A Comparative Study Between Ultrasound vs Nerve Stimulator for Femoral (3 in 1) and Sciatic Nerve Blocks for Major Knee Surgeries

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بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

وقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ ورَسُولُهُ والْمُؤْمِنُونَ

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List of Abbreviations

Abb.	Stands for
%	Percent
γ	Gamma
δ	Delta
κ	Kappa
<	Less than
>	More than
°	Degree
µ	Mue/Micron
µg	Microgram
ASA	American Society of Anesthesiologists
BA	Bronchial Asthma
BMI	Body mass index
Bpm	Beats per minute
Br	British
CAD	Coronary artery disease
Cm	Centimeter
CNS	Central Nervous System
CVS	Cardiovascular system
dB	Decibels
DM	Diabetes mellitus
DRG	Dorsal Root Ganglion
ECG	Electrocardiogram
Eds	Editors
et al.	And colleagues
FPS-R	Faces Pain Scale-Revised

Abb.	Stands for
Fig	Figure
GABA	Gamma Amino Butyric Acid
HR	Heart Rate
Hrs	hours
HTN	Hypertension
Hz	Hertz
IV	Intravenous
J.	Journal
Kg	Kilogram
L_{1-5}	Lumbar spinal roots
LA	Local Anesthetics
LC	locus coeruleus
mA	milliamperes
MAP	Mean Arterial Blood Pressure
Mg	milligram
Ml	milliliter
Mm	millimeter
mmHg	Millimeters of Mercury
NS	Nerve stimulator
NMDA	N-Methyl-D-Aspartate
NRM	Nucleus raphe magnus
NRS	Numerical rating scale
PABA	Para-Aminobenzoic Acid
PAG	Peri-Aqueductal Gray
PNBs	Peripheral Nerve Blocks
PSIS	Posterior superior iliac spine
OR	Operating room

Abb.	Stands for
RA	Rheumatoid Arthritis
RHD	Rheumatic Heart Diseases
S	Stereoisomer
US	Ultrasound
VAS	Visual Analogue Scale
VGSC	Voltage gated sodium channel
Vs.	Versus
WDR	Wide dynamic range
A	Alpha
B	Beta

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Introduction

In the past decade, there has been an increased interest in performing lower extremity peripheral nerve blocks (PNBs) because of the potential complications associated with centroneuraxial blockade, i.e. increased risk of epidural hematoma with new anti-thromboembolic prophylaxis regimens, and transient neurologic symptoms associated with spinal anesthesia. Additionally, evidence that improved rehabilitation outcome may be associated with continuous lower extremity PNBs has stimulated even more interest ***(Deschner et al., 2009).***

The advances in regional techniques for blocks of the lower limb have been driven primarily by the need to produce effective and prolonged analgesia in the postoperative period. Increasingly, modern practice demands a shorter hospital stay, improved patient expectations and early mobilization ***(Murray et al., 2010).***

The first demonstration of nerve stimulation (NS) was performed as early as 1780 by Luigi Galvani on a frog. Galvani touched the nerves of the frog's spinal cord with metal electrodes which caused contractions of the leg muscles. Perthes in 1912 and Pearson in 1955 demonstrated that nerves could be identified by electrostimulation, but it was the work of Greenblatt et al. in 1962 that introduced the nerve stimulator (NS) into clinical practice ***(Gleed and Ludders, 2008)***.

The key requirement for successful regional anesthetic blocks is to ensure optimal distribution of local anesthetic (LA) around nerve structures. This goal is most effectively achieved under sonographic visualization. Over the past decade, the Vienna study group has demonstrated that ultrasound guidance (US) can significantly improve the quality of nerve blocks in almost all types of regional anesthesia. In addition, complications such as intraneuronal and intravascular injection (IVI) can be avoided ***(Marhofer et al., 2005).***

Vision is the best of the primary human senses. US allows the anesthesiologist to evaluate complex and varied neural anatomy prior to needle insertion. In addition to providing real time guidance to the needle towards a nerve or a plexus. US allows anesthesiologist to witness the spread of local anesthetic after initiation of injection. Ultimately, it is the visual confirmation of the perineural spread of the local anesthetic that generates a rapid and successful block ***(Sites et al., 2007).***

US technology will continue to evolve, providing further improvements in portability, image processing, and display. Similar to the computer and telephone industry, US equipment will likely become smaller, highly mobile, potentially cordless, and available for use at the point of care anywhere at anytime. Enhanced imaging capability of compact machines may one day

rival those of the large cart-based machines, and lower prices and user-friendly simplicity will improve accessibility. If US is to become an integral part of regional anesthesia, future guidelines and teaching curricula must be established for proper training ***(Bodenham, 2006).***

Aim of The Work

The aim of the study is to compare ultrasound guided femoral (3 in 1) and sciatic nerve blocks with nerve stimulator regarding safety, efficacy, and rate of success & failure.