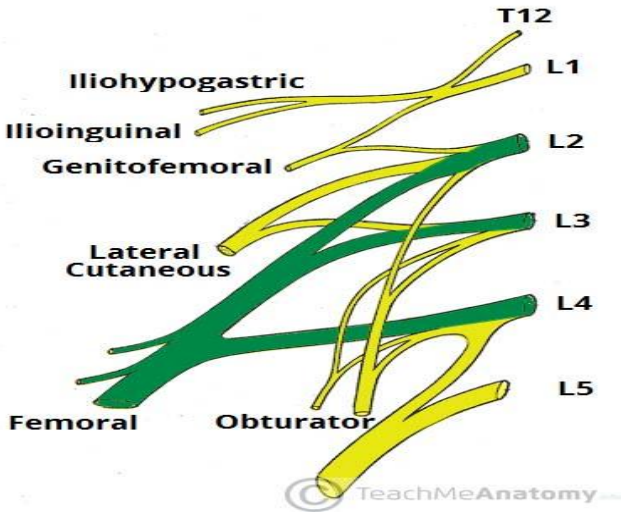

Figure (1): Lumbar plexus and its branches **(www.teachmeanatomy.info).**

Anatomical Course

After arising from the lumbar plexus, the femoral nerve travels inferiorly through the *psoas major muscle* of the posterior abdominal wall. It supplies branches to the iliacus and pectineus muscles prior to entering the thigh. The femoral nerve then passes underneath the inguinal ligament to enter the femoral triangle. Within this triangle, the nerve is located lateral to the femoral vessels (unlike the nerve, the femoral artery and vein are enclosed within the femoral sheath). Approximately 4cm below the inguinal ligament, the femoral nerve divides into *anterior and posterior divisions* **(www.teachmeanatomy.info).**

- **Branches of the anterior division**
  1- Anterior cutaneous branches
  2- Branch to Sartorius
  3- Branch to pectineus
- **Branches of the posterior division**
  1- Saphenous nerve
  2- Branches to quadriceps femoris

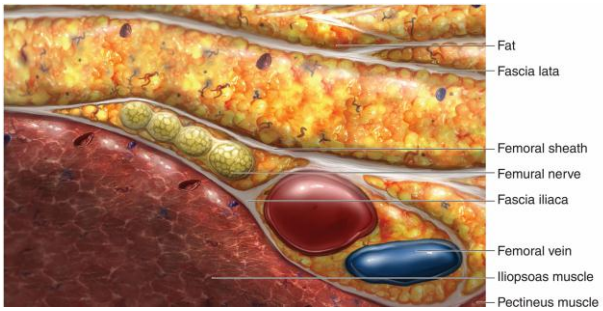

Figure (2): Femoral nerve at the inguinal region **(www.nysora.com).**

The terminal cutaneous branch of the femoral nerve is the *saphenous nerve*. It travels through the adductor canal (accompanied by the femoral artery and vein) and exits prior to the adductor hiatus. The saphenous nerve innervates the medial aspect of the leg and the foot **(www.teachmeanatomy.info).**

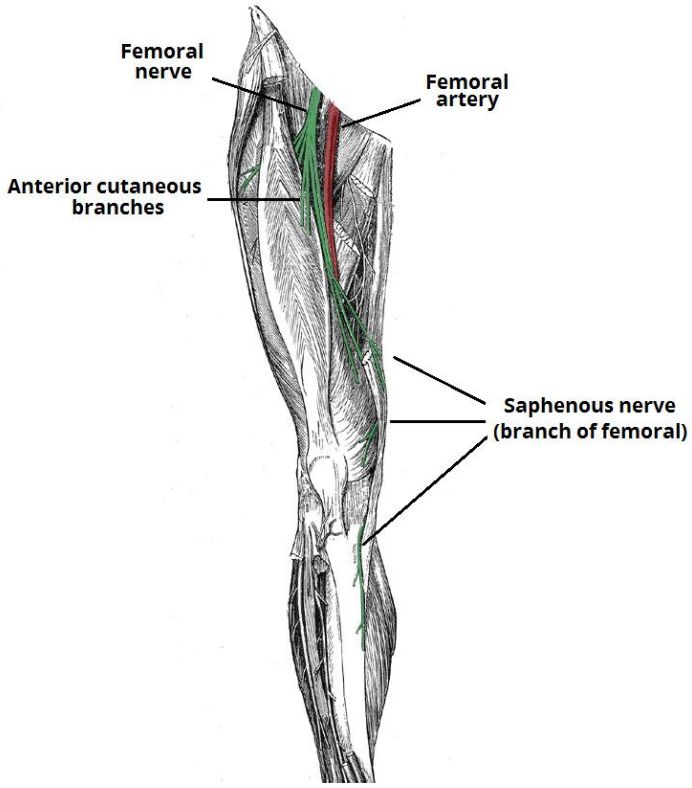

Figure (3): Femoral nerve course in the thigh **(www.teachmeanatomy.info).**