COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES

Dissertation submitted in partial fulfillment of

M.D. DEGREE EXAMINATION

M.D. ANAESTHESIOLOGY, BRANCH-X

CHENGALPATTU MEDICAL COLLEGE AND HOSPITAL

CHENGALPATTU

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

APRIL 2017

CERTIFICATE BY THE HEAD OF THE INSTITUTION

This is to certify that the dissertation titled **"COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES"** submitted by **Dr.M.S.LAKSHMI SREE, D.A** in partial fulfillment for the award of the M.D degree in anaesthesiology in the april 2017 examination by the Tamilnadu Dr.M.G.R , Medical University,Chennai, is bonafide record of the work done by her in the CHENGALPATTU MEDICAL COLLEGE, CHENGALPATTU, during the academic year 2015-2017.

PLACE: Chengalpattu

DATE :

Prof. Dr. N. GUNASEKARAN, M.D., DTCD.

DEAN,

Chengalpattu medical college &hospital ,

Chengalpattu.

CERTIFICATE BY THE HEAD OF THE DEPARTMENT

This is to certify that this dissertation titled **"COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES"** has been prepared by **Dr. M.S.LAKSHMI SREE**,**D.A**. under my supervision in the department of Anaesthesiology, Chengalpattu Medical College and Hospital, Chengalpattu during the academic period 2015- 2017 and is being submitted to the Tamil Nadu D.R. M.G.R. Medical University , Chennai in partial fulfillment of the University regulation for the award of MD degree in Anaesthesiology and her dissertation is a bonafide work.

PLACE: Chengalpattu

DATE:

Prof .Dr. J. REVATHY, M.D.,DA

Head of the department ,

Department of Anaesthesiology ,

Chengalpattu Medical College

Chengalpattu

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation titled **"COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES"** submitted by **Dr.M.S.LAKSHMI SREE , D.A** in partial fulfillment for the award of M.D degree in Anaesthesiology by the Tamilnadu Dr.M.G.R , Medical University,Chennai is bonafide record of the work done by her in the CHENGALPATTU MEDICAL COLLEGE, CHENGALPATTU, during the academic year 2015-2017 under my guidance .

PLACE : Chengalpattu

DATE :

Dr. N. BASKER, M.D.,D.A.,

Professor ,

Department of Anaesthesiology,

Chengalpattu Medical College,

Chengalpattu

DECLARATION BY THE CANDIDATE

I **Dr. M.S. LAKSHMI SREE** solemnly declare that the dissertation titled **"COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES"** is a bonafide work done by me in the Department of Anaesthesiology , Chengalpattu Medical College& hospital , Chengalpattu , under the able guidance of **Prof. DR. J . REVATHY, M.D, D.A,** Professor and HOD, Department of Anaesthesiology , Chengalpattu Medical College, Chengalpattu, after getting approval from ethical committee.

DR.M.S.LAKSHMISREE M.B.B.S.D.A

ACKNOWLEDGEMENT

I express my sincere thanks to **Dr. N. GUNASEKARAN M.D** Dean, Chengalpattu Medical College, for his permission to carry this study.

I am immensely grateful to **DR. J. REVATHY M.D . DA** Professor and Head of the Department, Department ofAnaesthesiology, Chengalpattu Medical College for her immence help ,encouragement and constant supervision in conducting this study. I am extremely grateful and would like to express my sincere thanks to:

Dr.BALASUBRAMIAM, M.D.D.A., Associate Professor of Anaesthesiology for his valuable guidance during every phase of this study**.**

Dr.L. RAGHAVAN M.D.D.A., Associate Professor of Anaesthesiology for his valuable suggestions , guidance and great attention.

Dr. DR.N.BASKER, MD Associate Professor of Anaesthesiology , for his constant motivation , advice and constant help throughout my period of study.

I am extremely grateful to my Senior Assistant Professor :

Dr.K.R.PADMANABHAN M.D., D.A, who has been a pillar of strength ,support and inspiration to me and for creating a sense of confidence in me. I am also , thankful to the Institutional Ethical Committee for their guidance and approval for this study.

I would like to thank the Assistant Professors and residents of the Department of Anaesthesiology , Chengalpattu Medical College for their help and support .They have been a source of encouragement throughout my postgraduate course.

Also, my sincere acknowledgement to the department of orthopaedics, Chengalpattu Medical College for their unwavering support for this study.

I am grateful to my family for their moral support and encouragement. I am thankful to all my colleagues and friends for their help and advice in carrying out this dissertation.

And I can never forget , the theatre personel for their willing co operation and assistance.

I thank all the patients for willingly submitting themselves for this study.

INSTITUTIONAL ETHICAL COMMITTEE

CHENGALPATTU MEDICAL COLLEGE, CHENGALPATTU

Title of Work	:	Combined PSOAS Compartment block and sciatic Nerve block for elective lower limb surgeries
Principal Investigator	:	Dr.M.S.Lakshmi Sree
Designation	:	1st Year Post Graduate in Anaesthesia
Co-Investigators	:	Dr.N.Basker,MD,. Associate Professor Department of Anaesthesiology
Department	:	Anaesthesiology

The request for an approval From the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 07.01.2016 at the Medical Education Unit, Government Chengalpattu Medical College, Chengalpattu at 11.00 PM.

The Members of the committee, the Secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal Investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of any changes in study procedure, site, investigator investigation or guide or any other changes.
2. You should not deviate from the area of work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reactions.
4. You should abide to the rules and regulations of the institution(s).
5. You should complete the work within the specific period and if any extension is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on complete of work.

MEMBER SECRETARY,
IEC, CHENGALPATTU MEDICAL COLLEGE
CHENGALPATTU.

DEAN
CHENGALPATTU MEDICAL COLLEGE
CHENGALPATTU.

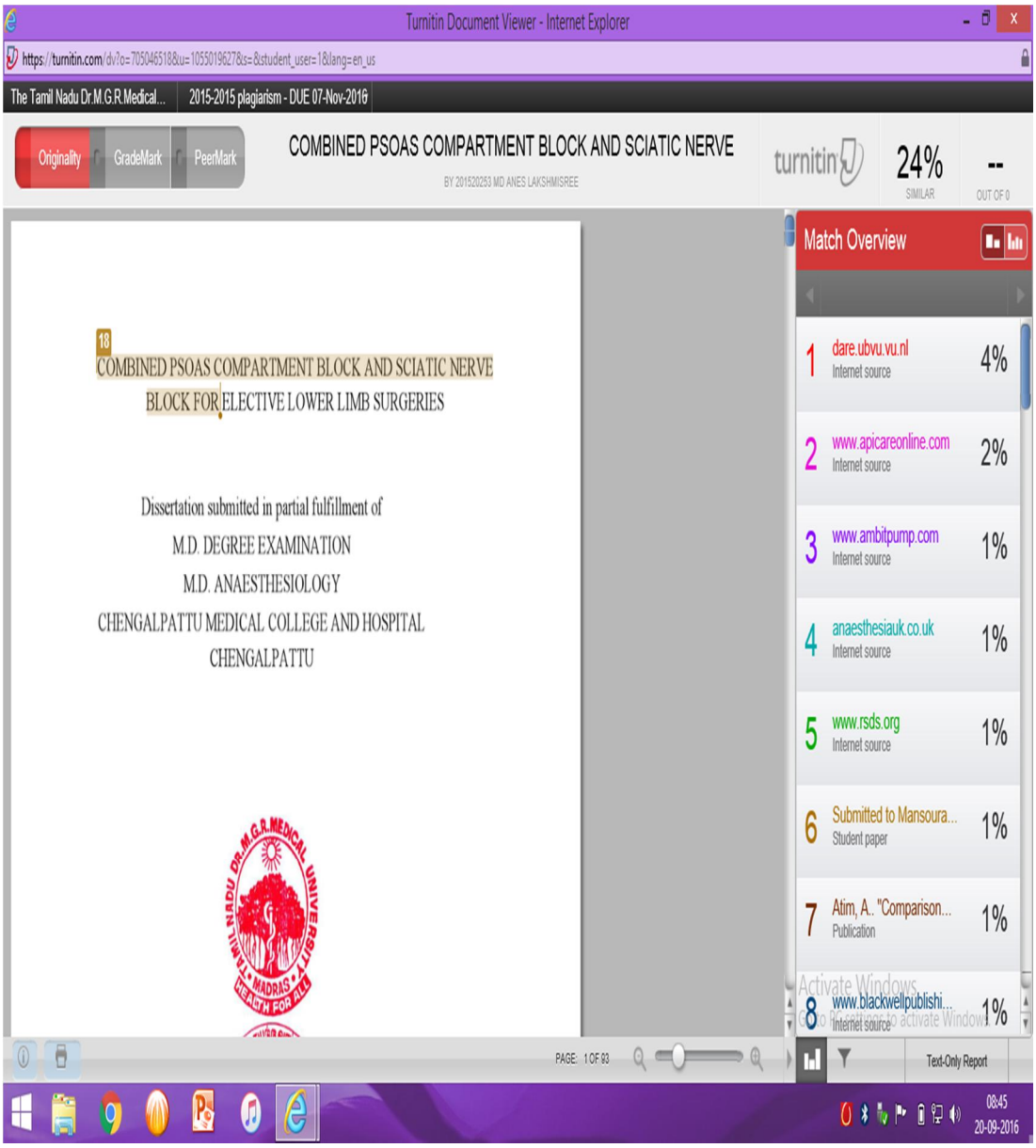

Turnitin Document Viewer - Internet Explorer
https://turnitin.com/dv?o=705046518&u=1055019627&s=&student_user=1&lang=en_us
The Tamil Nadu Dr.M.G.R.Medical...
2015-2015 plagiarism - DUE 07-Nov-2016
Originality
GradeMark
PeerMark
COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE
BY 201520253 MD ANES LAKSHMISREE
turnitin
24%
SIMILAR
--
OUT OF 0
18
COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES
Dissertation submitted in partial fulfillment of
M.D. DEGREE EXAMINATION
M.D. ANAESTHESIOLOGY
CHENGALPATTU MEDICAL COLLEGE AND HOSPITAL
CHENGALPATTU
Match Overview
1 dare.ubvu.vu.nl Internet source 4%
2 www.apicareonline.com Internet source 2%
3 www.ambitpump.com Internet source 1%
4 anaesthesiauk.co.uk Internet source 1%
5 www.rsds.org Internet source 1%
6 Submitted to Mansoura... Student paper 1%
7 Atim, A.. "Comparison... Publication 1%
8 www.blackwellpublishi... Internet source 1%
PAGE: 1 OF 93
Text-Only Report
08:45
20-09-2016

TABLE OF CONTENTS

INTRODUCTION

Lower extremity surgeries such as knee arthroscopy and open reduction and internal fixation requires procedures such as general anaesthesia or regional techniques such as epidural anaesthesia or spinal anaesthesia. These procedures produce significant postoperative pain. Opiods are administered in higher doses to manage this postpoerative pain. The psoas block along with sciatic nerve block is an alternative procedure with much less side effects when compared to that of general anaesthesia or spinal or epidural anaesthesia. With both psoas block and sciatic nerve block, lower limb anaesthesia may be achieved without major side effects.

AIM AND OBJECTIVE OF THE STUDY

This study was aimed at evaluation of the motor and sensory blockade and post operative analgesia using both psoas compartment block and sciatic nerve block in elective lower extremity surgeries .

PRIMARY OBJECTIVE

To assess the effectiveness of the lower limb block based on

1) Sensory block

2) Motor block

3) Post operative analgesia

SECONDARY OBJECTIVE

To assess the onset of block, total duration of block , and the time taken for the first dose of rescue analgesia and to look for complications if any

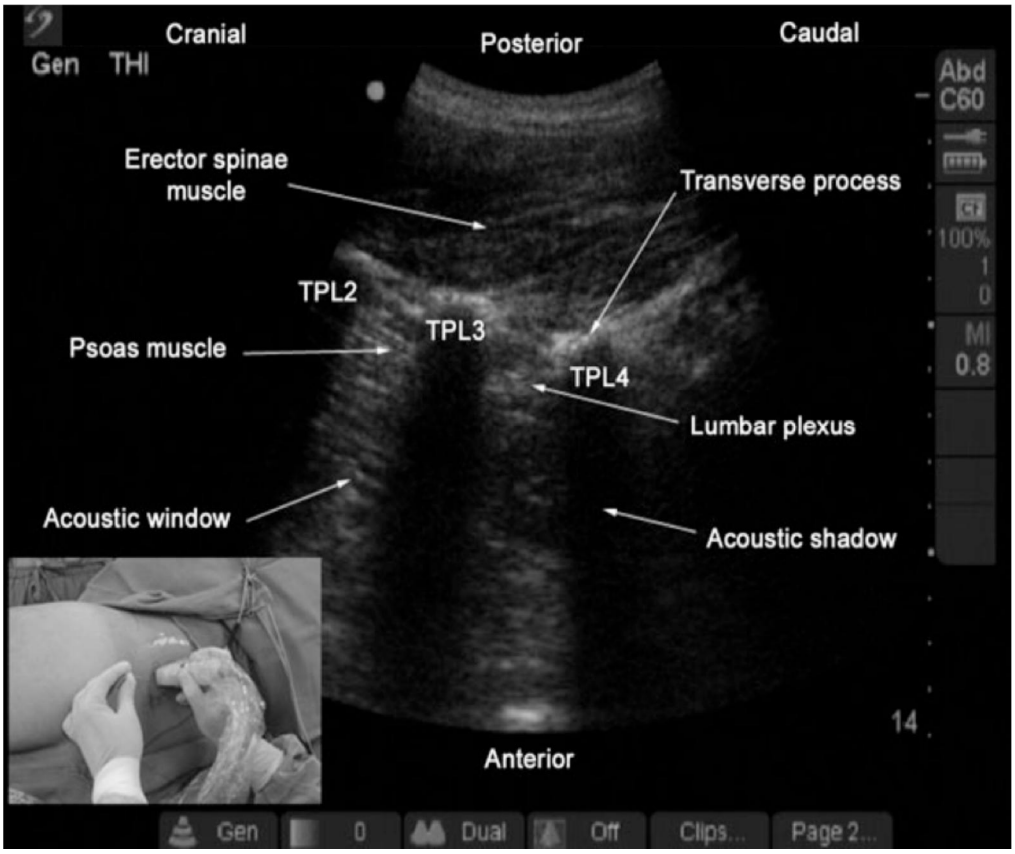
REVIEW OF LITERATURE

In 1884, it was Carl Koller, an ophthalmologist, who first introduced regional anesthesia. He used topical application of cocaine to the cornea for a glaucoma operation[1] .Few years after that, the German anaesthetist August Bier became first to introduce the central neuraxial block, the spinal anesthesia [2]. Several years after that lower limb peripheral nerve block was described . In the study named The Inguinal Paravascular Technic of Lumbar Plexus Anesthesia , Winnie described an anterior approach for blocking lumbar plexus [3]. The needle insertion point was just lateral to the femoral artery and 1 cm below inguinal ligament. Paraesthesia was elicited, and 30 ml of local anesthetic was injected. Pressure below the needle insertion point was used for cephalad movement of the local anesthetic to block the three main nerves femoral nerve, obturator nerve and lateral femoral cutaneous nerve. In another study, the author described about posterior lumbar paravertebral approach and presented this technique in a separate report one year later [4]. Chayen et al. in 1976 described a posterior approach of the lumbar plexus block named the Psoas Compartment Block[5]. The psoas compartment is formed by the psoas major muscle

on the anterior side , the transverse processes on the lateral side and the quadratus lumborum muscle on the posterior side and in this space lumbar plexus is located. Further studies did not strongly support the existence of " psoas compartment " [6,7].

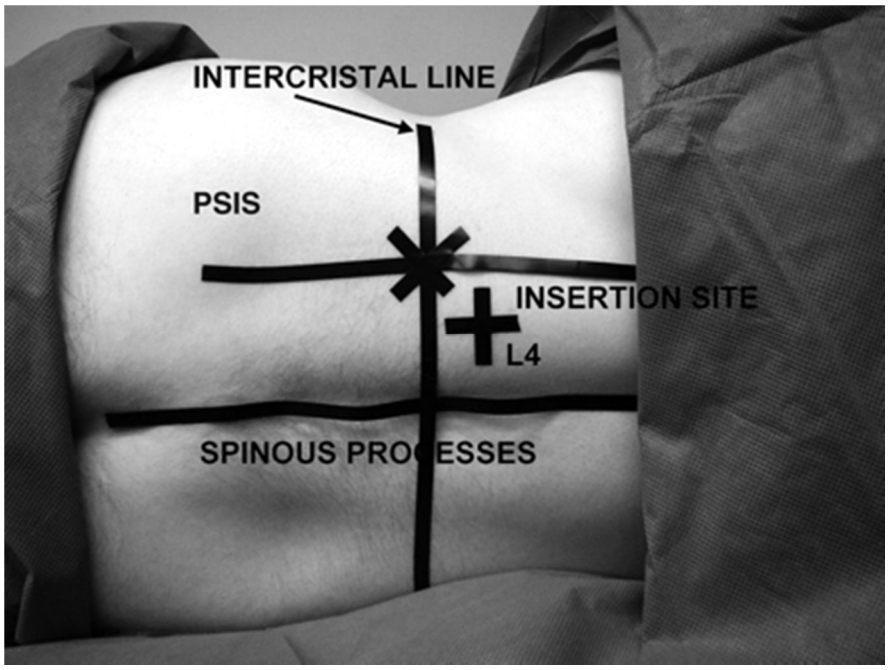
Kirchmair proved in a cadaver study that the lumbar plexus was situated within the psoas major muscle [7]. In the last 40 years , different approaches of the Posterior lumbar plexus block have been described . In 1989, Parkinson (Dekrey's approach)[8] described a L3 approach of the posterior lumbar plexus block . In 1993 [9]Hanna described L2 – L3 interspace approach of the Posterior lumbar plexus block . capdevila modified winnes approach by a more medial needle insertion point when compared to the Winnie approach [10]. In 2002 Pandin modified the Chayen approach with a more medial needle insertion point [11]. There were no significant difference in efficacy between different approaches, but side effects and complications were described in the L3 approach and the approaches with a more medial insertion point [1213,14,15] . Heller et al. showed that in a study that except for the Pandin approach, other approaches were lateral [16] · With the development of different approaches of the Posterior lumbar plexus block , different techniques to locate the lumbar plexus were also evolving. In 1974, Chayen et al. introduced a technique by using 20 ml syringe with air to

locate psoas compartment . Now, nerve stimulation using a nerve stimulator has become popular for identifying the lumbar plexus [17]. With the advent of ultrasound, localization of the lumbar plexus is very accurate.[18,19,20,21]. In his study, Karmakar mentioned lumbar plexus can be identified by ultra-sonogram of the lumbar as shown in figure



Injected local anaesthetics in the psoas compartment with ultrasound guidance produces an lumbar plexus block. Marhofer described that at L3-L5 level, the lumbar plexus, can be visualized using ultrasound . The authors found the use of nerve stimulation with ultrasound for effective lumbarplexus block .

CAPDEVILA APPROACH

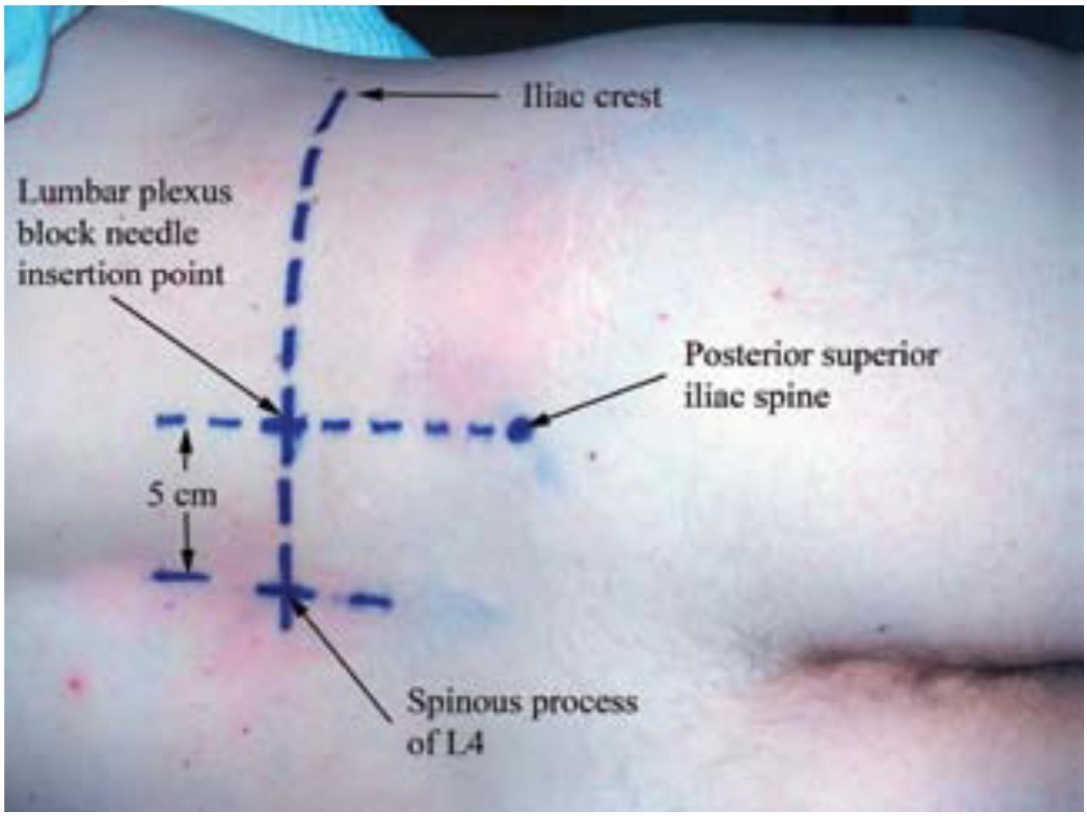


Kirchmair founded that the accuracy of a Psoas compartment block can be increased by ultasound and complications, that occur during other approaches can be prevented by this technique

It is evident that a psoas compartment block of the lumbar plexus block has significant benefit when compared to the anterior approach of lumbar plexus. The posterior approach is accurate in blocking the femoral nerve, the obturator nerve and cutaneous nerve when compared to that of anterior approach [22,23,24]. Visual analogue score was very much lower during the post operative period by using a Posterior lumbar plexus block when compared with a femoral nerve block in patients undergoing lower limb surgeries .[25] . Combination of a

Posterior lumbar plexus block and a sciatic nerve block is necessary for anaesthesia of lower extremity

WINNES APPROACH

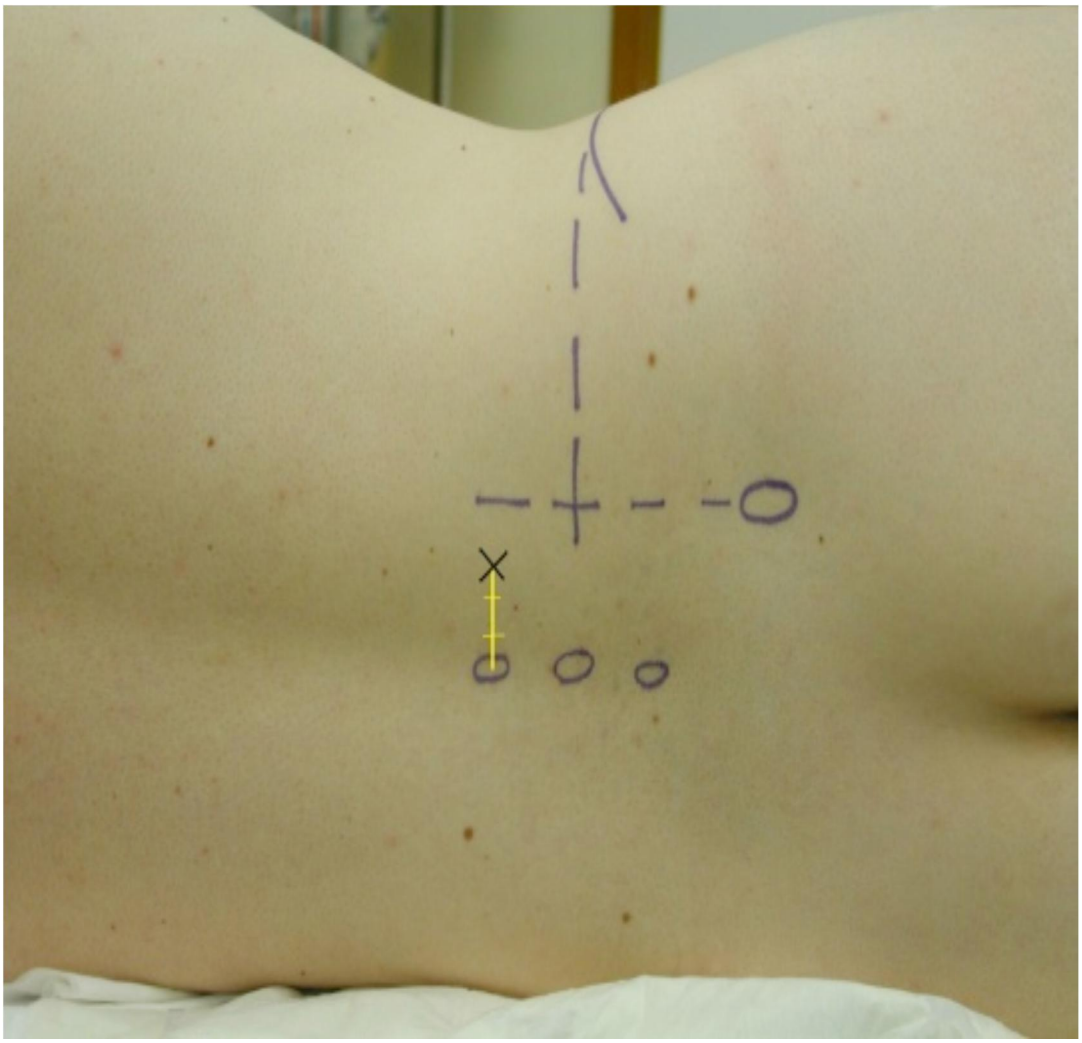


The addition of sciatic nerve block to a posterior lumbar plexus block is essential because hip joint capsule is partly supplied by the sciatic nerve [26]. A Posterior lumbar plexus block, with a sciatic nerve block, is essential for postoperative analgesia .

Studies described a reduction of pain and decreased consumption of opioids after lowerlimb surgeries due to the addition sciatic nerve

block with that of Posterior lumbar plexus block[27,28] . Turker in his study. mentioned that there is no differences in analgesic effect between a Posterior lumbar plexus block and epidural analgesia for patients undergoing lowerlimb surgeries [29]. This means that Posterior lumbar plexus block provides effective post operative analgesia for lowerlimb surgery, because side effects of epidural anaesthesia, such as meningitis , encephalitis and infection are avoided and postoperative analgesia can be obtained[30] . For lowerlimb surgery, the Posterior lumbar plexus block with sciatic nerve block is essential. De Visme mentioned decreased need for opioids for patients undergoing lower extremity surgeries done under Posterior lumbar plexus block with an additional sacral plexus block[31]

CHAYEN APPROACH



SIDE EFFECTS AND COMPLICATIONS

Like other regional procedures, a Posterior lumbar plexus block has side effects. The most common side effect is the epidural spread of the injected local anesthetics [32]. Needle insertion on medial aspect of the Posterior lumbar plexus is the cause for this side effect . Mannion mentioned that a large volume of drug is the important factor for bilateral spread, and it was not because of the approach of the Posterior lumbar plexus block . Another factor which cause epidural diffusion of local anesthetics after Psoas compartment block, is the pressure while injecting the drug. Gadsden proved that local anesthetic injection under high pressure during lumbar plexus block results in total spinal anaesthesia and is associated with higher chances of epidural anaesthesia .Other side effects of psoascompartment block being neuropathy, local anaesthetic toxicity, renal puncture and intraperitoneal injection.

VARIOUS APPROACHES FOR LUMBAR PLEXUS BLOCK

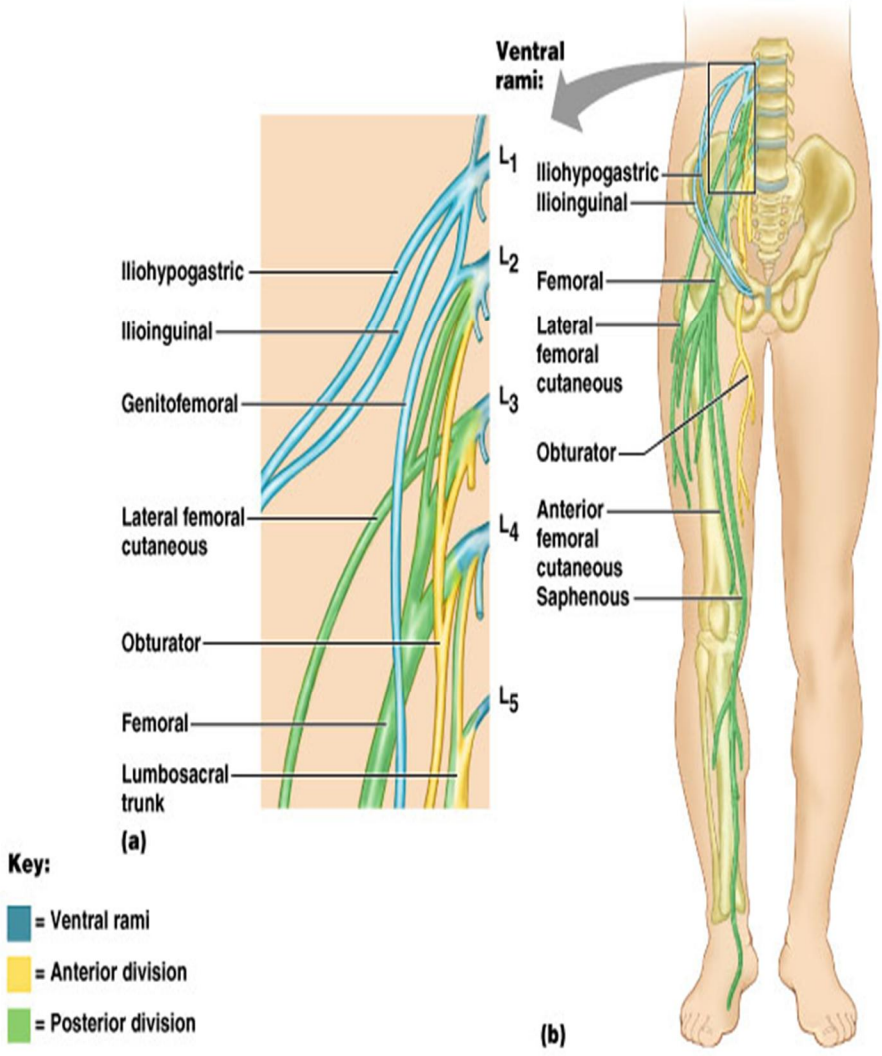
YEAR	APPROACH	LANDMARKS	REMARK
In 1974	Winnies approach	Line intersecting between posterior superior iliac spine and line connecting both iliac crest	Lateral approach
In 1989	Parkinsons approach	About 3-4 cm lateral to spinous process at the level of L3	High Risk of renal puncture
In 1993	Hannas approach	Lateral to spinous process about 3 to5 cm at the level of L2-L3	
In 2002	Capdevilas approach	Line intersecting lateral one third and medial two thirds of the line L4 and the line that passes through posterior superior iliac spine	Lateral approach
In 2002	Pandins approach	Lateral to the interspinous line about 3 cm at L4 – L5	Medial approach

ANATOMY OF LUMBAR PLEXUS

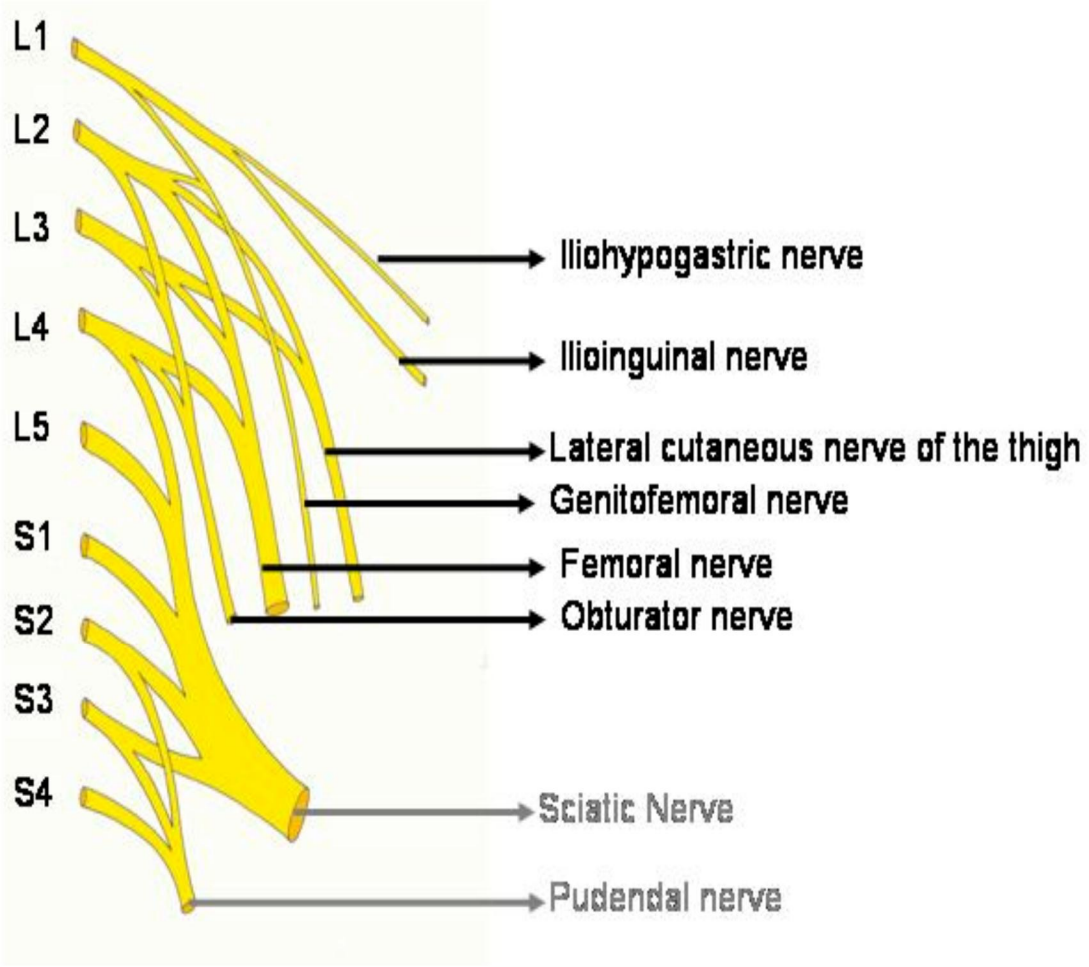
The lumbar plexus is formed within the psoas major muscle by spinal nerves L1 through L4 and fibers from T12. These nerve roots enter the psoas muscle in a confined compartment; they then divide into anterior divisions and posterior divisions,the plexus is responsible for innervation of lower limb.

The plexus is anteriorly 3cm to the plane of the transverse process of lumbar vertebra. In ultrasound guidance, it is a hyperechoic region within the hypoechoic psoas major muscle . The plexus supplies lower abdomen and anterior and the medial portion of the lower extremities. The branches include lumbar plexus are iliohypogastric nerve, ilioinguinal nerve, genitofemoral nerve, lateral femoral cutaneous nerve, femoral nerve, and obturator nerve. The block is done at the L4 level in a sagittal plane that corresponds to the lateral part of the lumbar L4 transverse process. Lumbar plexus block done at this level decreases the risk of puncturing the ipsilateral kidney.

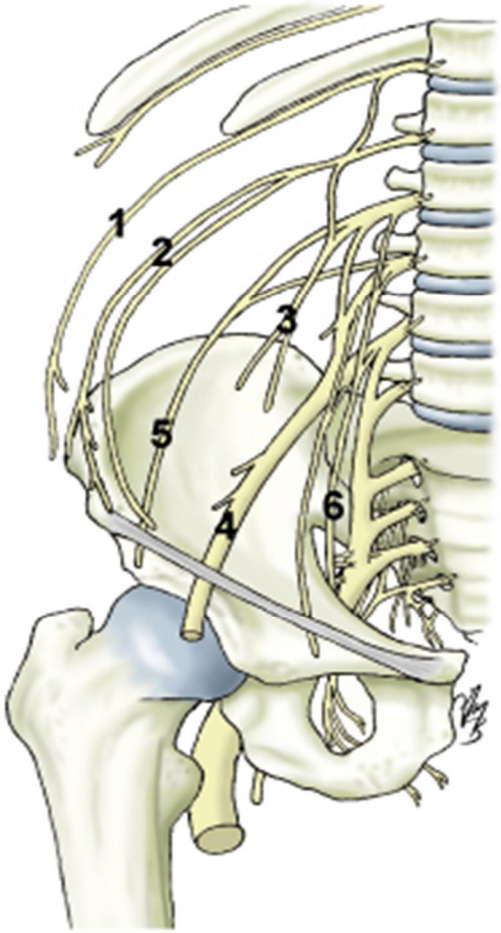
LUMBAR PLEXUS



LUMBAR PLEXUS



LUMBAR PLEXUS



The lumbar plexus gives rise to a number of branches. They are:

1. iliohypogastric nerve (IHN, L1);
2. ilioinguinal nerve (IIN, L1);
3. genitofemoral nerve (GFN, L1-2);
4. femoral nerve (FN, L2-4);
5. lateral femoral cutaneous nerve (LFCN, L3-4); and
6. obturator nerve (ON, L2-4).

Lumbar plexus (T12- L4):

- Femoral Nerve
- Obturator Nerve
- Lumbosacral Trunk
- Iliohypogastric Nerve
- Ilioinguinal Nerve
- Subcostal Nerve
- Genitofemoral Nerve
- Cutaneous Nerve Of The Thigh

Branches of this plexus stimulate muscles of the back, hip and thigh. The plexus also is responsible for sensation in the skin of the thighs, the pubic area and the external genitalia in males and females.

FEMORAL NERVE

– Cutaneous supply

Thigh, leg, foot

– Motor supply

Anterior thigh muscles (quadriceps, sartorius, iliopsoas)

OBTURATOR NERVE

– Sensory supply

Skin over knee joints hip and thigh

– Motor supply

Adductor muscles of thigh

LATERAL FEMORAL CUTANEOUS NERVE

– Sensory supply

Skin over thigh on lateral aspect

GENITOFEMORAL NERVE

- -Sensory supply

Skin over labia majora, anterior thigh and scrotum

– Motor supply

Cremaster

SACRAL PLEXUS

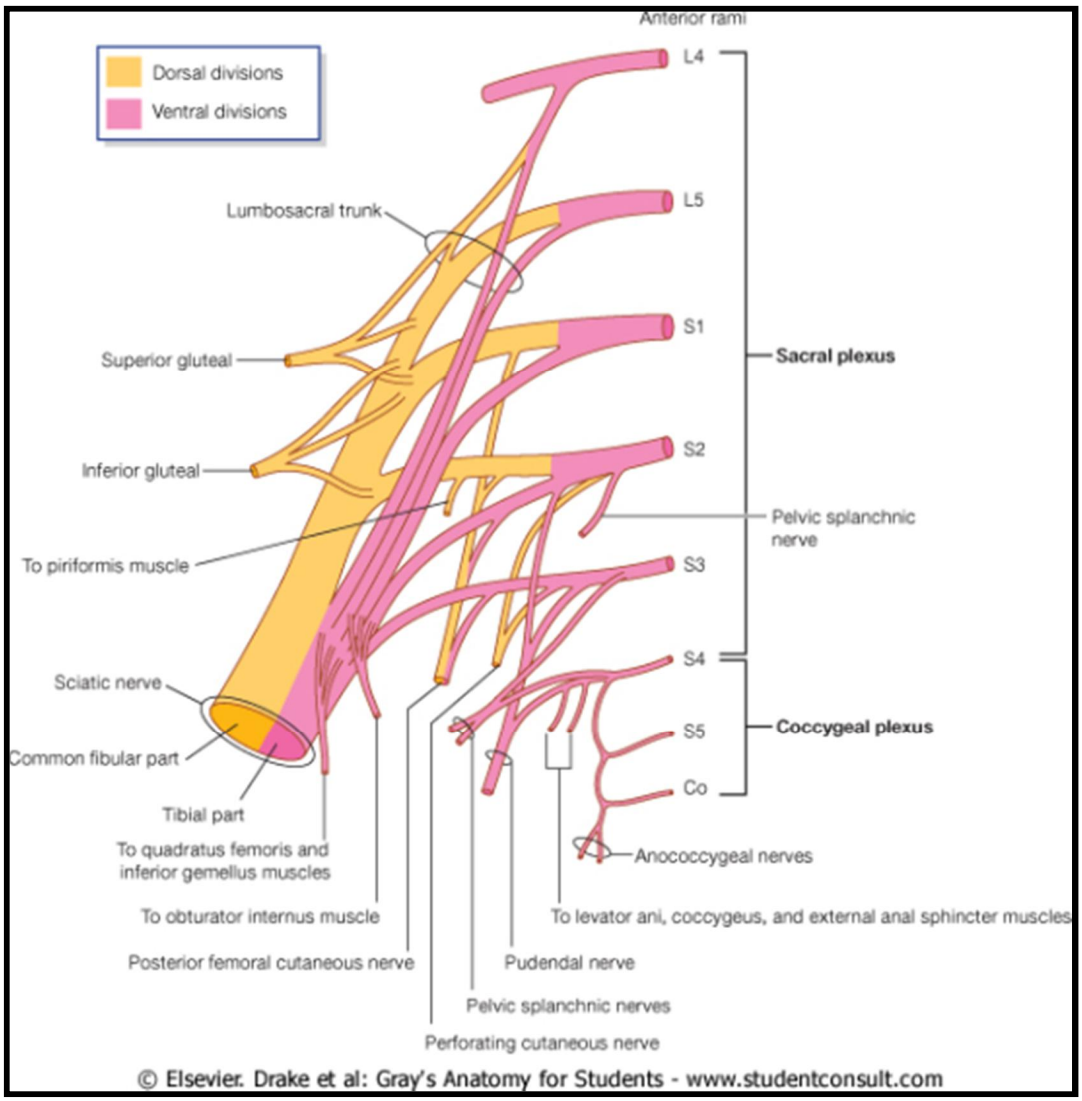
FORMATION

By anterior rami of L4 & whole of L5 (lumbosacral trunk) and S1, 2, 3 and most of S4. It is present in piriformis muscle .Nerves branching from this plexus innervate the lower limb and pelvic regions , since lumbar and sacral plexuses are interconnected, they are sometimes referred to as the lumbosacral plexus. Sacral plexus supplies muscles and skin of posterior thigh and almost whole of the leg

BRANCHES OF LUMBOSACRAL PLEXUS

- Sciatic nerve
- Superior gluteal nerve
- Inferior gluteal nerves
- Pudendal nerve
- Cutaneous branches

SACRAL PLEXUS



SCIATIC NERVE

- Arises from Sacral Plexus (L4,5, S1, 2,3).
- It is the largest branch of sacral plexus
- It is the largest nerve in body

COURSE

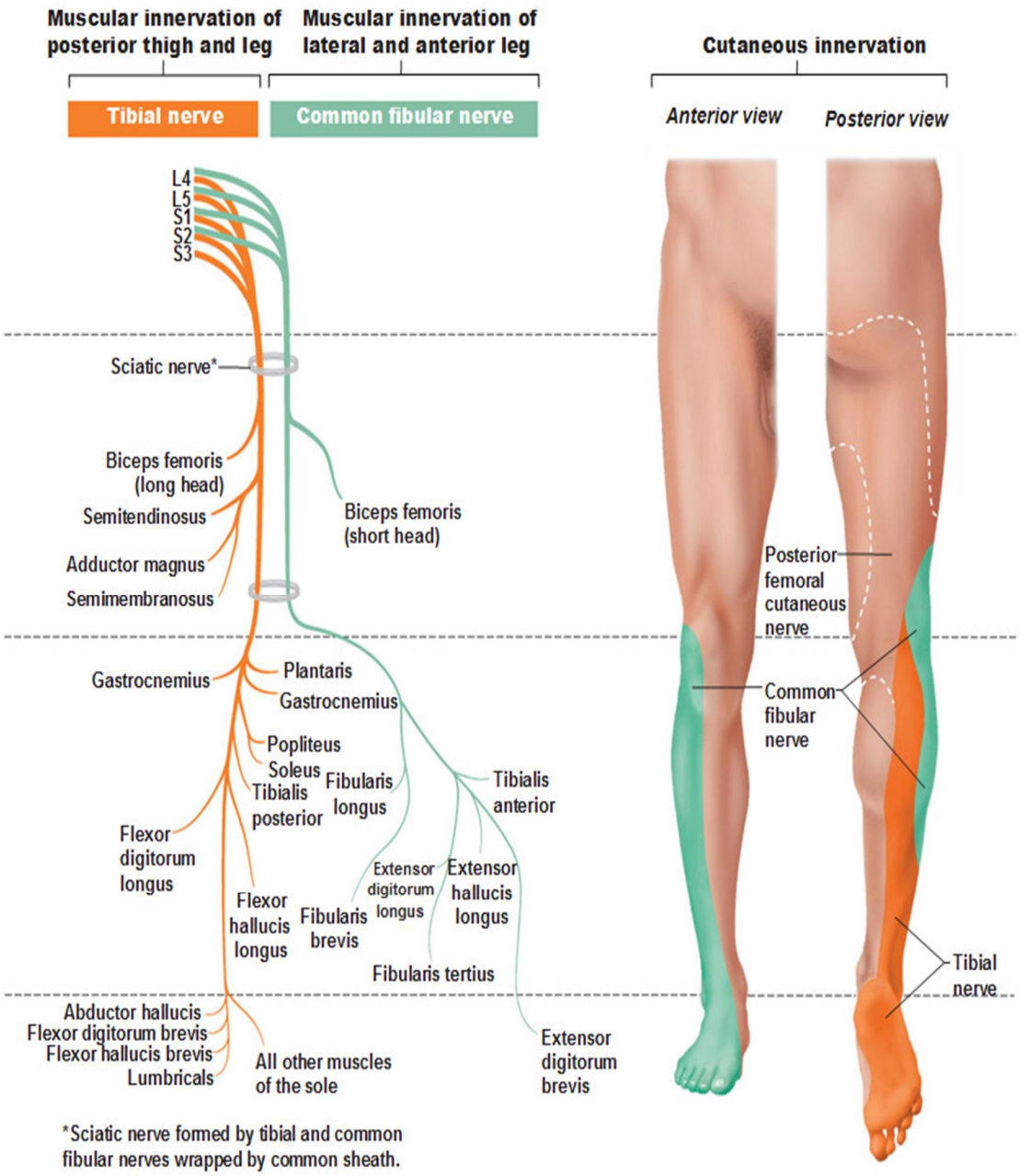
Sciatic nerve leaves the pelvis via greater sciatic foramen, below piriformis & passes in the gluteal region (between ischial tuberosity & greater trochanter) then into the posterior compartment of the thigh.

TERMINATION

It terminates by dividing into

- Tibial Nerve
- Fibular nerve

SCIATIC NERVE



BRANCHES OF THE SCIATIC NERVE

MUSCULAR BRANCHES:

Hamstrings which includes flexor muscle of knee & extensor muscle of hip and all muscles below the knee in leg & foot.

COMMON PERONEAL NERVE:

Muscles of anterior and lateral compartments of the leg that includes Dorsiflexors of ankle,Extensors of toes, Evertors of foot.

TIBIALNERVE:

Posterior compartment muscles of leg and intrinsic muscles of sole , Plantar flexors of ankle, Flexors of toes, Invertors of foot except tibialis anterior

CUTANEOUS BRANCHES:

To leg & foot except areas supplied by the saphenous nerve (branch of femoral nerve).

TIBIAL NERVE

COURSE

- Tibial nerve passes through popliteal fossa to the posterior compartment of leg.
- It is accompanied with posterior tibial vessels.
- It passes behind the medial malleolus to reach the sole of foot and it divides into 2 terminal branches, Medial and Lateral plantar nerves.

COMMON PERONEAL NERVE

COURSE:

It passes through popliteal fossa and turns around the lateral aspect of neck of fibula.

BRANCHES:

Superficial peroneal or (Musculocutaneous): It supplies the Lateral compartment of the leg.

Deep peroneal or (anterior tibial) : It supplies the Anterior compartment of the leg.

SUPERIOR GLUTEAL NERVE

– Motor supply

Gluteus medius and minimus muscle, tensor fasciae latae

INFERIOR GLUTEAL NERVE

– Motor supply

Gluteus maximus muscle

POSTERIOR FEMORAL CUTANEOUS NERVE

- Sensory supply

Inferior buttocks, posterior thigh.

PUDENDAL NERVE

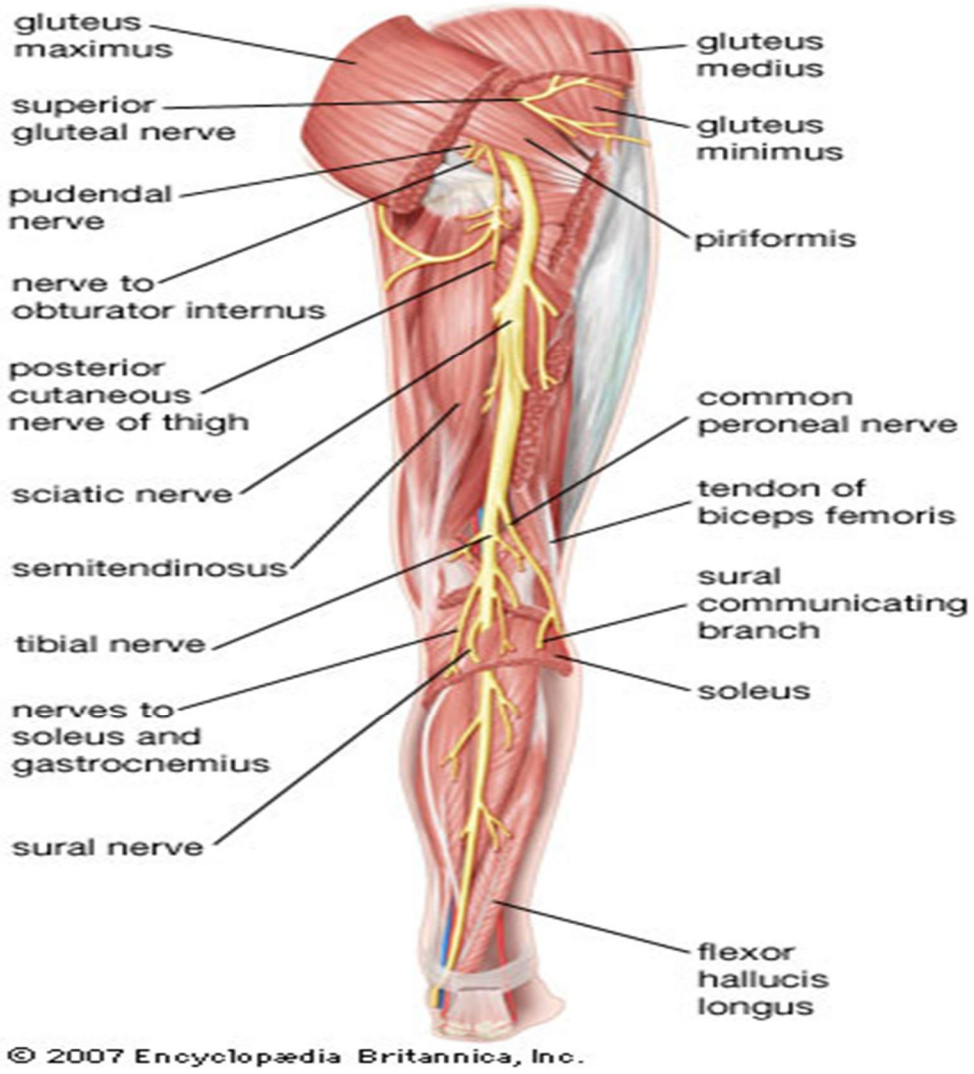
– Sensory supply

External genitalia, anus

– Motor supply

Muscles of perineum

MUSCLES SUPPLIED BY SACRAL PLEXUS



PHARMACOLOGY OF BUPIVACAINE

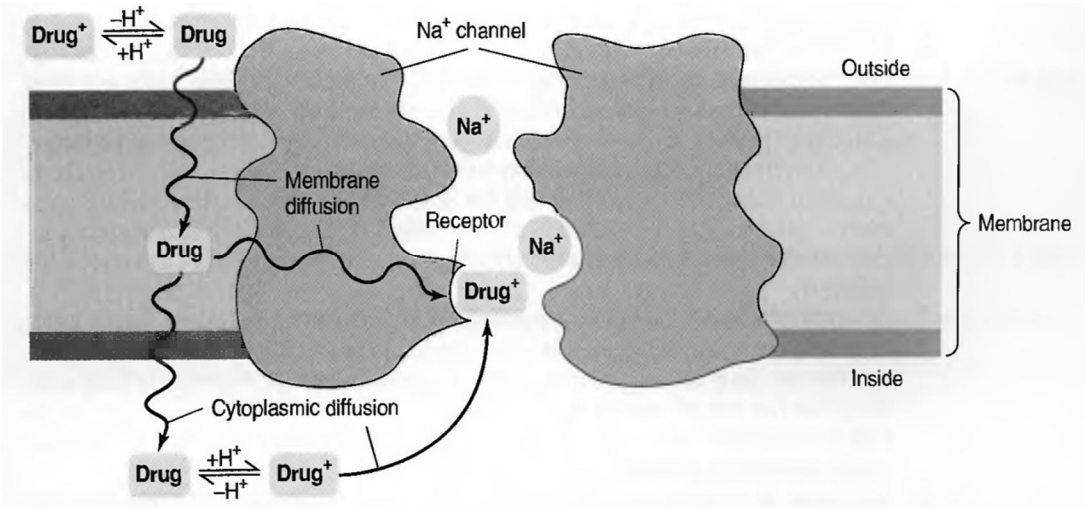
BUPIVACAINE:

1-butyl 2', 6' pipecoloxylidide hydrochloride. Bupivacaine is a local anaesthetic agent and it belongs to amide group. It is synthesized by Ekenstom in 1957, and its clinical use was made in the year 1963 by LJ Telivuo. It is structurally similar to lignocaine,and it is different from lignocaine because it contains the amine group butyl piperidine. S-Enantiomer levobupivacaine which is less cardiotoxic is also available.

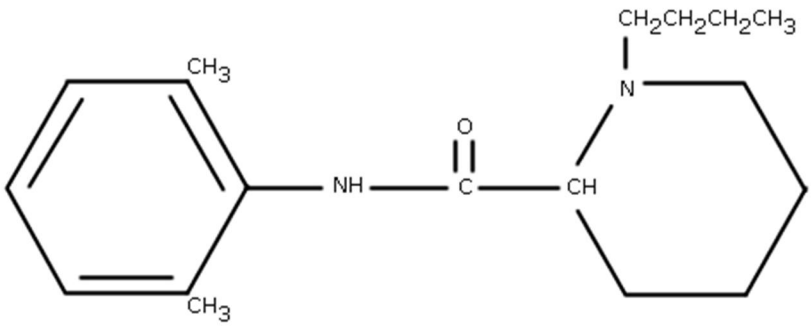
MECHANISM OF ACTION:

Bupivcaine attach to sodium channels to block influx of sodium into the nerve cell. Because of this depolarization of nerve doesnot occur as a result action potential propagation and conduction of nerve function is blocked. Bupivacaine block the conduction of nerve impulses, by increasing the threshold of excitation in the nerve, and by stopping the propagation of the nerve impulse, and there by decreasing the rise of the action potential .

MECHANISM OF ACTION OF BUPIVACAINE:



STRUCTURE OF BUPIVACAINE



PHARMACOKINETICS:

Bupivacaine a pka value of 8.1,it has a molecular weight of 288 Daltons, with a 95% protein binding capacity ,30% lipid solubility,and a volume of distribution 0.4 - 0.9 liters/ kg , it has a clearance rate of 2.8 - 7.1ml/min/kg ,and half life of 1.2 - 2.4 hours. It has a peak time of action 0.17 - 0.5 hours, at concentration of 0.8microgram/ml. Toxicity occurs

when plasma concentration is greater than1.5 microgram/ml. Important plasma protein binding site is alpha 1 acid glycoprotein.

PH AND BUPIVACAINE

Bupivcaine is weak base and activity of bupivacaine increases when PH increases.It is because if a drug is unipolar, it will facilitate its penetration through the cell membrane. When the drug has entered the lipid barrier and reaches its site of action it gets ionized and the ionized form is responsible for action of bupivacaine

Acidosis due to wound inflammation reduces the action of bupivacaine. It is because most of the bupivacaine is ionized and therefore cannot cross the cell membrane and to reach its site of action on sodium channel.

ORDER OF BLOCKADE OF NERVE FIBERS

Bupivacaine act by blocking sensory nerve, motor nerve and autonomic nerve fibres. The smallest diameter fibres are first blocked by the effects of local anaesthetics. order of blockade

1. Autonomic fibres

2. Sensory fibres

3. Motor nerve

The order of loss of nerve function is as follows: pain ,temperature, touch, proprioception, and skeletal muscle tone.

PHARMACOKINETICS

METABOLISM:

Liver is the site of metabolism, it undergoes aromatic hydroxylation, N-dealkylation, amide hydrolysis, and conjugation. The metabolite formed is N- dealkylated desbutyl bupivacaine.

Dose : 2 to3mg/ kg

PHARMACODYNAMICS:

- Infiltration and nerve block onset of action 2-20 minutes

DURATION OF ACTION

- For Infiltration 1 hour
- For nerve block: 5-7 hours
- For Half-life elimination: 1.5-5.5 hours

USES:

- Epidural anaesthesia
- spinal anaesthesia
- Peripheral nerve block
- Infiltration anaesthesia
- Retro bulbar block
- Sympathetic block

BUPIVACAINE CONCENTRATIONS:

- For local infiltration 0.25%
- For Peripheral nerve block 0.25%, 0.5%
- For Retrobulbar block 0.75%
- For Sympathetic block 0.25%
- For Lumbar epidural 0.25%, 0.5%
- For Caudal 0.25%, 0.5%

SYSTEMIC TOXIC REACTIONS:

Toxic reactions are due to large volume of drug administration .To avoid a toxic reaction to bupivacaine, the small volume of the dilute solution that blocks effectively should be given.

SIGNS OF SYSTEMIC TOXICITY

These signs are circum-oral numbness, blurring of vision, tongue numbness, tinnitus, headache, muscular twitching, seizures, loss of consciousness, coma and cardiopulmonary arrest

SIGNS OF CENTRAL NERVOUS SYSTEM TOXICITY

Bupivacaine can cause central nervous system excitement or depression when absorbed systemically in excessive amounts . Tremors, confusion, and seizures are symptoms suggestive of central nervous system excitement. The central nervous system depression is characterized by respiratory depression and cardiopulmonary arrest.

SIGNS OF CARDIOVASCULAR TOXICITY:

Systematically absorbed bupivacaine especially, in large volume cause depression of the cardiovascular system.

Peripheral vascular arteriolar dilation can occur. Hypotension and atrioventricular block are features of depression. These ultimately result in cardiac and respiratory arrest.

TREATMENT

- Administer oxygen.Intubate patient if necessary
- To stop cerebral excitation and give Midazolam 2-5 mg,Thiopental 50-150 mg,Propofol 50-100 mg
- To correct hypotension and arrhythmias by crystalloids, vasopressors, antiarrhythmic drugs
- (Ephedrine 5-10 mg, Epinephrine 10-100 μg)
- Cardiopulmonary resuscitation for cardiac arrest.
- Treat aggravating factors such as Hypoxia and acidosis

MATERIAL AND METHOD

DESIGN OF THE STUDY

- Randomized Prospective study

SELECTION OF SUBJECTS

- Study involves adult patients between 18 to 60 years ofASAps I-II posted for elective lower limb surgeries.
- Sample size 60
- Randomization – computer generated random numbers

MONITORS:

- Noninvasive Blood Pressure monitor
- Electrocardiogram
- Pulse Oximeter

ANAESTHESIA

COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK

Sixty patients subjected to psoas compartment block followed by sciatic nerve block using nerve stimulator 0.25% bupivacaine over 30 ml for psoas compartment block and 0.25% of 20ml bupivacaine for sciatic nerve block was administered.

Under strict aseptic precautions, psoas compartment block performed by winnes technique and and sciatic nerve block by labat's technique using peripheral nerve stimulator after obtaining twitch of quadriceps and calf muscle contraction and dorsiflexion of foot.

Supplemental oxygen provided during and after the procedure.

FOLLOWING PARAMETERS ARE NOTED

Time of onset of block and motor blockade, sensory blockade, total duration of analgesia and the time taken for 1st dose of rescue analgesia noted

EXCLUSION CRITERIA:

- Neurological disorder
- Age < 18 years
- ASA class > II
- Infection at the puncture site
- Patients refusal
- Patients with hypersensitivity to bupivacaine
- Coagulation disorder
- Antenatal cases

INVESTIGATIONS :

- Hemoglobin
- Total count
- Platelets
- Blood sugar
- Renal function test

- Urine routine:
- Electocardiogram
- Chest xray
- Electrolytes

METHODOLOGY:

EQUIMENTS:

Eiectrocardiogram ,Noninvasive blood pressure, pulse oximetry, working laryngoscopes, endotracheal tube, suction apparatus, nerve stimulator, 21 gauge 10 cm insulated needle.

INTRAVENOUS ACCESS:

IV line secured with 18G cannula,

PREMEDICATION:

Iv midazolam 1mg and IV fentanyl 1µg/kg given as premedication

EMERGENCY DRUGS:

Atropine, ephedrine and adrenaline.

ANAESTHESIA

Under strict aseptic precautions, psoas compartment block performed by posterior approach followed by sciatic nerve block by labat's approach using peripheral nervestimulator after obtaining twitch of quadriceps and calf muscle contraction and dorsiflexion of foot. Supplemental oxygen provided during and after the procedure

FOLLOWING PARAMETERS WERE NOTED

- Time of onset of sensory blockade
- Time taken for onset of motor blockade:
- From the time of block, visual analogue scale noted for every 30 minutes 1hour,2 hour by 4, 6, and8 hours
- From the time of block Bromage score noted for 2, 6,and 8 hours
- Time elapsed till first rescue analgesia dose
- Other side effects:

NERVE LOCATOR USED FOR PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK

POSTERIOR APPROACH [WINNIES] WAS USED FOR LUMBAR PLEXUS BLOCK AND LABATS APPROACH FOR SCIATIC NERVE BLOCK

Patient Position

Many posterior landmark approaches are available for the lumbar plexus which require the patient to be in the lateral position with the side that is to be operated on the upperside, the hips and knees are flexed to an angle of 90 degrees;

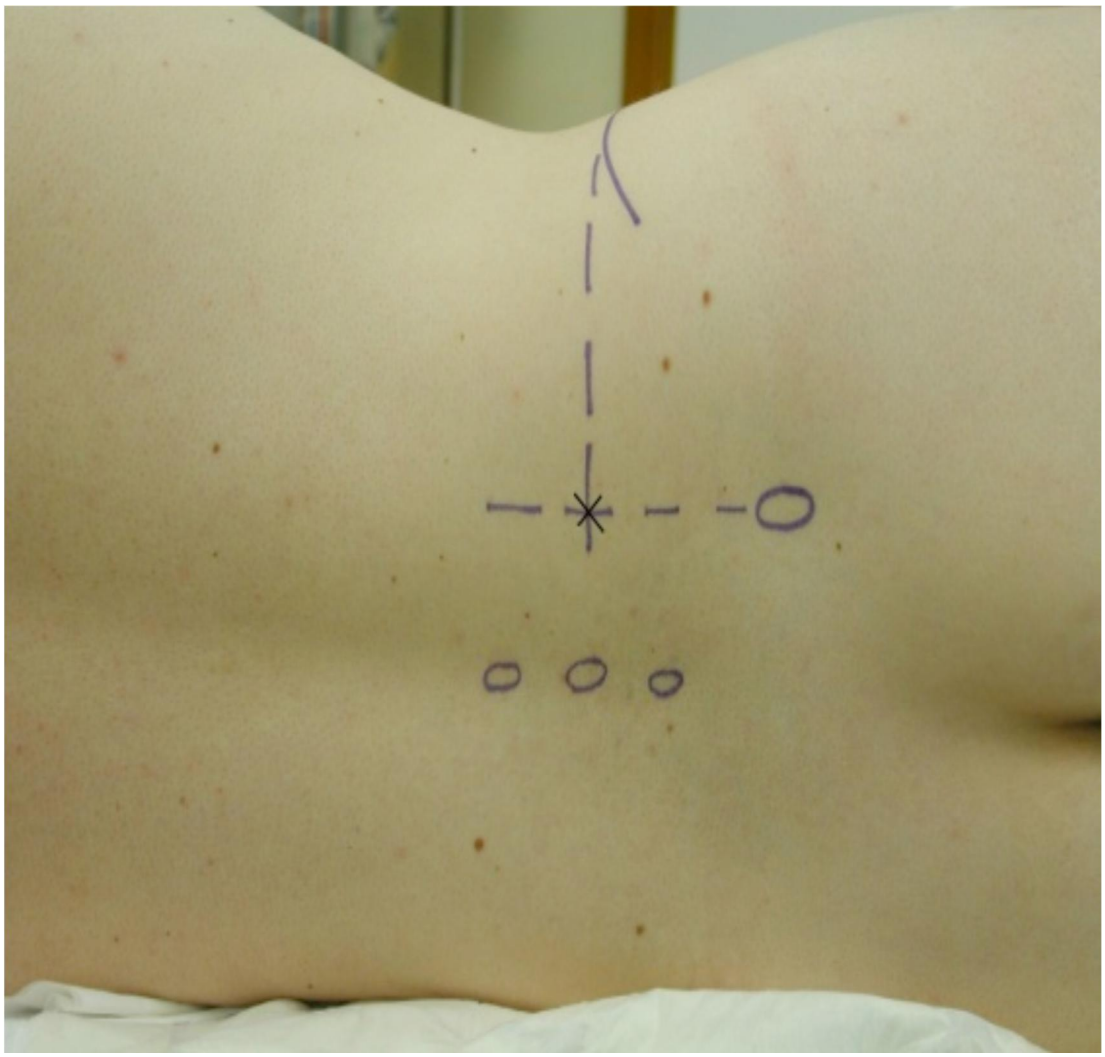
Landmarks of the lumbar plexus.

1. Tuffiersline

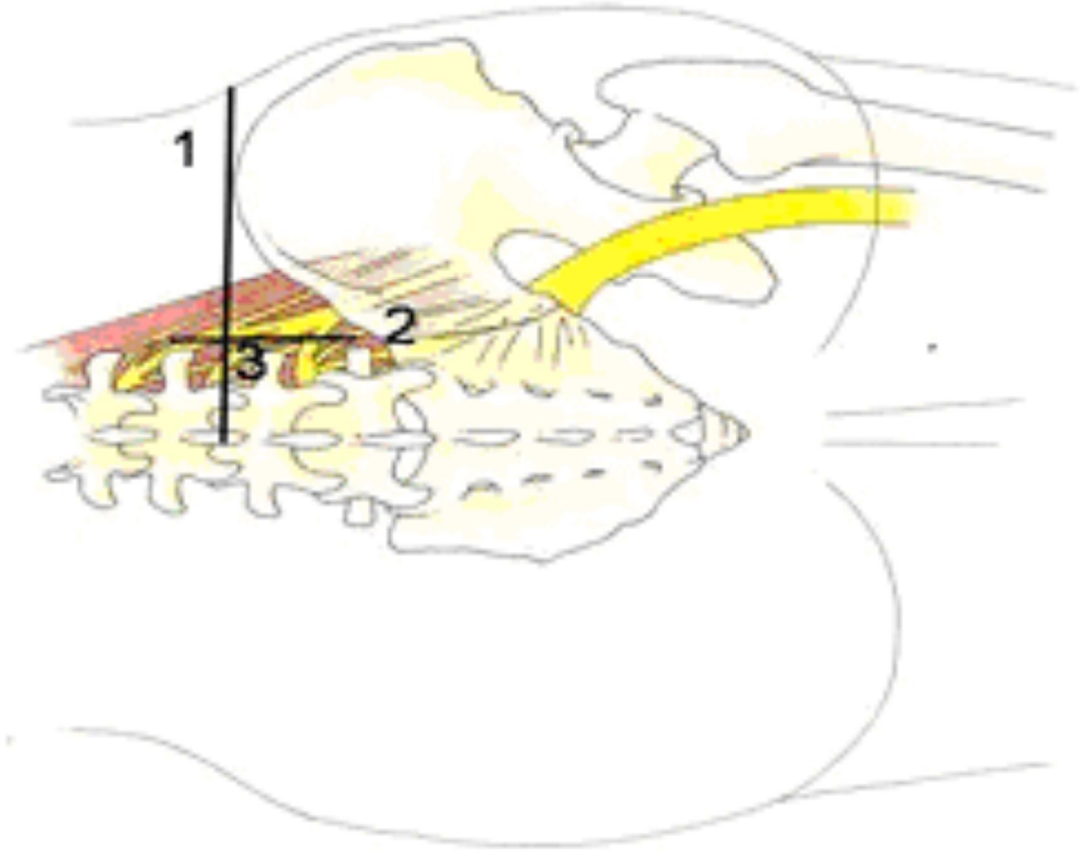
2. posterior SuperiorIliacspine

3 lumbar plexus

WINNIES APPROACH



LANDMARK OF LUMBAR PLEXUS



WINNIE'S TECHNIQUE

A line drwn through Posterior Superior Iliac Spine and intercristal line and point of intersection between this line is entry point . Needle should be inserted at the junction of these lines . Between the transverse processes of L4 and L5.needle is introduced and it can be directed if the transverse process of L5 is hitched. Winnie made paresthesia as response but the ultimate point for the lumbar plexus is stimulation of the femoral nerve , observed by contraction of the quadriceps muscle The response is stimulation of the femoral nerve, observed by contraction of the quadriceps muscle. The contraction of quadriceps produces patella twitching should be obtained by a current of 1-2mA, and the current should be decreased until contraction is still present at <0.5mA. Suppose if muscle contraction is lost before 0.5mA needle repositioning should be done ..Quadriceps contraction below a current of 0.2mA contraction should stop, because of the risk of intraneural needle positioning is high

LABATS APPROACH OF SCIATIC NERVE

The patient is placed in lateral position in Labat's approach, and the leg is flexed at the knee. In case the patient unable to flex the leg, the leg may be extended at the hip.

Initially, a line is drawn between the greater trochanter of femur and the posterior superior iliac spine. Next, a line is drawn from the greater trochanter to the patient's sacral hiatus.

The point at which the needle is inserted should be determined by drawing a line at right angles from the midpoint of the first line to meet the secondline.

A fourth line is drawn in the crease formed by the medial edge of the gluteus maximus muscle and the long head of the biceps femoris muscle. This represents the course of the sciatic nerve in the lower leg.

The confluence of the first, second, and fourth lines marks site of initial needle placement, and further adjustments of the needle within that area can improve success at sciatic nerve stimulation, needle placement close to the sciatic nerve is observed with plantar flexion or inversion or dorsiflexion or eversion with 0.5 mA or less of current ,

needle placement in proximity to the sciatic nerve is observed with plantar flexion/ inversion or dorsiflexion/eversion with 0.5 mA or less of current.

Twitching of the hamstrings indicates the needle tip has been placed too medial. Mild adjustments of the needle tip result in approprite localization of the sciatic nerve at 1.0 to 1.5 mA.

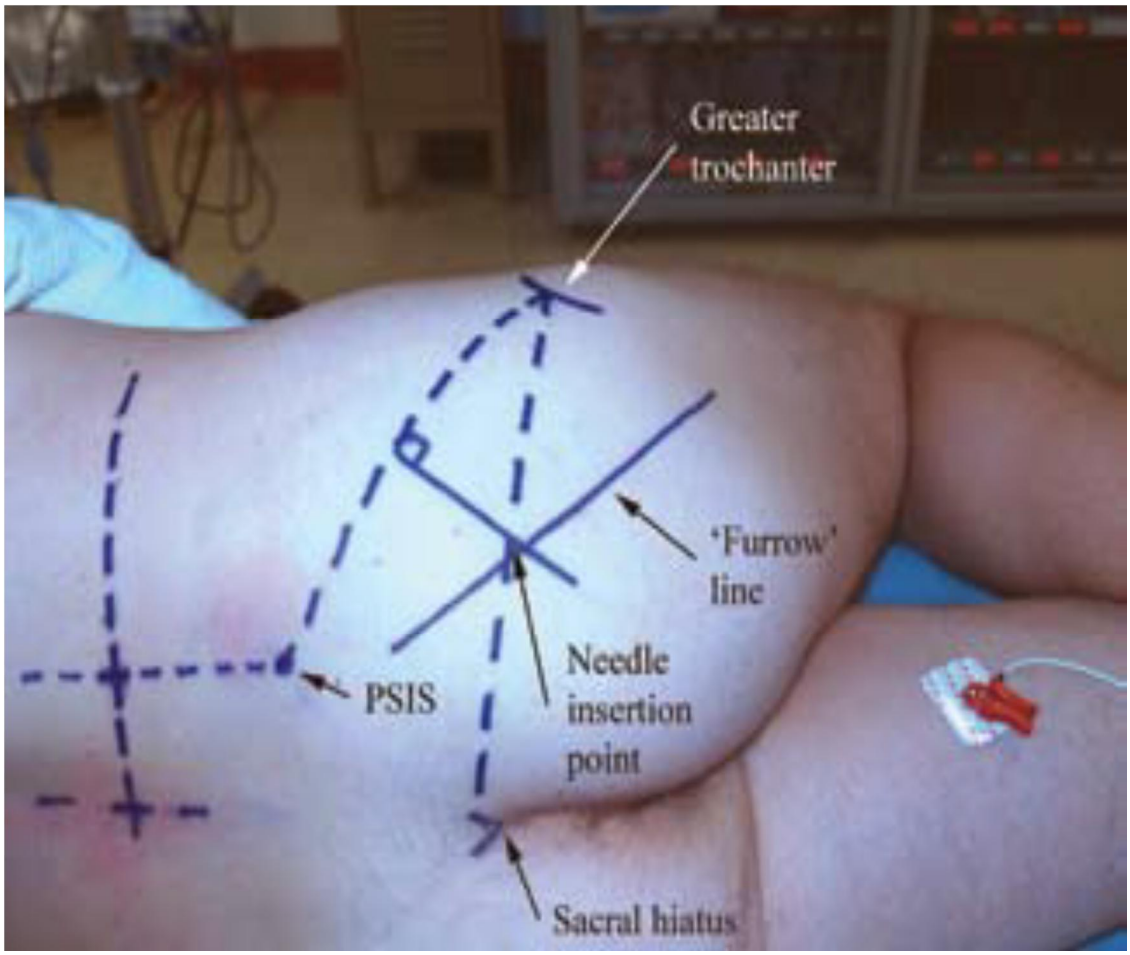
NEEDLE SIZE

10-cm insulated needle of size 21-gauge

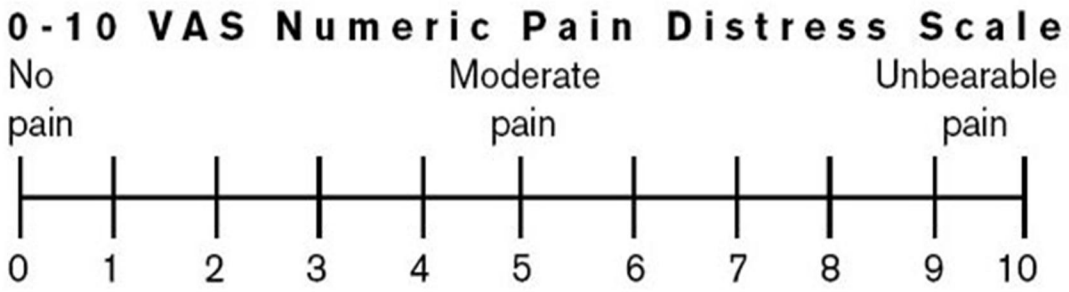
STIMULATION OF NERVE:

Nerve stimulation initially given at 1.0 to 1.5 mA. Needle placement in close to the sciatic nerve is observed with plantar flexion/ inversion or dorsiflexion/eversion with a current of 0.5 mA.

LANDMARK OF SIATIC NERVE



SENSORY BLOCKADE ASSESSED BY VISUAL ANALOGUE SCALE



A Visual Analogue Scale (VAS) is a measurement instrument that measures range of pain perceived by the patient during surgical procedures .For example, the amount of pain that a patient feels ranges across from none to an extreme amount of pain. From the patient's perspective the range appears from none, mild, moderate and severe .To assess the degree of pain VAS was devised. VAS is usually a horizontal line, 100 mm in length, indicated by word descriptors such as no pain at one end and unbearable pain at another end, as illustrated in Fig. Patient marks the line the point that they feel represents their perception of their current state. The VAS score is determined by measuring from the left hand end of the line to the point at the right end.

- VAS is a simple pain measurement device

- VAS can be used to measure severity or Improvement of pain
- VAS can be used for children over the age of five
- The VAS is usually a 10cm line

SCORING AND INTERPRETATION

VAS Score is determined by measuring the distance on the 10-cm line between the "no pain" at one end and extreme pain at another end , providing a range of scores from 0–10. A higher score indicates greater pain . VAS scores is used in post- surgical patients (knee surgeries , lower limb surgeries) who mentioned their postoperative pain intensity as none, mild, moderate, or severe, the following cut points on the pain VAS score is as follows no pain (1-4cm), moderate pain pain (4-7cm), severe pain pain (7 to 10cm). The normative values are not available. Visual analogue scale is a simple device and it is a visual one.

ASSESSMENT OF MOTOR BLOCKADE BY BROMAGE SCALE

Bromage scale is commonly used to measure motor blockade. The degree of motor block is assessed by patient's ability to move their lower limbs.

Bromage scale is based on six category which depends upon the movement of the lower limb. It ranges from category 1 : complete block to category VI: able to perform partial knee bend

MODIFIED BROMAGE SCORE

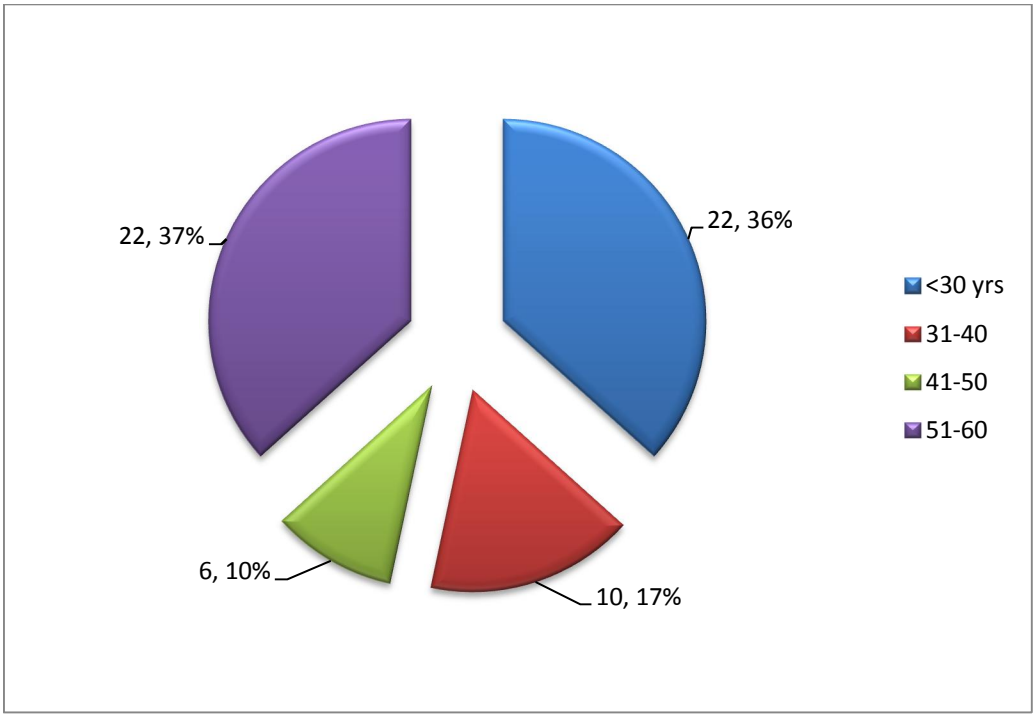
1. Complete block or (unable to move feet or knee)
2. Almost complete block or (able to move feet only)
3. Partial block or (able to move knees)
4. Detectable weakness of hip flexion while supine

   (Full flexion of knees)
5. No detectable weakness of hip flexion while supine
6. Able to perform partial knee bend

STATISTICAL ANALYSIS

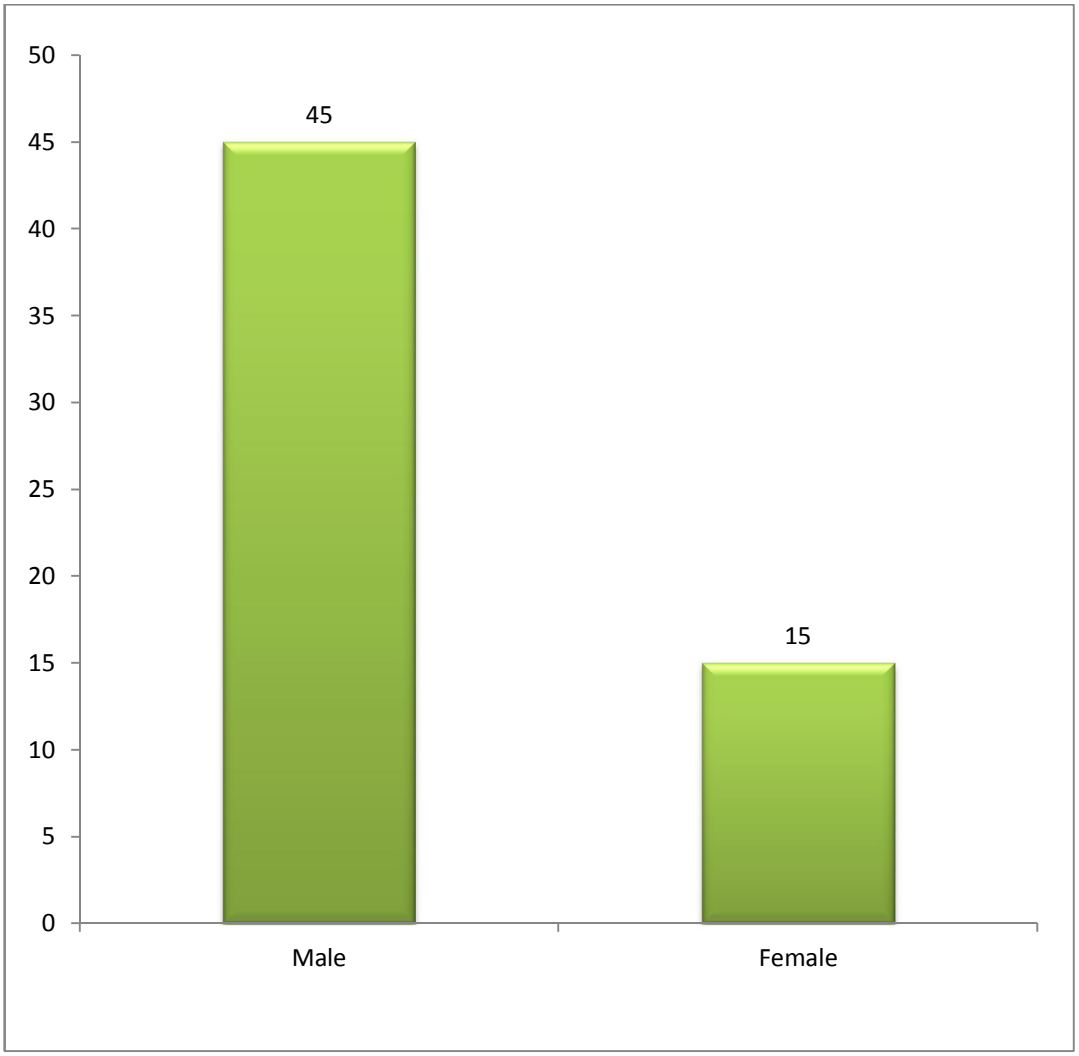
AGE DISTRIBUTION

Age	Frequency	Percent
<30 yrs	22	36.67
31-40	10	16.67
41-50	6	10.00
51-60	22	36.67
Total	60	100.00



MALE AND FEMALE RATIO

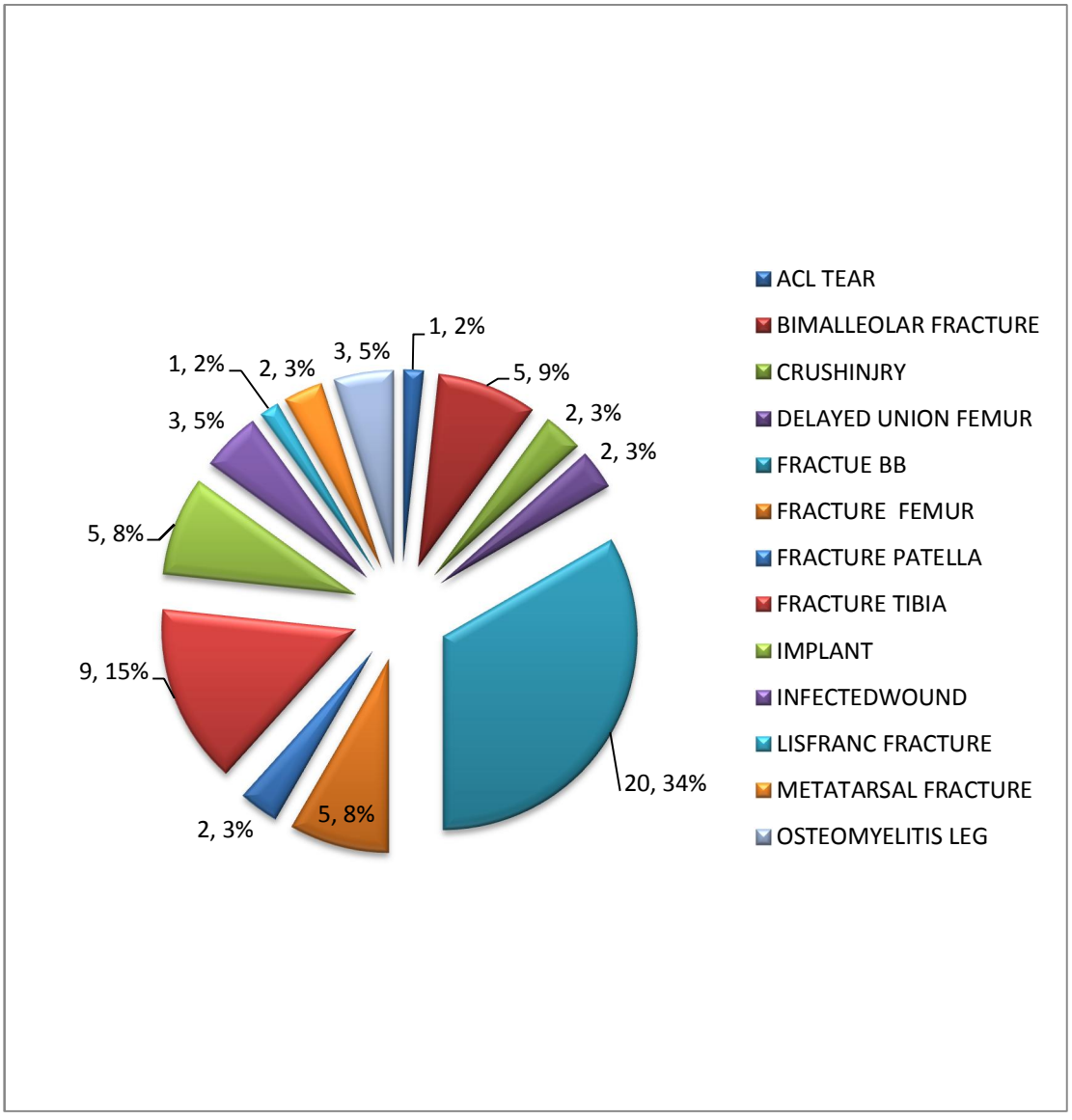
SEX	Frequency	Percent
Male	45	75
Female	15	25
Total	60	100



TYPE OF DIAGNOSIS

DIAGNOSIS	Frequency	Percent
ACL TEAR	1	1.7
BIMALLEOLAR FRACTURE	5	8.3
CRUSHINJRY	2	3.3
DELAYED UNION FEMUR	2	3.3
FRACTUE BB	20	33.3
FRACTURE FEMUR	5	8.3
FRACTURE PATELLA	2	3.3
FRACTURE TIBIA	9	15.0
IMPLANT	5	8.3
INFECTEDWOUND	3	5.0
LISFRANC FRACTURE	1	1.7
METATARSAL FRACTURE	2	3.3
OSTEOMYELITIS LEG	3	5.0
TOTAL	60	100

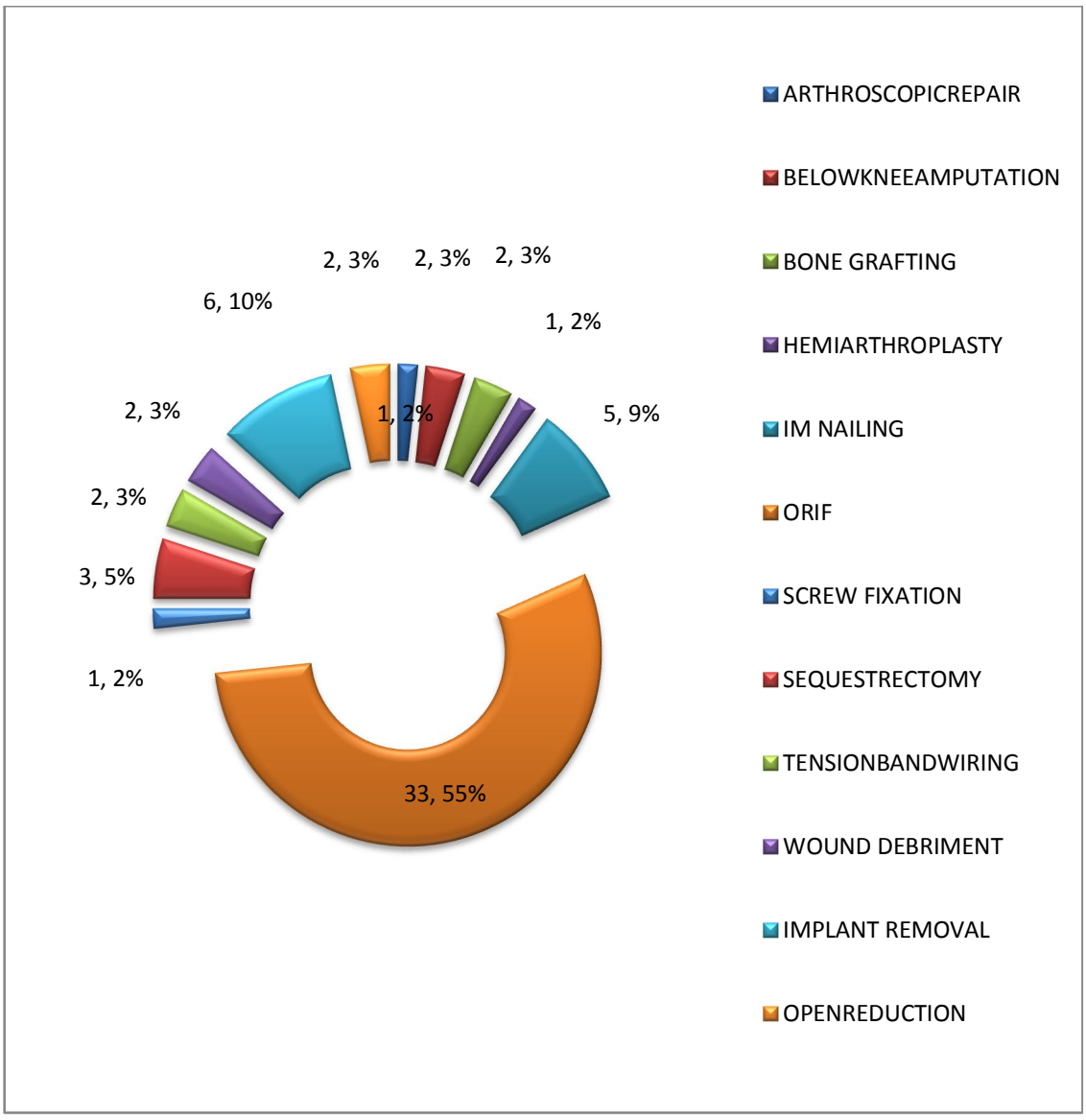
TYPE OF DIAGNOSIS



TYPE OF PROCEDURE

PROCEDURE	Frequency	Percent
ARTHROSCOPICREPAIR	1	1.7
BELOWKNEEAMPUTATION	2	3.3
BONE GRAFTING	2	3.3
HEMIARTHROPLASTY	1	1.7
INTRA MEDULLARY NAILING[IM MAILING]	5	8.3
OPEN REDUCTION AND INTERNAL FIXATION [ORIF]	33	55.0
SCREW FIXATION	1	1.7
SEQUESTRECTOMY	3	5.0
TENSIONBANDWIRING	2	3.3
WOUND DEBRIMENT	2	3.3
IMPLANT REMOVAL	6	10.0
OPENREDUCTION	2	3.3
	60	100.0

TYPE OF PROCEDURE

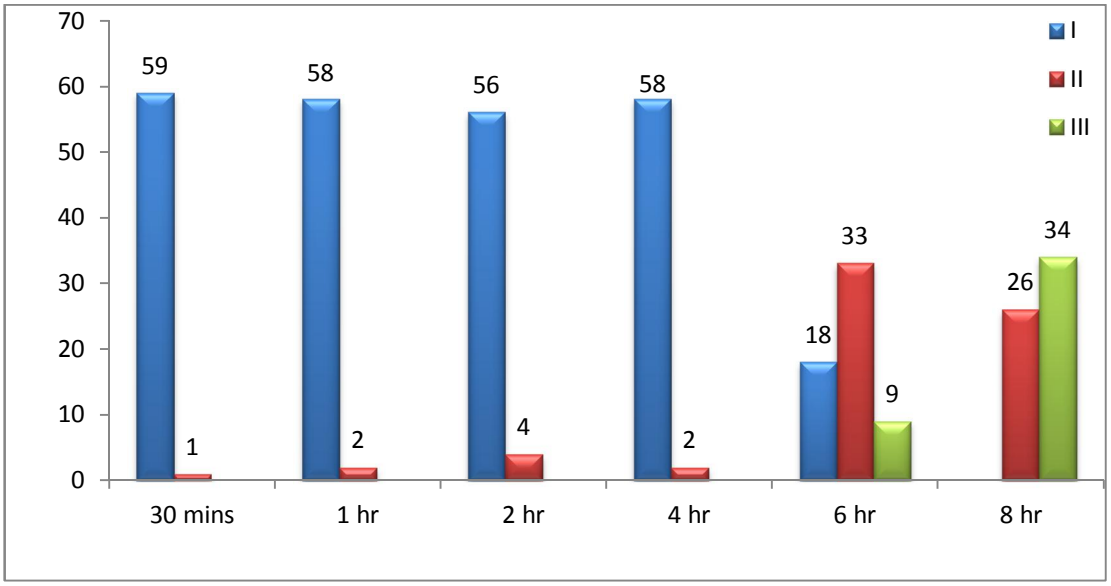


SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE[VAS]

AT VARIOUS TIME INTERVAL

VAS	30 mins	1 hr	2 hr	4 hr	6 hr	8 hr
I	59	58	56	58	18	
II	1	2	4	2	33	26
III					9	34

SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE AT VARIOUS TIME INTERVAL



Sensory blockade assessed by visual analogue scale at thirty minutes revealed a score of 1(no pain)for 59 out of 60 patients (98.3%) and 2 for 1 out of 60 patients (1.7%). Sensory blockade assessed by visual analogue scale at one hour revealed a score of 1(no pain) for 58 out of 60 patients (96.7%) and 2(no pain) for 2 out of 60 patients (3.3%). Sensory blockade assessed by visual analogue scale at two hours revealed a score of 1(no pain) for 56 out of 60 patients (93.3%) and 2(no pain) for 4 out of 60 patients (6.7%). Sensory blockade assessed by visual analogue scale at four hours revealed a score of 1(no pain) for 52 out of 60 patients (86.7%) and 2(no pain pain) for 8 out of 60 patients (13.3%). Sensory blockade assessed by visual analogue scale at six hours revealed a score of 1 for 18 out of 60 patients (30%), and a score of 2 for 33 out of 60 patients (55%) and a score of 3 for 9 out of 60 patients (15%). Sensory blockade assessed by visual analogue scale at eight hours revealed a score of 2 for 26 out of 60 patients (43.3%) and a score of 3 for 34 out of 60 patients (56.7%).

SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE AT 30 MINUTES

Sensory blockade assessed by visual analogue scale at thirty minutes revealed a score of 1(no pain)for 59 out of 60 patients (98.3%) and 2 for 1 out of 60 patients (1.7%).

VAS AT 30MINUTES	Frequency	Percent
1	59	98.3
2	1	1.7
Total	60	100

SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE AT ONE HOUR

Sensory blockade assessed by visual analogue scale at one hour revealed a score of 1(no pain) for 58 out of 60 patients (96.7%) and 2(no pain) for 2 out of 60 patients (3.3%).

VAS AT 1HOUR	Frequency	Percent
1	58	96.7
2	2	3.3
Total	60	100

SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE AT 2 HOURS

Sensory blockade assessed by visual analogue scale at two hours revealed a score of 1(no pain) for 56 out of 60 patients (93.3%) and 2(no pain) for 4 out of 60 patients (6.7%).

VAS AT 2HOURS	Frequency	Percent
1	56	93.3
2	4	6.7
Total	60	100

SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE AT 4 HOURS

Sensory blockade assessed by visual analogue scale at four hours revealed a score of 1(no pain) for 52 out of 60 patients (86.7%) and 2(no pain pain) for 8 out of 60 patients (13.3%).

VAS AT 4 HOURS	Frequency	Percent
1	52	86.7
2	8	13.3
Total	60	100

SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE AT 6 HOURS

Sensory blockade assessed by visual analogue scale at six hours revealed a score of 1 for 18 out of 60 patients (30%), and a score of 2 for 33 out of 60 patients (55%) and a score of 3 for 9 out of 60 patients (15%).

VAS AT 6HOURS	Frequency	Percent
1	18	30
2	33	55
3	9	15

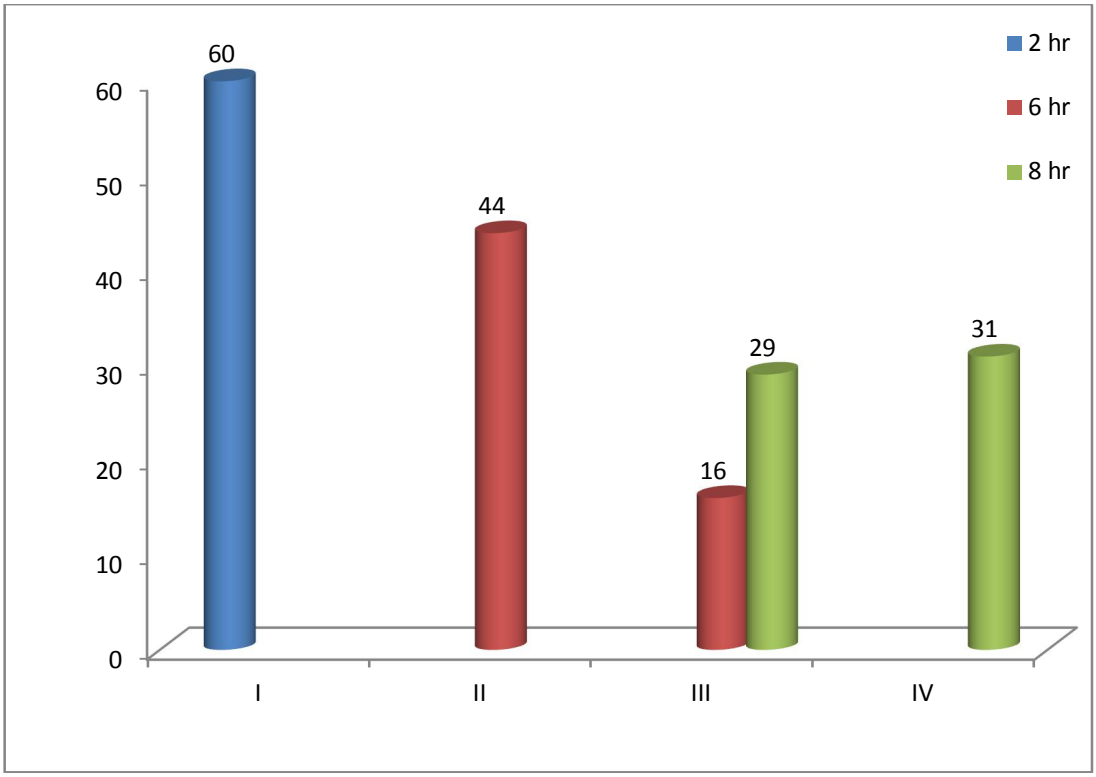
SENSORY BLOCKADE BY VISUAL ANALOGUE SCALE AT 8 HOURS

Sensory blockade assessed by visual analogue scale at eight hours revealed a score of 2 for 26 out of 60 patients (43.3%) and a score of 3 for 34 out of 60 patients (56.7%).

VAS AT 8HOURS	Frequency	Percent
2	26	43.3
3	34	56.7
Total	60	100

MOTOR BLOCKADE BY MODIFIED BROMAGE SCALE AT VARIOUS TIME INTERVALS

Modified bromage scale	2 hr	6 hr	8 hr
I	60		
II		44	
III		16	29
IV			31



MOTOR BLOCKADE BY MODIFIED BROMAGE SCALE AT 2 HOURS

Motor blockade assessed by modified bromage scale at 2 hours revealed a score of 1(complete block – unable to move feet or knee) in 60 out of 60 patients (100%).

Modified bromage scale at 2Hours	Frequency	Percent
1	60	100

MOTOR BLOCKADE BY MODIFIED BROMAGE SCALE AT 6 HOURS

Motor blockade assessed by modified bromage scale at 6 hours revealed a score of 2(almost complete block – unable to move feet only) in 44 out of 60 patients (73.3%) and 3(partial block – able to move knees) in 16 out of 60 patients(26.7%).

Modified bromage scale at 6Hours	Frequency	Percent
2	44	73.3
3	16	26.7
Total	60	100

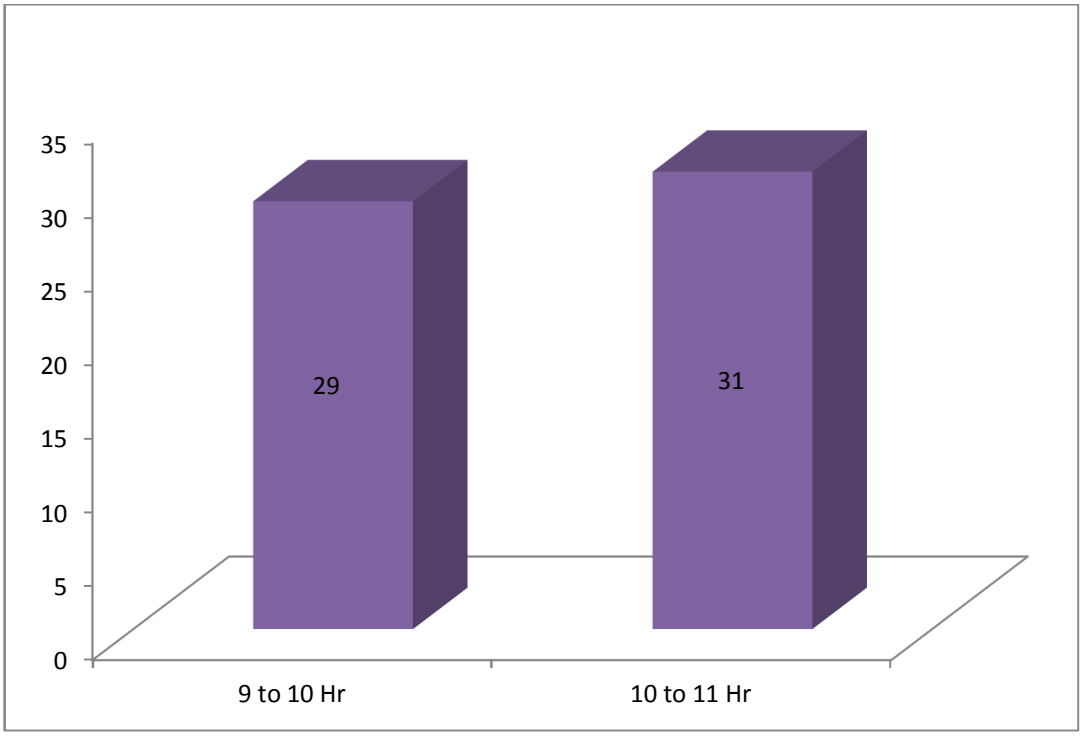
MOTOR BLOCKADE BY MODIFIED BROMAGE SCALE AT 8 HOURS

Motor blockade by modified bromage scale at 8 hours Motor blockade assessed by modified bromage scale at 8 hours revealed a score of 3(partial block – able to move knees) in 29 out of 60 patients(48.3%) and 4(detectable weakness of hip flexion while supine, full flexion of knees) in 31 out of 60 patients (51.7%).

Modified bromage scale at 8Hours	Frequency	Percent
3	29	48.3
4	31	51.7
Total	60	100

IST DOSE OF RESCUE ANALGESIA

RESCUE ANALGESIA	Frequency	Percent
9 to 10 Hr	29	48.3
10 to 11 Hr	31	51.7



The incidence of first dose of rescue analgesia at 9 to 10 hours is 48.3 %(29 out of 60 patients) and at 10 to 11 hours is 51.7 %(31 out of 60 patients).

RESULTS

Results are based on following parameters

- Time of onset of sensory blockade
- Time taken for onset of motor blockade
- From the time of block, visual analogue scale noted for every 30 minutes 1hour,2 hour by 4, 6, and 8 hours
- From the time of block Bromage score noted for 2, 6,and 8 hours
- Time elapsed till first rescue analgesia dose
- Other side effects:

Sensory blockade assessed by visual analogue scale at thirty minutes revealed a score of 1(no pain) for 59 out of 60 patients (98.3%) and 2(no pain) for 1 out of 60 patients (1.7%).

Sensory blockade assessed by visual analogue scale at one hour revealed a score of 1(no pain) for 58 out of 60 patients (96.7%) and a score of 2(no pain) for 2 out of 60 patients (3.3%).

Sensory blockade assessed by visual analogue scale at two hours revealed a score of 1(no pain) for 56 out of 60 patients (93.3%) and a score of 2(no pain) for 4 out of 60 patients (6.7%).

Sensory blockade assessed by visual analogue scale at four hours revealed a score of 1(no pain) for 52 out of 60 patients (86.7%) and a score of2(no pain) for 8 out of 60 patients (13.3%).

Sensory blockade assessed by visual analogue scale at six hours revealed a score of 1 for 18 out of 60 patients (30%), a score of 2 for 33 out of 60 patients (55%) and a score of 3 for 9 out of 60 patients (15%).

Sensory blockade assessed by visual analogue scale at eight hours revealed a score of 2 for 26 out of 60 patients (43.3%) and a score of 3 for 34 out of 60 patients (56.7%).

Motor blockade assessed by modified bromage scale at 2 hours revealed a score of 1(complete block – unable to move feet or knee) in 60 out of 60 patients (100%).

Motor blockade assessed by modified bromage scale at 6 hours revealed a score of 2(almost complete block – unable to move feet only) in 44 out of 60 patients (73.3%) and 3(partial block – able to move knees) in 16 out of 60 patients(26.7%).

Motor blockade assessed by modified bromage scale at 8 hours revealed a score of 3(partial block – able to move knees) in 29 out of 60 patients(48.3%) and 4(detectable weakness of hip flexion while supine, full flexion of knees) in 31 out of 60 patients (51.7%).

The incidence of first dose of rescue analgesia at 9 to 10 hours in 48.3 %(29 out of 60 patients) and at 10 to 11 hours is 51.7 %(31 out of 60 patients).

DISCUSSION

Several studies has evaluated about the psoas block and sciatic nerve block in patients undergoing orthopedic hip surgery [33]or knee procedures [34]. The study included the sciatic nerve blockade with psoas compartment, as regional techniques because of the complete blockade of the lumbosacral plexus.[35]

This study was conducted on sixty patients who underwent orthopedic procedures including total knee arthroplasty , total hip replacement, knee arthroscopy, corrective osteotomies of lower limb, , ankle surgeries and others.

60 patients were subjected to psoas compartment block (winnies approach) combined with proximal sciatic block (labat's approach). The anaesthetic effects and other measurements were evaluated intra and postoperatively.

The results of this study agrees with that of observed by Montes and colleagues, in their comparative study of spinal anesthesia with combined sciatic-femoral block done on 50 patients undergoing knee surgery, and they found that combined sciatic-femoral nerve blocks had

significantly lower pain scores during the postoperative period ($P<0.002$)[36]

Aim and colleagues compared sciatic –psoas compartment block and sciatic-femoral block and hemodynamics did not significantly vary between groups[37, decreased heart rate was observed in patients undergoing psoas compartment block. This is due to neuroaxial spread of drug in the psoas compartment block due to the injection of large volumes of drug

Incidence of psoas compartment block complications due to epidural and intrathecal spread of local anaesthetic was about 1% in a study conducted by Auroy and colleagues. [38] However, there were no signs or symptoms of epidural involvement in our patients, and less hemodynamic changes which could be attributed mostly to the fixed average volume and low concentration of local anesthetic injected (30 ml of bupivacaine 0.25%).

Direct nerve injury due to the needle is another dreaded complication of the psoas compartment block. [39]

Ultrasonography is used to locate catheter tip location, only in cases in where there is systemic or intrathecal spread . In our study,

ultrasonography or any other technique used for the visualization of epidural spread was not applied because of no such spread.

The results of this study showed that the need for postoperative opioid analgesia was much less in the combined psoas-sciatic group . The time by which they required first opioid dose was much delayed . This finding agrees with the study conducted by Moreno and Cassalia on lumbar plexus anesthesia, which reported an prolonged postoperative analgesia , which significantly decreases the need of opioids during this period[40]

Boouaziz and colleagues reported that the superiority of psoas block for analgesia after knee surgery to femoral analgesia as the latter blocks the obturator nerve to an insufficient degree[41]. However, studies conducted by both Kaloul et al and Morin et al better found no significant difference in pain scores . [42]

In our study, pain assessed by visual analogue scale (VAS) were low (psoas-sciatic block) . Kaloul, made a study in which the sciatic nerve was not blocked. It is due to the the pain arising from the sciatic nerve may be significant after knee arthroplasty[43], that this combination may be essential.

Morin and colleagues conducted study in which , the combined femoral and sciatic catheter group had fixed infusion rates opioid consumption over 24 hours was much higher in the study by Morin and colleagues

Frassanito and colleagues did a study on 2008 conducted on 40 patients on "The efficacy of the psoas compartment block versus the intrathecal combination of morphine, fentanyl and bupivacaine for postoperative analgesia after primary hip arthroplasty", it was found that the visual analogue score was lower in psoas compartment block group than in intrathecal fentanyl-morphine group , [44]. In the same study by Frassanito and colleagues, tramadol consumption was lower in the intrathecal morphine fentanyl group than in the psoas compartment block group during the first 24 hours. This doesn't agree with the results of our study regarding 24 hr postoperative pethidine consumption which revealed being lower [combined psoas-sciatic]

The incidence of first dose of rescue analgesia in our study is at 9 to 10 hours is 48.3 %(29 out of 60 patients) and at 10 to 11 hours is 51.7 %(31 out of 60 patients).

Moreno and Cassalia in their study "lumbar plexus anesthesia: Psoas compartment block" in 2006 that blockade of only one extremity

avoids side effects of central neuroaxial blockades like spinal anesthesia. This allows fast recovery, early ambulation, , which perfectly supports the results of the current study.

Raimer and colleagues, in their prospective study continuous psoas and sciatic block have good effects compared to epidural analgesia or i.v opioid analgesia.He reported that post operative analgesia by epidural or continuous psoas-sciatic blocks was better than by intravenous opioid patient controlled analgesia. This result shows that adequate analgesia after total knee arthroplasty cannot be obtained with intravenous patient controlled analgesia alone.[45]

Patient's should agree regional techniques and it depends on different factors, such nerve stimulations, intensity of stimulation, paresthesia, repeated needle insertions, correct placement of needle , and needle puncture site , muscle contractions, bony injury and sedation[46].

Lastly, this was implicated upon the surgeons impression that their patients are likely to have positive emotional response about their experience, and comfortable postoperative period provided by the long lasting lumbar plexus together with sciatic nerve blocks analgesia

FOLLOWING PARAMETERS WERE NOTED IN OUR STUDY

- Time of onset of sensory blockade
- Time taken for onset of motor blockade:
- From the time of block, visual analogue scale noted for every 30 minutes 1hour,2 hour by 4, 6, and8 hours
- From the time of block Bromage score noted for 2, 6,and 8 hours
- Time elapsed till first rescue analgesia dose
- Other side effects:

Sensory blockade assessed by visual analogue scale at thirty minutes revealed a score of 1(no pain) for 59 out of 60 patients (98.3%) and 2(no pain) for 1 out of 60 patients (1.7%).

Sensory blockade assessed by visual analogue scale at one hour revealed a score of 1(no pain) for 58 out of 60 patients (96.7%) and a score of 2(no pain) for 2 out of 60 patients (3.3%).

Sensory blockade assessed by visual analogue scale at two hours revealed a score of 1(no pain) for 56 out of 60 patients (93.3%) and a score of 2(no pain) for 4 out of 60 patients (6.7%).

Sensory blockade assessed by visual analogue scale at four hours revealed a score of 1(no pain) for 52 out of 60 patients (86.7%) and a score of2(no pain) for 8 out of 60 patients (13.3%).

Sensory blockade assessed by visual analogue scale at six hours revealed a score of 1 for 18 out of 60 patients (30%), a score of 2 for 33 out of 60 patients (55%) and a score of 3 for 9 out of 60 patients (15%).

Sensory blockade assessed by visual analogue scale at eight hours revealed a score of 2 for 26 out of 60 patients (43.3%) and a score of 3 for 34 out of 60 patients (56.7%).

Motor blockade assessed by modified bromage scale at 2 hours revealed a score of 1(complete block – unable to move feet or knee) in 60 out of 60 patients (100%).

Motor blockade assessed by modified bromage scale at 6 hours revealed a score of 2(almost complete block – unable to move feet only) in 44 out of 60 patients (73.3%) and 3(partial block – able to move knees) in 16 out of 60 patients(26.7%).

Motor blockade assessed by modified bromage scale at 8 hours revealed a score of 3(partial block – able to move knees) in 29 out of 60

patients (48.3%) and 4(detectable weakness of hip flexion while supine, full flexion of knees) in 31 out of 60 patients (51.7%).

The incidence of first dose of rescue analgesia at 9 to 10 hours is 48.3 %(29 out of 60 patients) and at 10 to 11 hours is 51.7 %(31 out of 60 patients).

Sensory blockade by visual analogue scale reveals no pain upto 8 hours and almost complete block upto upto 6 hours in 73.3% of patients and good analgesic effect upto 9 to 10 hours in 48.3 %(29 out of 60 patients) and at 10 to 11 hours is 51.7 %(31 out of 60 patients).

So overall combined psoas comapartment block and sciatic nerve block provides effective sensoryblockade ,motor blockade and good postoperative analgesic effect

CONCLUSION

This study concluded that skillful application of psoas compartment block by posterior approach[WINNIES APPROACH] and proximal sciatic nerve block[LABATS APPROACH] provides adequate intraoperative analgesia for major lower extremity procedures and maintains prolonged postoperative analgesia with significantly lower consumption of opioid analgesics. It also provides, early ambulation, short hospital stay and far less side effects when compared with neuroaxial blocks such as hemodynamic instability, meningeal irritation, introduction of infections, neurological complications and others. Finally, both patient and surgeon satisfaction were achieved successfully with psoas compartment block and sciatic nerve block. Combined psoas compartment block and sciatic nerve block is a safe and effective alternative for analgesia for lower limb surgeries.

BIBILIOGRAPHY

1. Koller C On the use of cocaine for producing anaesthesia on the eye. Lancet 1884; 2: 990.
2. Bier A. Versuche über Cocainisirung des Rückenmarkers. Dtsch Z Chir 1899; 5151:361.
3. Winnie AP, Ramamurthy S, Durrani Z. The inguinal paravascular technique of lumbar plexus anesthesia: The “3 in 1” block. Anesth Analg 1973; 52: 989-996.
4. Winnie AP, Ramamurthy S, Durrani Z. Plexus blocks for lower extremity surgery: new answers to old problems. Anesth Rev 1974; 1: 1-6.
5. Chayen D, Nathan H, Chayen M. The psoas compartment block. Anesthesiology 1976; 45: 95-99.
6. Farny J, Drolet P, Girard M. Anatomy of the posterior approach to the lumbar plexus block. Can J Anaesth 1994; 41: 480-485.
7. Kirchmair L, Lirk P, Colvin J, Mitterschiffthaler G, Moriggl B. Lumbar Plexus and Psoas Major Muscle: Not Always as Expected. Reg Anesth Pain Med 2008; 33: 109-114.

8. Parkinson SK, Mueller JB, Little WL, Bailey SL. Extend of blockade with various approaches to the lumbar plexus. Anesth Analg 1989; 68: 243-248.

9. Hanna MH, Peat SJ, D'Costa F. Lumbar plexus block: An anatomical study. Anaesthesia 1993; 48: 675-678.

10. Capdevila X, Macaire P, Dadure C, Choquet O, Biboulet B, Ryckwaert Y, D'Athis F. Conyinuous psoas compartment block for postoperative analgesia after total hip arthroplasty: New landmarks, technical guidelines, and clinical evaluation. Anesth Analg 2002; 94: 1606-1613

11. Pandin PC, Vandersteene A, d'Hollander AA. Lumbar plexus posterior approach: A catheter placement decription using electrical nerve stimulation. Anesth Analg 2002; 95: 1428-1431.

12. Mannion S, O'Callaghan S, Walsh M, Murphy DB, Shorten GD. In With the New, Out with the Old? Comparison of Two Approaches for Psoas Compartment Block. Anesth Analg 2005; 101: 259-64.

13. Capdevila X, Coimbra C, Choquet O. Approaches to the Lumbar Plexus: Success, Risks, and Outcome. Reg Anesth Pain Med 2005; 30: 150-162.

14. Mannion S. Epidural spread depends on the approach used for posterior lumbar plexus block. Can J Anesth 2004; 51: 516-7.

15. Aida S, Takahashi H, Shimoji K. Renal subcapsular hematoma after lumbar plexus block. Anesthesiology 1996; 84: 452-455.

16. Heller AR, Fuchs A, Rossel T, Vicent O, Wiessner D, Funk RHW, Koch T, Litz RJ. Precision of Traditional Approaches for Lumbar Plexus Block. Anesthesiology 2009; 111: 525-32.

17. Stevens RD, Van Gessel E, Flory N, Fournier R, Gamulin Z. Lumbar plexus Block reduces pain and blood loss associated with total hip arthroplasty. Anesthesiology 2000; 93: 115-121

18. Marhofer P, Harrop-Griffiths W, Willschke H, Kirhmair L. Fifteen years of ultrasound guidance in regional anaesthesia: Part 2 – Recent developments in block techniques. Br J Anaesth 2010; 104: 673-83.

19. Ilfeld BM, Loland VJ, Mariano ER. Prepuncture ultrasound imaging to predict transfer process and lumbar plexus depth for psoas compartment block and perineural catheter insertion: a prospective, observational study. Anesth Analg 2010; 110:1725-8.

20. Karmakar MK, Ho AM, Li X, Kwok WH, Tsjang K, Ngan Kee WD. Ultrasound-guided lumbar plexus block through the acoustic

window of the lumbar ultrasound trident. Br J Anaesth 2008; 100: 533-7.

21. Kirchmair L, Entner T, Kapral S, Mitterschiffhaler G. Ultrasound guidance for the psoas compartment block: an imaging study. Anesth Analg 2002; 94: 706-10.

22. Ganidagli S, Cengiz M, Baysal Z, Baktiroglu L, sarban S. The comparison of the two lower extremity block techniques combined with sciatic block: 3-in-1 femoral block vs. psoas compartment block. Int J Clin Pract 2005; 59: 771-6.

23. Kaloul I, Guay J, Côté C, Falhalla M. The posterior lumbar plexus (psoas compartment) block and the three-in-one femoral nerve block provide similar postoperative analgesia after total knee replacement. Can J Anaesth 2004; 51: 45-51.

24. Tokat O, Turker YG, Uckunkaya N, Yilmazlar A. A clinical comparison of psoas compartment and inguinal paravascular blocks combined with sciatic nerve block. J Int Med Res 2002; 30: 161-7.

25. Biboulet P, Morau D, Aubas P, bringuier-Branchereau S. Capdevial X. postoperative analgesia after total-hip arthroplasty: Comparison of intravenous patient-controlled analgesia with morphine and single injection of femoral nerve or psoas

compartment block. A prospective, randomized, double-blind study. Reg Anesth Pain Med 2004; 29:102-9.

26. Birnbaum K, Prescher A, Hessler S, Heller KD. The sensory innervation of the hip joint – an anatomical study. Surg Radiol Anat 1997; 19: 371-5.

27. Becchi C, Al Malyan M, Coppini R, Campolo M, Magherini M, Boncinelli S. Opioid-free analgesia by continuous psoas compartment block after total hip arthroplasty. A randomized study. Eur J Anaesthesiol 2007; 21: 1-6.

28. Mannion S. Psoas compartment block. Continuing Education in Anaesthesia, Critical Care and Pain 2007; 5: 162-6.

29. Turker G, uckunkaya N, Yavascaoglu B, Yilmazlar A, Ozcelik S. Comparison of the catheter-technique psoas compartment block and the epidural block for analgesia in partial hip replacement surgery. Acta Anaesthesiol Scand 2003; 47: 30-6.

30. Veering BT, Cousins MJ. Epidural neural blockade (Chapter 11). In Cousins and Bridenbaugh. Neural Blockade in Clinical Anesthesia and Pain Medicine. Fourth edition. Philadelphia: Lippincott Williams & Wilkins, 2009: pp 241-95.

31. Devisme V, Picart F, Le Jouan R, Legrand A, Savry C, Morin V. Combined lumbar and sacral plexus block compared with plain

bupivacaine spinal anesthesia for hip fractures in the elderly. Reg Anesth Pain Med 2000; 25: 158-62

32 Bogoch ER, Henke M, Mackenzie T, Olschewski E, Mahomed NN. Lumbar paravertebral nerve block in the management of pain after total hip and knee arthroplasty: a randomized controlled clinical trial. J Arthroplasty 2002; 17: 398-401.

33. RYEKWARTE Y, MACAIRE P, CHOQUET O: Postoperative analgesia by continuous psoas compartment block after total hip arthroplasty

34. HORLOCKER TT, HEBLJR, KINNEY MAO :Opioid free analgesia following total knee arthroplasty.. a multimodal approach using continuous lumbar plexus block

35. BIBLOQUET L, MORAU D, RYEWARTE G: Extent of blockade to the thigh after anterior and posterior approach to the lumbar plexus

36. MONTES FR, ZARATE E: comparison of spinal anesthesia with sciatic femoral nerve block for outpatient knee arthroscopy.

37. ATIM A, ERGIN A, KURT E, GUZULDEMIR E : comparison of sciatic psoas compartment block with sciatic femoral 3 in 1 lock for knee arthroscopy

38. GANIDAGLI S, CENGIZ M, AND BAYSAL Z: The comparison of two lower extremity block techniques combined with sciatic block: three in one femoral block vs psoas compartment block

39. AL NASSER B, PALACIOS JL: femoral nerve injury complicating psoas compartment block

40. MORENO M, AND CASALIA AG: Techniques in regional anaesthesia and pain management

41. BOUZIZ H, VIAL , MACALOU D, MEURET P, LAXENAIRE MC : an evaluation of cutaneous distribution after obturator nerve block

42. MORIN A KRATZE C EHECARTI DIGNESG HEIDERE SCHWARZNN EISENHARDT GGELDNERG WULFH postoperative analgesia and functional recovery after total knee replacement comparison of continuous posterior lumbar plexus block and continuous femoral nerve block

43. PHAM DANG C, GATHERON E, GUILLEY J , PINAUD M : the value of adding scitic block to continuous femoral block for analgesia

44. FRASSANITO M, RODOLA G: the efficacy of psoas compartment block versus the intrathecal combination of

morphine, fentanyl and bupivacaine for postoperative analgesia after primary hip arthroplasty otal knee knee replacement

45. CHELLY J, GERGER J, BUCKE R, CRISWELL A: continuous femoral block improve recovery and outcome of patients undergoing total knee arthroplasty

46. CAPDEVILA X, MACAIRE P, DDURE C, CHOQUET O: Continuous psoas compartment block for postoperative analgesia after total hip arthroplasty.. new landmarks, technical guideline,

ANNEXURE

PATIENT INFORMATION SHEET

INFORMATION TO THE PARTICIPANTS

Principal investigator

DR.LAKSHMI SREE.M.S,

I year MD post graduate,

Department of Anaesthesiology

Chengalpattu medical college, Chengalpttu.

Name of the participant :

Title: "COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES"

You are invited to take part in this study. The information in the document is meant to help you decide whether or not to take part . Please feel free to ask if you have any queries or concerns.

You are being asked to participate in this *study* being conducted in the Department of Anesthesiology, Chengalpattu medical college.

Purpose of the research:

- To find whether Psoas compartment block and sciatic nerve block provide better anaesthesia and post op analgesia .
- We have obtained permission from the Institutional Ethical Committee.

STUDY DESIGN

Randomized Prospective study

STUDY PROCEDURE:

- Study involves adult patients of ASA I- II posted for elective lower limb surgeries. Age between 18to60 years
- Sample size 60
- Randomization – computer generated random numbers
- Monitors – NIBP,ECG AND SPO2
- Anaesthesia: psoas compartment block and sciatic nerve block given using nerve stimulator.
- Assessment: Time of onset of analgesia and motor blockade, total duration of analgesia and sensory blockade.

CONSENT FORM

சுயஒப்புதல்படிவம்

ஆய்வுசெய்யப்படும்தலைப்பு : “A STUDY ON “ COMBINED PSOAS COMPARTMENT BLOCK AND SCIATIC NERVE BLOCK FOR ELECTIVE LOWER LIMB SURGERIES”

ஆய்வு செய்யப்படும் இடம்:

பங்கு பெறுபவரின் பெயர்:

பங்கு பெறுபவரின் வயது: பங்கு பெறுபவரின் எண் :

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கபட்டுள்ளது. நான் இவ்வாய்வில் தன்னிச்சையாக பங்கேற்கின்றேன். எந்த காரணத்தினாலோ, எந்த சட்டசிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன்.

இந்த ஆய்வு சம்பந்தமாகவோ,இதைசார்ந்து மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்கு பெறும் மருத்துவர், என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவை இல்லை என அறிந்துகொள்கிறேன். இந்த ஆய்வின் மூலம் கிடைக்கும் தகவலையோ, முடிவையோ பயன்படுத்திக்கொள்ள மறுக்கமாட்டேன்.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன்.

பங்கேற்பவரின்கையொப்பம்: சாட்சியாளரின்கையொப்பம்

இடம்: இடம்:

தேதி: தேதி :

பங்கேற்பவரின்பெயர்மற்றும்விலாசம்:

ஆய்வாளரின்கையொப்பம்:

இடம்: தேதி:

PROFORMA

- Name :
- Age /sex:
- IP no :
- Date of admission :
- Date of surgery :
- Address for communication:
- Contact no:
- Diagnosis :
- Surgery :
- H/o comorbid illness
- physical examination
- Weight :
- Pulse rate:
- Blood pressure:
- Cardiovascular system:

- Respiratory system:
- abdomen:
- Central nervous system:
- Mallampati classification class:
- ASA PS class :
- Investigations :
    - Hemoglobin:
    - Total count
    - Differential count
    - Platelets
    - Renal function test:
    - Urine routine:
    - Electrocardiogram:
    - Chest x ray:
    - Electrolytes:
    - Others :

- Intraop monitoring
- Noninvasive Blood Pressure monitor
- Electrocardiogram
- Pulse Oximeter

Premedication

- Time of onset of sensory blockade
- Time taken for onset of motor blockade:
- From the time of induction of anaesthesia, visual analogue scale noted for every 30 minutes 1,2,4, 6 and 8 hours
- From the time of induction of anaesthesia Bromage score noted for 2, 6, 8 hours
- Time elapsed till first rescue analgesia

MASTER CHART

N0	NAME	AGE	SEX	IP NO	DIAGNOSIS	PROCEDURE	SENSORY BLOCKADE						MOTOR BLOCKADE			RESCUE ANALGESIA [IN HOUR]
							VISUAL ANALOGUE SCALE						BROMAGE SCALE			
							1 MIN	1H	2H	4H	6H	8H	2H	6H	8H	
1	VARADHARAJAN	46	M	45729	FRACTURE DISTAL RT FEMUR	OPENREDUCTION	1	1	1	2	2	2	1	2	4	1OH20MIN
2	RAJA	26	M	26817	BIMALLEOLARFRACTURE RT LEG	OPENREDUCTION	1	1	1	2	2	3	1	2	3	10H30 MIN
3	PANJALAI	38	F	25591	METATARSAL FRACTURE RT LEG	OPENREDUCTION	1	2	2	2	2	2	1	2	3	10H15 MIN
4	DHAYALAN	38	M	22345	INFECTEDWOUND LT LEG	WOUNDDEBRIMENT	1	1	1	1	1	2	1	2	3	10H40MIN
5	MADHURAI	44	M	24777	CRUSHINJURY LT FOOT	BELOWKNEEAMPUTATION	1	1	1	1	2	2	1	2	3	10H15MIN
6	KARUNAKARAN	58	M	24663	OSTEOMYELITIS RT THIGH	SEQUESTRECTOMY	1	1	1	1	2	2	1	2	3	10H50MIN
7	VINAYAGAN	58	M	19844	INFECTIVE WOUND LT ANKLE	WOUND DEBRIMENT	1	1	1	1	2	2	1	2	3	10H25MIN
8	ARULANANTAN	60	M	28348	FRACTURE BB RT LEG	OPENREDUCTION	1	1	1	1	2	3	1	2	3	10H35MIN
9	VENKATESAN	38	M	24144	BIMALLEOLAR FRACTURE RT LEG	OPENREDUCTION	1	1	1	1	2	3	1	2	3	10H40MIN
10	SUMATHY	30	F	24336	IMPLANT RT LEG	IMPLANT REMOVAL	1	1	1	1	2	3	1	2	3	10H45MIN
11	SURESH	27	M	21334	FRACTURE BOTHBONE LT LEG	IM NAILING	1	1	1	1	3	3	1	2	3	9H40MIN
12	MARI	60	M	20831	FRACTURE BB LT LEG	OPENREDUCTION	1	1	1	1	3	3	1	2	3	10H20MIN
13	SUBRAMANIAN	60	M	22525	OSTEOMYELITIS RT LEG	SEQUESTRECTOMY	1	2	2	2	3	3	1	3	3	9H35MIN
14	RAJALAKSHMI	60	F	23232	IMPLANT RT LEG	IMPLANT REMOVAL	1	1	1	1	3	3	1	2	3	1OH20MIN
15	GANESAN	52	M	22855	LISFRANC FRACTURE RT LEG	OPENREDUCTION	1	1	1	1	3	3	1	2	3	9H10MIN
16	SAKUNTHALA	60	F	22846	FRACTURE BB LEG	OPENREDUCTION	1	1	1	1	2	3	1	3	3	1OH20MIN
17	MUNUSAMY	60	M	23435	FRACTURE BB LEG	OPENREDUCTION	1	1	1	1	2	3	1	3	4	10H30 MIN
18	SHANKAR	23	M	22543	FRACTURE DISTAL FEMUR LT	OPENREDUCTION	1	1	1	1	2	3	1	2	4	10H15 MIN
19	VIGNESH	20	M	4918	FRACTURE LT TIBIA	IM NAILING	1	1	1	1	2	2	1	2	3	10H40MIN
20	OMSAKTHI	33	F	4248	ACL TEAR LTLEG	ARTHROSCOPICREPAIR	1	1	1	1	2	2	1	2	3	10H15MIN

N0	NAME	AGE	SEX	IP NO	DIAGNOSIS	PROCEDURE	SENSORY BLOCKADE VISUAL ANALOGUE SCALE						MOTOR BLOCKADE BROMAGE SCALE			RESCUE ANALGESIA [IN HOUR]
							1 MIN	1H	2H	4H	6H	8H	2H	6H	8H	
21	SHANTI	45	F	3717	BIMALLEOLARFRACTURE RT	OPENREDUCTION	1	1	1	2	2	2	1	2	4	10H50MIN
22	BOOPATY	39	F	3087	FRACTURETIBIA LT	OPENREDUCTION	1	1	1	1	1	3	1	2	4	10H25MIN
23	DEVI	27	F	3938	BIMALLEOLARFRACTURE	SCREW FIXATION	1	1	1	1	2	3	1	2	4	10H35MIN
24	SUBRAMANI	52	M	3917	DELAYEDUNIONFEMUR	BONEGRAFTING	1	1	1	1	1	3	1	2	4	10H40MIN
25	DINESH	30	M	3286	FRACTUE BBRT LEG	OPENREDUCTION	1	1	1	1	2	3	1	2	3	10H45MIN
26	MANJULA	51	F	2860	FRACURE BBLT LEG	OPENREDUCTION	1	1	1	1	1	3	1	2	3	9H40MIN
27	VAITESWARAN	20	M	54645	FRACTURESHFTOFFEMUR	OPENREDUCTION	1	1	1	1	1	3	1	2	4	10H20MIN
28	VAIRAM	21	M	2498	FRACTURE BBLT LEG	OPENREDUCTION	1	1	1	1	1	3	1	2	4	9H35MIN
29	PONAMBALAM	28	M	2264	FRACTURE BB RT LEG	OPENREDUCTION	1	1	1	1	2	3	1	2	3	1OH20MIN
30	AYYANAR	20	M	2932	FRACTURE LT PATELLA	TENSIONBANDWIRNG	1	1	1	1	2	3	1	3	3	9H10MIN
31	SUNDARAMAL	60	F	52667	FRACTURE BBLTLEG	OPENREDUCTION	1	1	1	1	2	2	1	3	3	10H10MIN
32	DURAI	59	M	54678	FRACTURE FEMURLT	HEMIARTHROPLASTY	1	1	1	1	2	2	1	2	4	10H15 MIN
33	KARTHICK	27	M	53759	FRACTURE BB RT LEG	OPENREDUCTION	1	1	1	1	1	2	1	2	4	10H20MIN
34	POONAMAL	60	F	53716	BIMALLEOLAR FRACTURE	OPENREDUCTION	1	1	1	1	3	3	1	2	4	10H25MIN
35	PRASANTH	22	M	49468	FRACTURE RT TIBIA	OPENREDUCTION	1	1	1	1	2	2	1	3	4	9H40MIN
36	DAYALAN	60	M		FRACTURE BBRT LEG	OPENREDUCTION	1	1	1	1	1	3	1	2	3	9H35MIN
37	HARIKRISHNAN	59	M	45533	FRACTURE BB LT LEG	OPENREDUCTION	1	1	1	1	2	3	1	2	3	9H55MIN
38	CHARULATA	19	F	45750	FRACTURE BB RT LEG	IM NAILING	1	1	1	1	1	3	1	2	4	9H40MIN
39	AJITHKUMAR	30	M	45173	CRUSHINJRY LT FOOT	LT BK AMPUTATION	1	1	1	1	2	3	1	2	4	9H45MIN
40	SUNDARAM	55	M	39493	FRACTURERT TIBIA	OPENREDUCTION	1	1	1	1	1	3	1	2	4	9H55MN
41	PAZHANI	55	M	48709	FRACTURE BB RTLEG	OPENREDUCTION	1	1	1	2	2	3	1	2	3	10h40 MIN
42	MATHAN	58	M	49202	FRACTURE RT TIBIA	IM NAILING	1	1	1	1	2	3	1	2	4	9H30MIN

N0	NAME	AGE	SEX	IP NO	DIAGNOSIS	PROCEDURE	SENSORY BLOCKADE VISUAL ANALOGUE SCALE						MOTOR BLOCKADE BROMAGE SCALE			RESCUE ANALGESIA [IN HOUR]
							1 MIN	1H	2H	4H	6H	8H	2H	6H	8H	
43	KALI	39	M	39892	FRACTURE BBLT LEG	OPENREDUCTION	1	1	1	1	2	2	1	2	4	10H5MIN
44	ETTIAMMAL	50	F	38682	FRACTURE TIBIA	IM NAILING	1	1	1	1	2	2	1	2	4	9H15MIN
45	PRAVEEN	20	M	49735	METATARSAL FRACTURELT	OPENREDUCTION	1	1	1	1	1	3	1	3	4	9H20MIN
46	NAGENDRAN	50	M	40396	FRATURE BB LT LEG	OPENREDUCTION	1	1	1	1	1	2	1	3	4	10H35MIN
47	MATHAN	25	M	44131	FRACTURELT PATELLA	TENSIONBANDWIRING	1	1	1	1	1	2	1	2	3	10H30MIN
48	RAJINI	22	M	43414	FRACTURE RT TIBIA	OPENREDUCTION	1	1	1	1	2	2	1	2	3	10H25MIN
49	ARAVIND	20	M	42172	OSTEOMYELITIS LT LEG	SEQUESTRECTOMY	1	1	1	1	1	2	1	2	4	9H25MIN
50	RAMESH	30	M	45022	RT TIBIA	OPENREDUCTION	1	1	1	1	1	2	1	3	4	10H20MIN
51	SHANMUGAM	35	M	46933	INFECTED IMPLANT LEG	IMPLANT EXIT	1	1	1	1	1	2	1	2	3	9H45MIN
52	SENTHIL	31	M	47391	IMPLANT LT LEG	IMPLANTEXIT	1	1	1	1	1	2	1	2	3	9H30MIN
53	MAHALINGAM	60	M	46352	FRACTURE BB LT LEG	OPENREDUCTION	1	1	1	1	1	2	1	2	4	9H40MIN
54	MURALIKRISNAN	40	M	46827	IMPLNT RT LEG	IMPLANT EXIT	1	1	1	2	2	3	1	3	4	9H50MIN
55	CHINNAPONNU	60	F	44592	FRACTURE RT DISTAL FEMUR	OPENREDUCTION	1	1	1	2	3	3	1	3	4	9H10MIN
56	KASTURI	60	F	45097	FRACTURE BB LT LEG	OPENREDUCTION	1	1	1	2	3	3	1	3	4	9H30MIN
57	MURALIKRISHNAN	28	M	46027	FRACTURE LT TIBIAL CONDYLE	OPENREDUCTION	1	1	1	1	3	3	1	3	4	10H10MIN
58	PAKKIRI	35	M	46512	FRACTURE BB RT LEG	OPENREDUCTION	1	1	1	1	2	2	1	3	4	10H20MIN
59	PRASANTH	23	M	46222	IMPLANT RT LEG	IMPLANT EXIT	1	1	1	1	2	2	1	3	4	9H40MIN
60	SANKAR	43	M	48720	DELAYED UNION RT F	BONE GRAFTING	1	1	1	1	2	3	1	3	4	9H25MIN