A COMPARATIVE STUDY OF CAUDAL BLOCK USING LIGNOCAINE ALONE AND WITH KETAMINE FOR ADULT ANORECTAL SURGERIES

DISSERTATION SUBMITTED FOR THE FULFILLMENT OF

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BRANCH X – ANAESTHESIOLOGY

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DEPARTMENT OF ANAESTHESIOLOGY

MADURAI MEDICAL COLLEGE

MADURAI

CERTIFICATE

This is to certify that the dissertation entitled "**A COMPARATIVE STUDY OF CAUDAL BLOCK USING LIGNOCAINE ALONE AND WITH KETAMINE FOR ADULT ANORECTAL SURGERIES**", is a bonafide record work done by **DR. M. MURALI MOHAN**, in the Department of Anaesthesiology, GovernmentRajaji Hospital, Madurai Medical College, Madurai.

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DECLARATION

I**, Dr. M. MURALI MOHAN** solemnly declare that the dissertation titled **"A** COMPARATIVE **STUDY OF CAUDAL BLOCK USING LIGNOCAINE ALONE AND WITH KETAMINE FOR ADULT ANORECTAL SURGERIES"** has been prepared by me.

This is submitted to The Tamilnadu Dr.M.G.R.Medical University, Chennai, in partial fulfillment of the regulations for the award of MD degree Branch X [Anaesthesiology].

Madurai. **Dr. M. MURALI MOHAN**

Date:

ACKNOWLEDGEMENT

I am deeply indebted to all the patients for submitting themselves for this study and I express my heartfelt gratitude to all of them.

It was with great trepidation and with a sense of unknown that I ventured into one of the novel and most advancing branches of Medicine, Anaesthesiology. It is to the credit of my teachers that I managed to stay and began working on my dissertation.

If not for my Professor **DR.S.SUBBIAH,** MNAMS, DA., M.D., DCH., Professor and Head of Department of Anaesthesiology, Madurai Medical College, Madurai who gave invaluable guidance and inspiration, this study would not have consummated to its logical conclusions. I sincerely thank him for his encouragement and support at every stage of this study.

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CONTENTS

INTRODUCTION

Anorectal diseases are common in adult population. They constitute about 4 -5% in western literature, of which 10-15% require surgery. Anorectal diseases are peculiar in that the procedure itself is of short duration but require very deep plane of anaesthesia and postoperative problems like intense pain , bladder , bowel and sexual dysfunction are common due to the common innervation of the pelvic organs.

The trend in many western countries and non-western countries is to perform minor anorectal surgeries on a day care basis. This trend is likely to follow in our country due to the increasing health care costs and ever increasing wait lists for surgery.

Anorectal surgeries are done under General anaesthesia, Regional anaesthesia, or local blocks. None of these methods are ideal; each has its own advantages and disadvantages. Proper patient selection is essential for the success of each of these methods.

Adult Caudal epidural block is gaining popularity among anaesthetists in the recent times after being unpopular for sometime due to the perceived difficulty in performing the procedure as the anatomy of the sacral hiatus is highly variable in the adult patient (as contrast to the paediatric population).

Nevertheless the advantages like predictable level of blockade depending on the dose of drug ,

haemodynamic stability , possibility of producing the selective block in the anorectal area without producing the motor blockade in legs (and consequent ambulation soon after surgery) , absence of Post dural puncture headache, Prolonged post op analgesia using longer acting local anaesthetic drugs and adjuvants have stimulated interest in the caudal epidural technique in recent times .

Consequently reports are available about the safety and efficiency of caudal blocks in variety of surgical and non surgical procedures. Caudal blocks are successfully used for anorectal surgeries, orthopedic procedures, urological procedures (e.g.TURP), gynaecological surgeries, Varicose veins, back and leg pain, etc.

Ketamine, the NMDA (N-Methyl D-Aapartate) receptor blocker has been widely studied as an adjuvant in the Paediatric caudals as well as in adult epidural blocks. Studies using Ketamine as a sole anaesthetic agent in Paediatric caudals are being published. But in the adult population the results are not consistent. Some studies concluded that Ketamine prolonged the duration of anaesthesia while some other studies failed to confirm this.

This study was conducted by the Department of Anaesthesiology in GOVT. RAJAJI HOSPITAL, MADURAI to study the effects of subanaesthetic dose of Ketamine in caudal epidural block using Lignocaine.

This study conducted on 50 adult patients coming for anorectal surgeries, shows that Adult Caudal block is safe, efficient and simple technique for anorectal surgeries. It also shows that addition of ketamine to lignocaine did prolong the duration of the anaesthesia and significantly increased the quality of the sensory block. The advantages of Adult Caudal epidural block can be exploited by careful selection of the patients.

Even though there are some failures due to technical difficulties these can be overcome by experience and practice. The caudal blocks are particularly well suited for day care surgeries were early ambulation and lack of post operative complications are major concerns.

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATIONS

Caudal epidural was first used in Paris in 1901 by Cathelin and Sicard. Since then it has become very popular in Paediatric patients. Caudal epidural block for Adult anorectal surgeries is being used since around 2000.

Nerve supply of anorectal region:

Anorectal surgery requires deep anesthesia because the zone gets multiple nerve supply and is reflexogenic. Operations under light planes of anesthesia will cause intense pain, reflex body movements, tachypnoea and laryngeal spasm, the so-called Brewer–Luckhardt reflex.

Nerve supply is mixed, somatic and autonomic, common with other pelvic structures. Sympathetic supply comes from sympathetic chain to hypogastric plexus (getting branches from L1–L5) and celiac plexus (Th11–L2), and sympathetic nerves proceed to pelvic plexuses. Parasympathetic supply comes from ventral rami of S2–S4 and forms the pelvic splanchnic nerves. These join the sympathetic plexuses to then relay in tiny end organ ganglia. Functionally, parasympathetic fibers provide rectal and bladder motor function inhibit sphincteric muscle and cause genital vasodilatation. Sympathetic fibers inhibit visceral motor function and provide contraction of sphincteric muscle.

Somatic nerve supply to the pelvic floor and external sphincters comes from sacral plexus (L4–L5 and S1–S4 segments). Coccygeal zone gets nerve fibers from S4, S5 and Co1. The main somatic nerves are:

1. Pudendal nerve (S2–S4), it gives origin to inferior hemorrhoidal nerve, which supplies the external anal sphincter and perianal skin. Other branches of pudendal nerve supply some peripheral fibers of the levator ani as well as the vagina, the base of the bladder, ischiocavernosus and bulbospongiosus muscles, penis and clitoris. Autonomic fibers supplying rectum and urinary bladder join the pudendal nerve.

2. Direct perineal branches from S3–S4 supply major part of levator ani, puborectalis and has afferent fibers from the anal canal and perianal skin.

3. Anococcygeal nerve (S4, S5, and Co1) innervates the skin over the coccyx.

4. Superior gluteal nerve (L4 and L5, S1).

5. Inferior gluteal nerve (L5, S1, and S2).

6. Posterior femoral cutaneous nerve (S1–S3) gives supply to the skin of the inferior part of the gluteal region, the perineum and the back of the thigh and leg.

7. Perforating cutaneous nerve (S2 and S3) supplies the skin over the medial and lower parts of the gluteus maximus.

When applying regional anesthesia it is essential to determine an optimal dose of local anesthetics, i.e. to seek for a segmentary block of the operated area. If the operation is carried out exclusively outside of the anal canal it is sufficient to produce sacral block; however, a considerable traction of rectum requires a block up to Th10 level. Otherwise the patient will experience an unpleasant feeling of tension in the lower abdomen caused by unblocked autonomic nerve fibers.

The caudal epidural block:

Technique:

The patient is prepared as for general anaesthesia:

(1) He/she should be fasted

(2) All appropriate equipment for resuscitation must be available. Equipment for intubation, airway suction and drugs to stop convulsions (Thiopentone 2-5 mg/kg or Diazepam 0.2-0.4 mg/kg.) should be available.

(3) An intravenous cannula should always be inserted in an upper limb, to manage any accidental intravenous injection, or profound sympathetic blockade from a high epidural block.

(4) The procedure must be carried out with a strict aseptic technique. The skin should be thoroughly prepared and sterile gloves worn. Any infection in the caudal space is extremely serious.

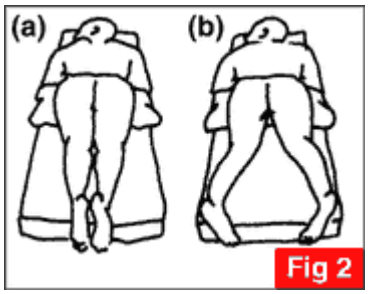
(5) There are three main approaches: the prone, the semi-prone, and the lateral. The choice

depends on the preference of the anaesthetist and the degree of sedation of the patient.

The prone position is often easiest in the adult, as fat tends to move away from the mid-line and landmarks are easier to find. However, there could be difficulty if urgent access to the airway is required. The caudal space is made more prominent by asking the patient to internally rotate their ankles (fig. 2).

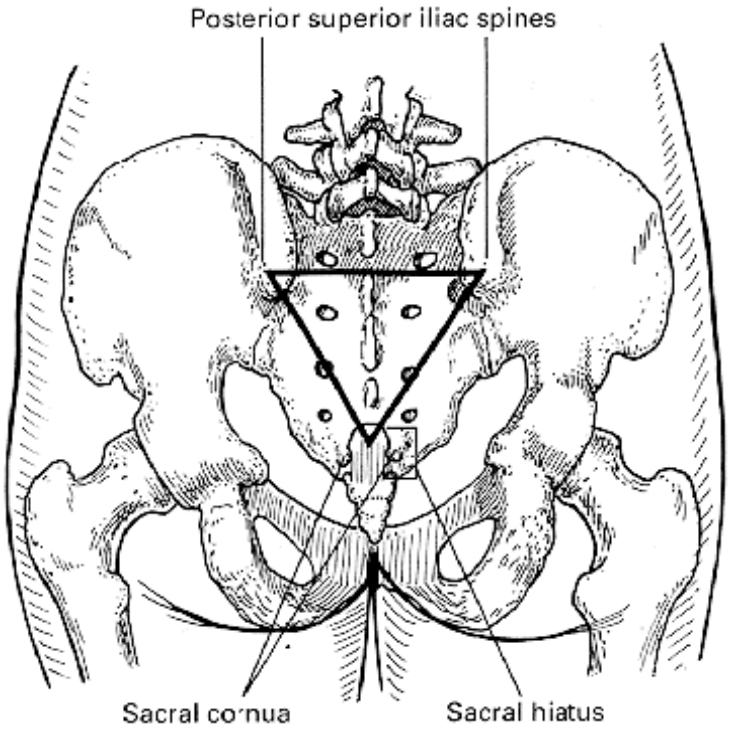
Position (a) causes contraction of the gluteal muscles.

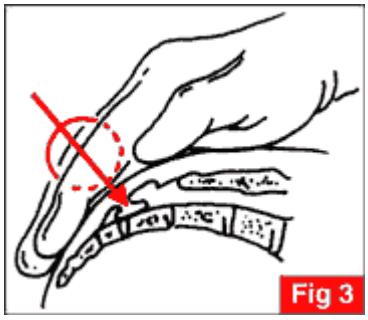
Position (b) allows relaxation of gluteal muscles.



The semi-prone position is preferred for the anaesthetised or heavily sedated patient as the airway is easier to control in this position, while still allowing reasonably easy access to the sacral hiatus. The lateral position is often used in children, as the landmarks are easier to find than in adults. Care should be taken to avoid over flexing the hips (as for lumber epidurals) as this can make the landmarks more difficult to palpate.

(6) The landmarks are palpated. The sacral hiatus and the posterior superior iliac spines form an equilateral triangle pointing inferiorly.

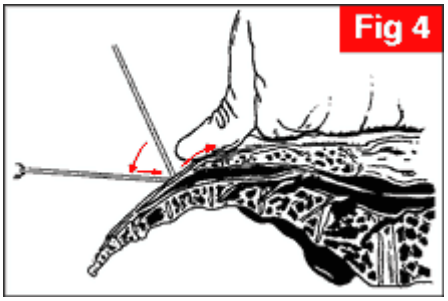




The sacral hiatus can be located by first palpating the coccyx, and then sliding the palpating finger in a cephalad direction (towards the head) until a depression in the skin is felt. (In an adult the distance from the tip of the coccyx to the sacral hiatus is approximately the same as the distance from the tip of their index finger to their proximal inter phalangeal joint)!

As there can be a considerable degree of anatomical variation in this region confirmation of bony landmarks is the key to success. The needle can penetrate a number of different structures mimicking the feel of entering the sacral hiatus. It is important to establish the midline of the sacrum as considerable variability occurs in the prominence of the cornua, causing problems unless care is taken.

(7) Once the sacral hiatus is identified the area above is carefully cleaned with antiseptic solution, and a 22 gauge short bevelled cannula or needle is directed at about 90° to skin and inserted till a "click" is felt as the sacro-coccygeal ligament is pierced. The needle is then carefully directed in a cephalad direction at an angle approaching the long axis of the spinal canal.



Care should be taken not to insert the needle too far as the dura lies at or below the S2 level in the child.

(8) The needle should be aspirated looking for either CSF or blood. A negative aspiration test does not exclude intravascular or intrathecal placement. Care should always be taken to look for signs of acute toxicity during the injection. The injection should never be more than 10 ml/30 seconds.

Further tests to confirm the correct position include gently moving the tip of the needle from side to side. The needle will feel firmly held by the sacrococcygeal membrane. Introduction of a small amount of air will not produce subcutaneous emphysema, and will be heard as a "woosh" sound if a stethoscope is place further up the lumbar spine. Light blood staining is not uncommon and indicates entry into the sacral canal. There should be no local pain during injection. Tingling or a feeling of fullness that extends from the sacrum to the soles of the feet is common during injection.

(9) A small amount of local anaesthetic should be injected as a test dose (2-4mls). It should not produce either a lump in the subcutaneous tissues, or a feeling of resistance to the injection, nor any systemic effects such as arrhythmias, peri-oral tingling, numbness or hypotension. If the test dose does

not produce any side effects then the rest of the drug is injected, the needle removed and the patient positioned for surgery.

In the post-operative period, motor function must be checked and the patient should not be allowed to try and walk until complete return of motor function is assured. The patient should not be discharged from hospital until he/she has passed urine, as urinary retention is a recognized complication.

Complications:

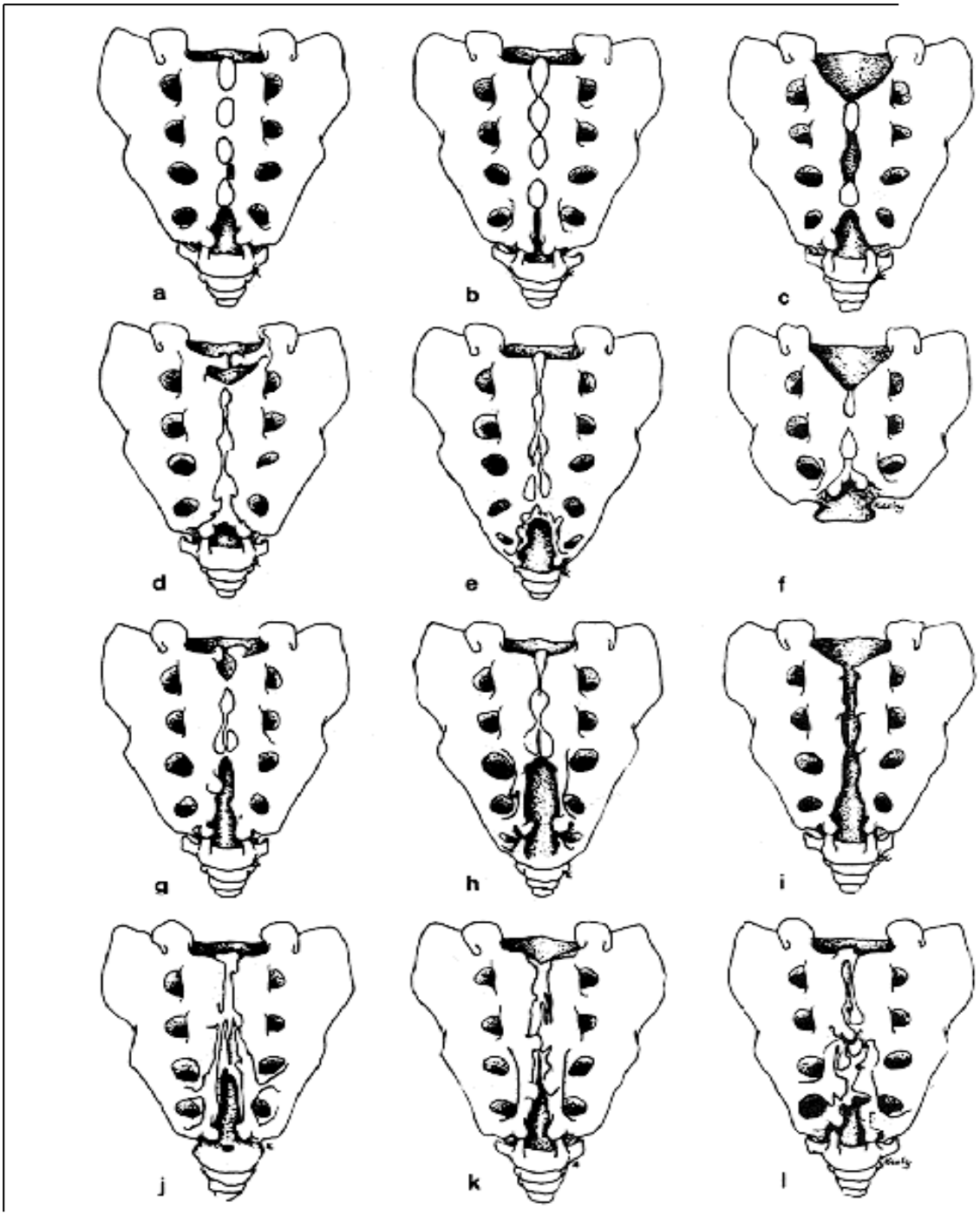
- Intravascular or intraosseous injection. This may lead to grand mal seizures and/or cardio-respiratory arrest.
- Dural puncture. Extreme care must be taken to avoid this as a total spinal block will occur if the dose for a caudal block is injected into the subarachnoid space. If this occurs then the patient will become rapidly apnoeic and profoundly hypotensive. Management includes control of the airway and breathing, and treatment of the blood pressure with intravenous fluids and vasopressors such as ephedrine.
- Perforation of the rectum. While simple needle puncture is not important, contamination of the needle is extremely dangerous if it is then inserted into the epidural space.
- Sepsis. This should be a very rare occurrence if strict aseptic procedures are followed.
- Urinary retention. This is not uncommon and temporary catheterisation may be required.
- Subcutaneous injection. This should be obvious as the drug is injected.
- Haematoma
- Absent or patchy block.

REVIEW OF LITERATURE

VARIATIONS IN THE ADULT SACRAL ANATOMY:

The difficulty in performing the caudal block in adult patients is mainly due to the wide variations that occur in the anatomy of the sacral hiatus. This is the reason for anaesthetists abandoning the adult caudals. In a paper published in 1993, Zito S J, claimed that "Adult caudal blockade has fallen from favor in the anesthesia community. The majority of anesthesia providers now use lumbar epidurals and spinals for surgeries that can be done with caudals. Many claim the procedure is difficult to perform and the outcome of the block is unpredictable. Caudal anesthesia has distinct advantages over lumbar epidurals and spinals and can be done with confidence by anesthetists who are willing to learn the anatomy, basic skills, and limitations entailed in this lost technique."(Adult caudal anesthesia: a reexamination of the technique. AANA J. 1993 Apr; 61 (2):153-7)

In a study to clarify the anatomic variations in adult sacra using 92 isolated sacra, Sekiguchi M, Yabuki S, Satoh K, Kikuchi S., found that Forty-two percent of the cases have both hiatus and cornu. Four percent of the cases showed the absent hiatus. The apex of sacral hiatus existed at the level of S4 vertebrae in 64% of the cases. The average diameter of the sacral canal was 6.0 +/- 1.9 mm. The average distance of bilateral sacral cornua was 10.2 +/- 0.35 mm. There were closed hiatus in 3% of cases. (An anatomic study of the sacral hiatus: a basis for successful caudal epidural block. Clin J Pain. 2004 Jan-Feb; 20 (1):51-4).



In another interesting study by I.M.Crighton et al conducted at University Hospital, Nottingham, the MRI images sacra, showed considerable anatomical variations. The authors

concluded that for the successful caudal block in adults the needle should enter the Sacrococcygeal Membrane at its upper third at 90 degree angle followed by depression of the needle to 55-60 degrees .The advancement of the needle should be no more than 34 mm, because that is the shortest distance between the sacral hiatus and the dural sac. If the block proves to be too difficult or impossible to perform absent hiatus or Sacrococcygeal Membrane must be suspected.

Table 2 Measurements from MR images (mean (SD) [range] unless otherwise indicated)

	Females (*n*=23)	Males (*n*=14)	Combined (*n*=37)
Sacrococcygeal membrane (SCM)			
Absent (*n* (%))	1 (4.3)	3 (21.4)	4 (10.8)
Upper limit; sacral vertebra (median)	4.0 [3.2–4.7]	4.3 [3.4–5.3]	4.1 [3.2–5.3]
Length (mm)	22.6 (6.8) [13–36]	22.8 (6.9) [11–31]	22.6 (6.7) [11–36]
Thickness (mm)	3.6 (1) [1–5]	2.5 (0.9) [1–4]	3.2 (1.1) [1–5]
Sacral canal			
Maximum AP diameter at 90° to SCM (mm)	5 (2.1) [2–8]	3.8 (1.5) [1–6]	4.6 (2) [1–8]
Location of maximum AP diameter beneath SCM (*n* (%))			
Upper third of SCM	21 (95.5)	10 (90.9)	31 (93.9)
Middle third of SCM	1 (4.5)	1 (9.1)	2 (6.1)
Best fit angle into sacral canal via SCM (°)	56.6 (8.9) [40–74]	60.4 (5.9) [50–68]	57.9 (8.1) [40–74]
Volume (excluding foraminae and dural sac) (cm^3)	13.2 (2.68) [9.5–20] (*n*=22)	16.5 (4.08) [10.8–26.6] (*n*=13)	14.4 (3.59) [9.5–26.6] (*n*=36)
Dural sac			
Lowest limit; sacral vertebra (median)	1.3 [0.8–2.0]	1.5 [0.9–3.0]	1.4 [0.8–3.0]
Shortest distance (linear) from SCM to dural sac (mm)	58.5 (13) [34–80]	64.6 (12.8) [41–78]	60.5 (13.1) [34–80]

Br. J. Anaesth. 1997; **78**:391-395

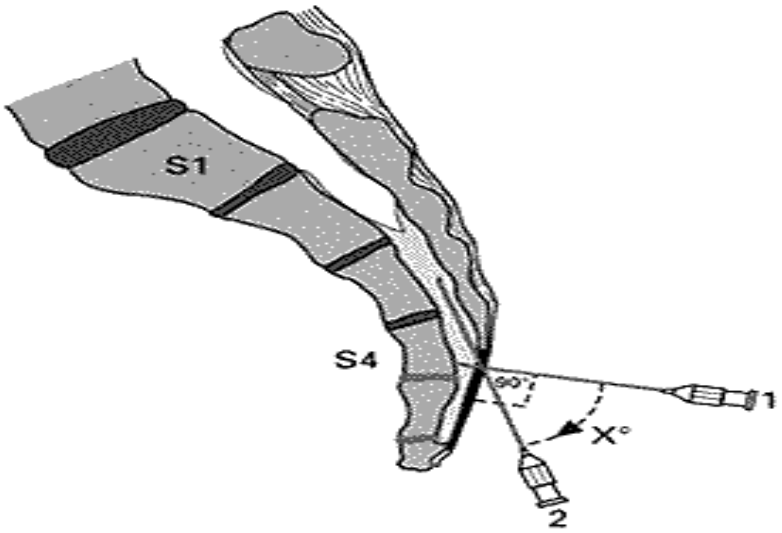


Figure 4 Diagram of the best fit angle for needle insertion into the caudal space (X°=angle of caudal depression of the needle from position 1 to position 2).

Br. J. Anaesth. 1997; **78**:391-395

These studies help us understand the anatomy of the sacral canal well and perform the caudal block more successfully.

Although in the previous study using isolated sacra found the volume of the sacral canal as 30 ml in adult patients , this latest study using MRI scans found that it is only 14.4 (range 9.5 -26.6) ml. This is because this study did not include the volume of the dural sac and the foramina. It has found some relationship between height and weight of the individual to the volume of the sacral canal. No relationship between the volume and age could be established. The previous studies using radioopaque dye injection have found variable leak of the dye through the foramina.

The relationship between height and sacral canal volume was derived by the formula: Y =

17.7 + 0.19 X cubic centimeters. The relationship between Weight and the sacral canal volume was found to be: Y = 5.76 + 0.12 X cubic centimeters. A relationship between age, height and a level of anaesthesia has not been found.

DOSE OF LOCAL ANAESTHETIC:

Of the available dosage regimens the one proposed by Armitage is clinically more useful one. He proposed that 0.5, 1.0, and 1.25 ml/Kg volume of local anaesthetic solution produced lumbosacral, thoracolumbar and midthoracic level blockades respectively. He also proposed surgeries that level of blockade requiring more than 1 ml/ Kg should not be done under caudal block. Instead other form of neuraxial blocks must be used. This is to avoid systemic toxicity of the local anaesthetic drugs.

Operations requiring upto L2-L4 i.e. surgeries on anal canal ,rectum require upto 30 ml of local anaesthetic solution whereas uncomplicated anal lesions require about 22 ml of local anaesthetic solution .(Atkinson RS, Rushman GB, Davies NJ. Lee's Synopsis of Anaesthesia. Regional Techniques, 11th ed. Oxford: Butterworth-Heinemann, Ltd.; 1993. p. 674).

Rates of failure:

The rate of failure differs among authors: according to K. McCaul it is from 1 to 20% (45), A. C. Van Elstraete – 10% (15), J. Gudaityte 12.5% (43), C. A. Adebamowo – 1% among black patients (13).

Types of Procedures:

Anorectal surgeries:

Caudal blocks are extensively studied in various acute and chronic anal lesions. Acute anal canal lesions, like Acute paraproctitis are successfully operated under Caudal epidural blocks (Georgardze A K et al.). This technique has also been used successfully for other anal canal surgeries like Hemorrhoidectomy, fissures, fistulas etc. (Klug W et al.). It has been used for examination of painful anal canal lesions in ward or out-patient settings (Adebamowo C A et. al.). It was found to provide excellent post-operative analgesia and better bladder and bowel function after Hemorrhoidectomy (Pryn S J et al.). Anal canal pressure which reflected the pelvic muscle relaxation was found to be better and quick with caudal epidural block when compared to lumbar epidural (Takahashi R et al.). Hence it was urged to use Caudal epidurals for anorectal surgeries for quick operative conditions.

Urological Procedures:

Caudal Epidurals are extensively used for various urological procedures like Transurethral resection of prostate, Bladder biopsies etc.

Gynaecology:

Minor gynaecological procedures like Traditional cone or endometrial biopsy, Marsupialization for Bartholin cyst, Laser therapy for condyloma, Vulvar tumor excision and Posterior repair of perineum are successfully done under Caudal epidurals (Shu-Yam Wong et al.).

Abouleish also stated that Caudal epidural was used safely as a labor analgesia. In Taiwan, Chen et al. first reported the use of caudal block during a vaginal delivery.

Lower limb surgeries:

Levshankov A I et al. performed Caudal epidural for various procedures in Orthopedics and traumatology and concluded that it is a simple and safe technique.

Rostomashvili E T performed Caudal epidural for Lower limb varicose veins and came to the conclusion that it is safe and simple.

Polushin Iu S et al. studied Caudal epidural in 525 adult patients undergoing surgeries for lower limb and pelvic organs and concluded that it is safe, reliable and simple. They have used 40 ml of hyposmolar local anaesthetic solution. They highly recommended Caudal epidural for practice.

Back pain:

Netelson S E et al. studied Caudal epidural block in adult patients with back pain and concluded that it is a cost effective primary treatment for low back pain.

Role of Adjuvants in Caudal Epidural Blocks:

Although Caudal epidural block provides reliable blockade with local anaesthetic drugs alone

various authors have used adjuvants along with local anaesthetic agents. Their role is not clear. Opioid adjuvants clearly produced prolonged anaesthesia.

Caudal Morphine alone when used for postoperative analgesia following anal surgeries provided superior analgesia compared to I.M. Morphine. It also produced urinary retention in 20 % of the patients. (Farag H et al.). Morphine when combined with Bupivacaine (2 mg / Kg) provided post operative analgesia for 53 + / - 23.4 Hrs. (Klug W et al.).

In Paediatric patients adjuvants like Tramadol, Ketamine, Clonidine are extensively used. Caudal Ketamine as a sole anaesthetic for intraoperative and post operative analgesia has been used in Paediatric patients. (S J Martindale et al) These studies have demonstrated that Ketamine has a local neuraxial effect which help to prolong the post operative analgesia.

Marhofer P et al studied 49 children undergoing hernia repair with Caudal epidural and observed that Caudal S (+) Ketamine provided comparative analgesia as that of Caudal Bupivacaine.

However such studies about the efficacy of Ketamine in prolonging the post operative analgesia in adult patients are rare. The available studies are contradictory. The Present study was undertaken to help clear this controversial aspect.

CHOICE OF THE NEEDLE:

Although all kinds of needles have been used in the past, a short beveled 22 gauge needle of length no more than 4 cm with stylet is believed to offer best tactile sensation while the Sacrococcygeal membrane is pierced. It also prevents the implantation of dermal cells in the sacral canal (theoretical

risk of epidermal cell graft tumour).

PHARMACOLOGY

LIGNOCAINE:

It is called as Lidocaine, Xylocaine and Lignocaine.

Lofgren of Sweden synthesized lignocaine in 1943.

Gordh used it in clinical practice in 1948. It is the most commonly used anesthetic in UK today. It produces rapid and intense anaesthesia. It is active topically also. It is an effective cardiac antiarrythmic agent. For these reasons Lignocaine is considered as a gold standard against all other local anaesthetic agents.

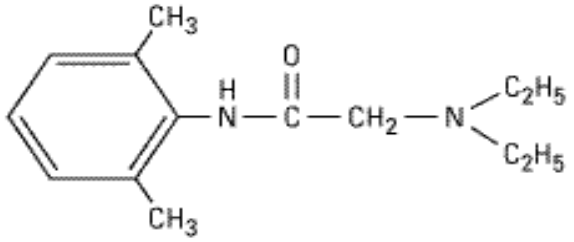
It is suitable for surface, infiltration, nerve block, caudal, epidural, and spinal anaesthesia.

The solution is extremely stable and may be sterilised by autoclaving a maximum of 2 times.

Properties:

Lignocaine is an amide linked local anaesthetic agent. It is very stable, not decomposed by boiling, acids or alkalis. The pKa is 7.86.

Chemical structure:



Lidocaine

Metabolism:

Lignocaine undergoes N-dealkylation to monoethylglycine-xylide (MEGX)

This in turn is either N-dealkylated to glycine-xylide (GX), or hydrolysed to 2, 6-xylidine

2, 6-xylidine in further metabolised to 4-hydroxy-2, 6-xylidine, which appears in the urine

MEGX & GX are found in significant concentrations in the blood of patients receiving lignocaine

Both of these agents have pharmacological activity and their respective half lives are,

1. MEGX t $\beta_{1/2}$ ~ 120 mins.
2. GX t $\beta_{1/2}$ ~ 10 hrs

The maximum recommended doses in the adult are,

a. plain 3mg/kg

b. with adrenaline ~ 7 mg/kg

NB: following epidural anaesthesia with 400 mg / 70 kg adult, blood concentrations reach 2.0-4.0 µg/ml, toxicity beginning at 5µg/ml.

TOXICITY:

In addition to blocking transmission in nerve axons, local anaesthetics affect all tissues where conduction of impulses occurs therefore, there are significant actions in,

1. the Central nervous system
2. autonomic ganglia
3. the Neuro Muscular Junction
4. all forms of muscle fibre, especially cardiac

Central Nervous System:

Earliest signs of toxicity are circumoral & tongue numbness, tinnitus, nystagmus, and dizziness

Following absorption, all nitrogenous local anaesthetics may cause CNS excitation

» restlessness, tremor and eventually tonic-clonic convulsions.

Death is usually due to subsequent respiratory depression

The barbiturates are effective in suppressing the convulsive activity of the local anaesthetics, but only in near anaesthetic doses, therefore, diazepam is the drug of choice.

Factors which influence the occurrence of CNS toxicity include,

1. Rrelative potency

   The relative toxicities approximate the relative anaesthetic potencies

2. Rate of injection and the rate at which a particular blood concentration is achieved. Volunteers being able to tolerate higher absolute levels of a given agent when infused at slower rates

3. P_{aCO2} → inversely related to the convulsive threshold.

4. pH → ↓ pH → ↓ convulsive threshold

CVS EFFECTS:

CVS effects are usually only seen at high doses, when CNS effects are already evident.

They are not usually seen with regional techniques.

Rarely, inadvertent intravascular administration may result in sudden death, presumably due to VF. This is more likely with solutions containing adrenaline.

Lignocaine produces little or no change in the ECG at therapeutic concentrations.

However, at increasingly toxic levels, it causes prolonged conduction → ↑ PR and QRS intervals.

Very high levels may suppress SA node activity → sinus bradycardia or sinus arrest

Similar depression of the AV node occurs, → progressive AV block ± AV dissociation

Allergic reactions:

Although agents of the amide-linked class are essentially free of this side effect, as they are not derivatives of para-aminobenzoic acid, they may contain preservatives which are not,

1. Multidose containers may contain the preservative methylparaben, which has a chemical structure similar to PABA (Para Amino Benzoic Acid).

2. The anti-oxidant metabisulphite, which is present in adrenaline containing solutions.

Cross sensitivity may occur with a number of foodstuffs, many of which contain

preservatives such as metabisulphite and hydroxybenzoate

Contraindications:

a. allergy / hypersensitivity to local anaesthetics

b. allergy / hypersensitivity to solution additives

c. adrenaline is contraindicated for,

i. conditions where tachycardia is detrimental (thyrotoxicosis, CCF, IHD)

ii. Anaesthesia around end arteries

iii. Intravenous regional anaesthesia

d. epidural/spinal anaesthesia in the presence of significant

i. hypotension / hypovolaemia

ii. coagulopathy

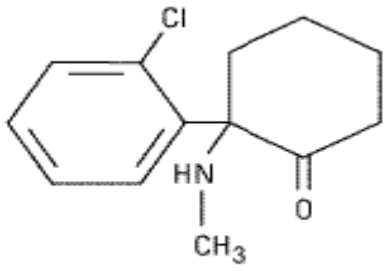
e. the presence of local tissue sepsis

f. patient refusal

Drug interactions:

Drug class	effects
Antiarrhythmic agents	potentiation of cardiac effects
β-blocking agents	decreased lignocaine metabolism
Cimetidine	decreased lignocaine metabolism
Anticonvulsant agents	increased lignocaine metabolism

KETAMINE:



Ketamine

Ketamine was synthesised by Stevens in 1962 and first introduced to clinical anaesthesia by Corssen and Domino in 1966

It was released for clinical use in 1970

It is an arylcyclohexylamine structurally related to phencyclidine

It contains an asymmetrical C-atom, hence has two isomers

The d-isomer is more potent but the parenteral solution is a racemic mixture. Ketamine hydrochloride is a white crystalline solid, soluble in water supplied in 1, 5, and 10% solutions which are stable at room temperature.

Benzethonium chloride is added as preservative.

The solution has a pH ~ 3.5 to 5.5.

Ketamine has a pK_A ~ 7.5.

It has a lipid solubility ~ 5-10 times that of Thiopentone.

Pharmacokinetics:

Has a similarity with Thiopentone sodium (STP).

Ketamine is extremely soluble in fat, 5-10 times more soluble than STP.

However, plasma protein binding is limited 45-50%.

After intravenous injection, consciousness is lost within 30 to 60 seconds and the resultant anaesthesia lasts for 10 to 20 minutes. Return to full orientation may require an additional 60 to 90 minutes.

The distribution half-life is longer, $t_{½\alpha}$ ~ 11-16 mins and the elimination half-life $t_{½\beta}$ ~ 2-3 hrs (W&W = 2.5).

Termination of the anaesthetic action is due to redistribution from the central compartment, early metabolism playing a lesser part.

The V_{dSS} ~ 2.3 to 3.1 l/kg consistent with its high lipid solubility.

However, the clearance ~ 17.5-20 ml/kg/min, is rapid resulting in the relatively short elimination half life.

This is due to both the high hepatic extraction ratio ~ 0.9 and limited protein binding.

Therefore, clearance will be sensitive to hepatic blood flow and agents such as halothane, which reduce this will decrease the clearance.

It can be administered IM with 93% bioavailability, but there is a delay of 2 to 4 minutes prior to loss of consciousness.

The major pathway of metabolism is in the liver, with N-demethylation of the cyclohexylamine ring, forming norketamine (metabolite I).

This is then hydroxylated to form hydroxy-norketamines, with up to 8 metabolites which may contribute to the undesirable side effects.

The activity of these metabolites has not been well studied, however, norketamine has ~ 20-30% of the activity of ketamine.

These are subsequently conjugated and excreted in the urine.

Pharmacodynamics:

Central Nervous System

Causes a "dissociative anaesthetic state".

This is a functional and electrophysiological dissociation between the thalamocortical & limbic systems (ie., blocks transmission between thalamus and cortex).

This state is characterised by catalepsy in which eyes remain open with slow nystagmic

gaze, while corneal and light reflexes remain intact.

When administered in subanaesthetic concentrations, ketamine produces good analgesia at plasma levels one-eighth those required for anaesthesia.

This may be related to its ability to suppress laminae specific spinal cord activity (opioid κ- receptors, ? laminae II & III).

Ketamine induced psychotomimetic activity, emergence reactions, can be disturbing to physicians, nurses, other patients and the patient him/herself.

Vivid dreams, hallucinations, and delirium are unpleasant for the patient and may occur in 5-30%.

A higher incidence reactions is associated with,

a. age > 16 yrs

b. sex female > male

c.Larger doses> 2mg/kg IV

d. rapid IV administration

e. subjects who normally dream during sleep

f. history of personality problems

The incidence is not affected by covering eyes during emergence, nor by allowing the patient

to emerge in a quiet room.

Adverse reactions may be lessened by preoperative discussion with the patient.

Atropine & droperidol may increase the incidence, while nitrous oxide supplementation decreases the dosage of ketamine and therefore the incidence of reactions.

Benzodiazepines are the most effective drugs for attenuating the psychic reactions both preoperatively and for their treatment. Diazepam (0.15-0.3 mg/kg IV), lorazepam (2-4 mg PO or IV), or midazolam.

Ketamine increases $CMRO_2$, cerebral blood flow and intracranial pressure.

The excitatory CNS effects of ketamine can be detected by the development of theta-activity and "petit-mal like" seizure activity.

This is associated with an increased $CMRO_2$, however, CBF increases to a greater degree.

This is probably due to cerebral vasodilatation and a rise in systemic blood pressure.

Cerebrovascular responses to P_{aCO2} remain intact.

However, due to these effects ketamine should be avoided in patients with potentially raised ICP.

Cardiovascular Effects:

Ketamine produces unique cardiovascular effects.

There is an increase in mean arterial BP, HR, pulmonary arterial and central venous pressures.

This is related to sympathetic stimulation, with increased circulating levels of adrenaline & noradrenaline, resulting in peripheral vasoconstriction and direct cardiac stimulation.

The haemodynamic changes are not related to the dose of ketamine, there being no difference after administration of 0.5 or 1.5 mg/kg.

Further, subsequent doses do not produce the same effect and may even be associated with cardiovascular depression.

The mechanism for this effect is uncertain.

Direct intrathecal administration is associated with an immediate increase in SNS outflow.

This effect can be blocked by prior administration of barbiturates, droperidol and benzodiazepines.

Stimulation of the cardiovascular system is not always desirable and the benzodiazepines appear

the most effective in attenuating this response.

Peripheral effects play an undetermined role.

Both inhibition of neuronal uptake of catecholamines, similar to cocaine, and inhibition of extraneuronal catecholamine uptake have been demonstrated.

Its direct effects are depressant on myocardium and dilatory on smooth muscle, but these are normally countered by the increased Sympathetic activity.

The effects on peripheral resistance are variable.

Ketamine abolishes adrenaline-induced arrhythmias by prolonging the relative refractory period.

In congenital heart disease patients there is no significant change in shunt direction or fraction, or systemic oxygen flux after ketamine.

NB: used in paediatric cardiac catheterisation with less arrhythmias.

In the normal heart, coronary blood flow increases secondary to the increased myocardial O_2 consumption and stroke work.

Increases pulmonary vascular resistance, thus increasing pulmonary artery pressure and right ventricular stroke work.

Therefore, the drug is a valuable induction agent for poor risk and hypovolaemic patients.

The (+)'ve chronotropic & inotropic effects are contraindicated in patients with IHD or minimal right ventricular reserve.

In patients with elevated pulmonary vascular pressures, ketamine appears to produce a more pronounced increase in Pulmonary Vascular Resistance than in Systemic Vascular Resistance.

Respiratory Effects:

Respiratory depression is minimal with anaesthetic doses but may be depressed with large doses.

Results in bronchodilatation and this is a useful agent for asthmatics or patients with Chronic airway obstruction.

In patients with reactive airway disease, ketamine decreases airway resistance and bronchospasm .

Ketamine produces marked salivation, especially in children, therefore an antisialogogue should be administered prior to its use.

There are opposing views on its effectiveness in preserving pharyngeal reflexes and the patency of the upper airway → thus it is not a substitute for good airway management.

Miller states laryngeal & pharyngeal reflexes remain active and that aspiration is less likely but still possible .

Other Effects:

There is a transient rise in intraocular pressure.

Eye movements and nystagmus may occur.

Nausea and vomiting are fairly common after sole administration.

USUAL DOSES OF KETAMINE

Induction of anaesthesia	0.5 -2.0 mg/Kg IV 4.0 -6.0 mg/ Kg IM
Maintenance of anaesthesia	50 – 90 microgram / Kg/ min 0.5 – 1.0 mg / Kg IV
Sedation	0.2 – 0.8 mg /Kg IV

TOXICITY AND PRECAUTIONS

Disadvantages:

1. Slow onset of action
2. Increased muscle tone
3. Spontaneous movements during Induction and Anaesthesia
4. Cardiovascular system stimulation
5. Slow recovery
6. Emergence reactions

7. Post operative nausea and vomiting
8. Elevated intracranial and intraocular pressures
9. Potent sialagogue

Contraindications for using Ketamine:

1. Poorly controlled Hypertension
2. Unstable angina or recent Myocardial infarction
3. Right or left Heart failure
4. Valvular Heart disease
5. Intracranial , intrathoracic or abdominal aneurysms
6. Cerebrovascular diseases
7. Increased Intracranial pressure
8. Recent penetrating Eye injury

AIMS AND OBJECTIVES OF THE STUDY

1. To study the characteristics of Caudal epidural block in adult anorectal surgeries

2. To study the effect of adding Ketamine as an adjuvant to Caudal epidural block.

3. To determine the suitability and safety of Caudal epidural block for adult anorectal surgeries.

MATERIALS AND METHODS

MATERIALS:

1. Lignocaine - 1.5%
2. Preservative free Ketamine
3. 22 gauge needle
4. Glass syringe -10 ml.
5. Povidone Iodine
6. Spirit
7. Sterile drapes, gloves

METHODS:

After getting the Hospital Ethical committee's approval, 50 ASA 1 and 2 patients were enrolled into the study, after their consent.

They were divided into two groups of 25 each. One group which received 1.5% LIGNOCAINE (30 ml) with Adrenaline (1 in 200 000) caudally served as CONTROL group.

The other group which received Ketamine (0.5 mg / Kg) in addition to Lignocaine (1.5 %) – 30 ml and Adrenaline (1 in 200 000) served as the STUDY group .

Patients with uncontrolled hypertension, cardio vascular disease , neurological disease, morbid obesity, psychological disorders , endocrine disorders were excluded from the study.

PREMEDICATION:

All the patients were premedicated with PENTAZOCINE 30 mg and ATROPINE 0.6 mg in the morning 45 min. prior to the surgery.

The procedure was explained to the patients and their doubts cleared.

POSITION:

Patient was put in the semiprone position.

PROCEDURE:

Prior to shifting to the operation table the anatomical landmarks were palpated. On the table after putting the patient in semiprone position thorough painting with Povidone Iodine solution and after that with Surgical Spirit was carried out. Sterile drapes were used to expose the sacral landmarks. Once again the anatomical landmarks were examined by inspection as well as palpation.

After confirming the position of the sacral hiatus by palpating the cornua, using smaller gauge needle intradermal infiltration of local anaesthetic solution around the hiatus was done. Using a 22 gauge needle, at an angle of 90 degrees to skin, the sacrococcygeal membrane was pierced. The subtle give way of the needle as it pierced the Sacro-Coccygeal Membrane was appreciated. After that the needle was lowered to 60 degrees towards the coccyx and advanced to a further few centimeters never going beyond 4 cm. Loss of resistance to air was used to confirm the epidural space. Also WHOOSH test was performed by placing the stethoscope over the lumbar spines. After confirming with above mentioned methods and aspirating for any CSF or Blood a test dose of 2 ml of the local anaesthetic solution was injected and waited to see any untoward reactions. Pulse rate was monitored for continuously and the patient was asked to move the great toe. After confirming that the drug has not

entered the Subarachnoid space or into a Vein the remaining dose of the drug was injected with all the monitoring. Attention was paid to see for the development of a subcutaneous swelling. Ease of injection of the drug was noted. After the successful injection of the drug patient was turned to the supine position. After 5 minutes perineal sensation was tested for temperature and touch. In case of successful anaesthesia of the perineum the sensory level of blockade was assessed and immediately lithotomy position was put and surgery started. Incase of poor anaesthesia of the perineum a few more minutes of waiting was done testing for anaesthesia every minute. If there was no anaesthesia or poor anaesthesia even after 20 minutes, with the patient able to recognize pin prick, the caudal block was adjudged as failed and other methods of anaesthesia such as Subarachnoid block or General anaesthesia were resorted to.

MONITORING:

1. Continuous pulse rate and waveform
2. Blood Pressure
3. Pulse Oxymetry
4. Continuous ECG
5. Wakefulness

SUBJECTIVE INFORMATION:

In addition to the above mentioned objective data subjective data were collected from the surgeon and the patient.

Surgeon was asked to compare the sphincter relaxation produced in caudal block and spinal anaesthesia. He has to term it as bad, good and excellent. Numerical scores were given for each of these qualitative terms. He was also asked for his satisfaction of the surgical conditions produced. That was also grouped under bad, good and excellent and given numerical values accordingly. The surgical condition produced not only depended on the sphincter relaxation but also on the movements produced by the patient that can be distracting to the surgeon.

The patient was also asked to characterize his experience as bad, good and Excellent. Numerical values were given for each of this accordingly.

At the end of the surgery patients wakefulness was tested .His haemodynamic status noted, and shifted to post anaesthesia care unit and then to the ward.

Post operative visit was made to enquire for postoperative pain and other complications.

RESULTS AND OBSERVATIONS

The following parameters were observed:

1. Time to first appearance anaesthesia
2. Time to start surgery
3. Sensory dermatome level
4. Muscle power in the lower limbs
5. Presence of pain due to lithotomy position
6. Anal sphincter relaxation
7. Sedation score
8. Intra operative complications
9. Patient satisfaction level
10. Surgeon satisfaction level
11. Post op analgesia time
12. Post operative complications
13. Hypotension during surgery

Sensory dermatome level:

Dermatome	–	Score
T 8	-	8
T 9	-	9

T10 - 10

T 11 - 11

T 12 - 12

L 1 - 13

L2 - 14

Muscle power:

The quantitative assessment was done by grading as suggested by the Medical Research Council as follows:

Grade 5 : Normal power

Grade 4 : Movement against resistance

Grade 3 : Movement against gravity

Grade 2 : Gravity eliminated movement

Grade 1 : Only a flicker of movement

Grade 0 : Total paralysis

Presence of pain due to lithotomy:

Score 0 - no pain

Score 1 - pain present

Anal sphincter relaxation:

Bad - score 0

Good - score 1

Excellent - score 2

Sedation score:

Modified Ramsay scale for rating sedation

Indication	**Score**
Anxious, agitated, restless	1
Awake, cooperative, oriented, tranquil	2
Semiasleep but responds to commands	3
Asleep but responds briskly to glabellar tap or loud auditory stimulus	4
Asleep with sluggish or decreased response to glabellar tap or loud auditory stimulus	5
No response can be elicited	6

Intraoperative complications:

Complications like pain, bradycardia , tachycardia , hypertension , hypotension , cardiorespiratory arrest , arrhythmias , brochospasm , laryngospasm , seizures , Brewer – Luckhardt reflex etc. were looked for.

Patient satisfaction level:

Bad - score 0

Good - score 1

Excellent - score 2

Surgeon satisfaction level:

Bad - score 0

Good - score 1

Excellent - score 2

Postoperative analgesia time:

Time from the first appearance of anaesthesia to the first perception of pain post operatively.

Post operative complications:

Post operative complications like retention of urine, nausea, vomiting, permanent neurological injury, infection of the meninges were looked for.

Hypotension during surgery:

Systolic fall in BP was recorded.

RESULTS

Statistical analysis was carried out by Student t test (the mean value of control and test groups in each parameter studied).

Of the 50 cases studied, there were 2 failures. The failure rate is 4% in this study. This is mainly because of not appreciating the sacral landmarks.

Gender : Males -43

Females-7

Group	MALES	FEMALES
Control	20	3
Study	21	4

The control and study groups are comparable regarding gender distribution.

Age : From 19 years to 63 years

The median age is 33.5 years

Group	Mean age
Control	34.9
Study	37

Both the groups are comparable in age distribution.

Weight : The average weight of the patient is 52.04 Kg.

Range : 38 - 70 Kg.

Median: 50 Kg.

Group	Mean Weight
Control	50.5
Study	52.4

Surgery:

Haemorrhoidectomy	31
Fistulectomy	13
Lat.sphincterotomy	6

Duration of surgery:

Mean duration of surgery : 42.75 min.

Median duration of surgery : 29.75 min.

Range : 20 – 60 min.

Group	Mean duration of surgery (min.)
Control	40
Study	45.8

Mean time to onset of anaesthesia:

Control group - 7.9 min.

Test group - 5.6 min.

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	7.913043478	3.06605
TEST	25	5.6	2.1725
S.E.(d)			0.772990
Difference		2.31304	

Mean Time to start surgery:

Control group - 13.04 min.

Test group - 11.04 min.

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	13.04347	3.20974
TEST	25	11.04	1.843473
S.E.(d)			0.764112
Difference		2.0034	

Mean sensory dermatome block level:

Control - T 12

Test - T 10

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	11.91304	0.71706
TEST	25	10	0.56568
S.E.(d)			0.187497
Difference		1.91304	

Mean muscle power in the lower limb:

Control - 4.04

Test - 4.52

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	4.043478	0.46422
TEST	25	4.52	0.64
S.E.(d)			0.025753
Difference		0.476522	

Mean sphincter relaxation score:

Control - 1.0

Test - 1.8

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	1	0
TEST	25	1.8	0.4
S.E.(d)			0.08
Difference		0.8	

Mean positional pain score:

Control - 0.13

Test - 0.04

'p' value not significant

	NUMBER	MEAN	S.D
CONTROL	23	0.130435	0.33678
TEST	25	0.04	0.039191
S.E.(d)			0.279395
Difference		0.090435	

Mean sedation scores:

Control : 1.95

Test : 3.12

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	1.956522	0.203931
TEST	25	3.12	0.587878
S.E.(d)			0.125028
Difference		1.163478	

Mean Surgeon satisfaction score:

Control : 1.17

Test : 1.8

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	1.173913	0.379034
TEST	25	1.8	0.4
S.E.(d)			0.29229
Difference		0.626087	

Mean patient satisfaction score:

Control : 1

Test : 1.84

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	1	0
TEST	25	1.84	0.910223
S.E.(d)			0.1820446
Difference		0.84	

Mean time to perception of post op pain:

Control : 210.21 min.

Test : 247.6 min.

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	210.2174	49.01053
TEST	25	247.6	38.91324
S.E.(d)			12.84545
Difference		37.3826	

(N.B. S.E. (d) Means Standard Error of Difference between the Means)

Intraoperative complications:

There was one case op sudden apnoea in the test group.

Post operative complications:

There were no cases of post operative complications.

Hypotension:

Control - 4.347

Test - 0

'p' value < 0.05

	NUMBER	MEAN	S.D
CONTROL	23	4.347826	6.47808
TEST	25	0	0
S.E.(d)			1.357
Difference		4.347826	

DISCUSSION

The results confirm the findings of various other studies about the safety and simplicity of caudal epidural block for anorectal surgeries. It is very important to note that, of all the patients who underwent caudal block, none of them had any serious intraoperative and post operative complications.

The failure rate also is quite comparable to other regional techniques, if we take into account that the experience of the anaesthesiologist is very much limited. The failure rate of 4% found in this study is similar to Georgadze A K et al. in their study of sacral epidural block for acute proctitis cases . They had a failure rate of 3.6%. Polushin IuS et al. found a failure rate of 5.2%.

The time to onset of anaesthesia and time to start surgery are quite superior to that of subarachnoid block because we need not wait for the drug to fix to the nerve tissue and the level of block is quite predictable depending on the dose of local anaesthetic drug injected. Caudal epidural is superior to Lumbar epidural blocks because lumbar epidural blocks are time consuming. Caudal Epidural gives predictable and adequate level of anaesthesia (particularly with Ketamine additive – up to T 10 level) so that anorectal surgeries can be done safely and pleasantly. It has got the advantage over the other regional blocks in that there is no profound hypotension (with ketamine – as there is nil hypotension). Also the post operative complications associated with subarachnoid block like retention of urine requiring bladder catheterization, are negligible with Caudal Epidural.

Addition of Ketamine in the subanaesthetic dose of 0.5 mg / Kg to the CEB definitely enhances the quality and patient perception of the procedure while not increasing the adverse effects.

There is a 2 minutes advantage in the time to onset of anaesthesia and time to start surgery in the test group compared to the control. Even though it is a very small difference it can reduce the anxiety of the patient as well as the anaesthesiologist!

Addition of Ketamine to the Lignocaine gives consistently good sensory block level when compared to Lignocaine alone (T 10 vs. T 12). Even though it is only a mean it can make a huge difference in terms patients comfort and in turn the surgeons' comfort. It also fulfills the recommendation that at least T 10 level of sensory block is essential to avoid sympathetic stimulation and the resultant discomfort to the patient.

The mean muscle power is significantly higher in the Ketamine group when compared to the control. This can be due to sensory block attained early in the ketamine group before the onset of motor block.

The mean anal sphincter relaxation score was significantly higher in the ketamine group. This can be correlated to the higher level of block achieved in the ketamine group as it is likely to inhibit the sympathetic flow from celiac plexus (T 11- L2) more adequately.

The mean positional pain score is significantly lower in the ketamine group compared to the control group. But it should be noted that none of the patients described positional pain as bad. It was only a tolerable discomfort. The superior result of the ketamine group may be due to the analgesia provided by ketamine by entering in to the systemic circulation.

All the patients were calm, comfortable, cooperative and responding to commands in the control group. This is because of the premedication of all the patients in this study. Patients in the Ketamine group were sleeping in and responding to the commands. This significant sedation effect is caused by Ketamine rapidly entering into the systemic circulation.

The mean patient and surgeon satisfaction scores were higher in the Ketamine group has the

sub anaesthetic dose provides better patient well being and so superior operating conditions by providing sleep , less positional discomfort, good sphincter relaxation and less patient movements .

Polushin IuS et al. found in their study that lignocaine caudal epidural block provides an analgesic duration of 3 +/- 0.5 hours. Our finding also confirms this. In our study the total analgesic effect of Lignocaine alone was 3 hours 20 min (mean). The addition of Ketamine prolongs this duration by about 37.6 minutes. This is a significant effect exerted by ketamine ($p < 0.05$).

Except for one case of apnoea, there were no incidences of intraoperative and post operative complications in this study. In the Ketamine group the incidence of hypotension has never occurred whereas in the control group there was a mean fall of 4.3 mm of Hg.

SUMMARY

In this study the mean time to first analgesia was 7.9 min. in the control group and 5.6 in the study group ($p < 0.05$). The mean time to start was 13 min. in the control and 11 min. in the study group ($p < 0.05$). The sensory block level reached in the control group was T12 and in the study group was T 10. The motor blockade was significantly less in the study group than in the control group ($p < 0.05$). Anal sphincter relaxation was better in the study group than in the control group. The discomfort caused by the awkward positioning was less in the ketamine group than the control.

In the study group patients had acceptable sedation which contributed to the sense of well being and superior patient satisfaction and better working conditions for surgery.

Both groups compared in the incidence of intraoperative and post operative complications.

In the study group the total duration of analgesia was significantly prolonged (210 min. vs. 247 min. p value < 0.05) . There was no hypotension in study group whereas in the control group there was a mean fall of 4 mm Hg. in the systolic BP.

Addition of Ketamine in the subanaesthetic dose of 0.5 mg / Kg to the Caudal epidural block provides comparatively better anaesthesia than Lignocaine alone.

CONCLUSION

This study conducted on 50 adult patients coming for anorectal surgeries has shown that Caudal Epidual Block (CEB) using Lignocaine 30 ml with Adrenaline (1 in 200 000 dilution) is a safe, reliable and simple technique that can be practiced for this kind of surgeries.

Ketamine as an adjuvant in sub anaesthetic doses significantly improves the quality , duration and patient comfort in the caudal block.

PROFORMA

Name : Age: Sex: IP No: Wt:

Case : Plan:

ASA Risk: **Group:**

Pre – medication Drug: Dose: Time:

TIME	Caudal block given	Onset of anaesthesia	Positioning	Start of surgery	End of surgery	Post op pain

Positional pain score :
0 – no discomfort
1 - discomfort present

Sphincter relaxation score :
0 – bad
1- good
2-excellent

Muscle power in the lower limbs :

1. normal power
2. movement agains resistance
3. movement against gravity
4. movement if gravity eliminated
5. flicker of movement
6. total paralysis

Surgeon satisfaction score :
0 - bad
1 – good
2 - excellent

Patient satisfaction score :

0 - bad
1 – good
2 - excellent

Sedation score :

1 – anxious , agitated , restless
2-awake,cooperative,oriented ,calm
3- semisleep , responds to commands
4- asleep ,responds to glabellar tap
5- asleep , sluggish response to
6- no response elicited

Intra op. complications :

Post op. complications :

Hypotension :

S.no	Age/ sex	Weight	ASA	SURGERY	Duration in Min.	test/control	Time to onset anaesthesia in min.	Time to start surgery	sensory dermatome level	Muscle power	spinchter relaxation	positional pain	Patient satisfaction	surgeon satisfaction	time to perceive pain	intraop complications	postop complications	Hypotension	Sedation score
1	34/62/M	52	2 2	H	55	C	5 12	10 15	11 12	4 4	1 1	0 0	1 1	1	220	175 Nil	Nil	Nil 10	0 2 / 2
2	15/20/M	40	1 1	H	45	C	10 10	15 15	12 12	5 4	1 1	0 0	1 1	1	205	180 Nil	Nil	Nil 10	0 2 / 2
3	16/58/F	60	2 1	LS	30	C	10	15	12	4	1	0	1	1	170	Nil	Nil	20	2
4	27/32/M	72	1 1	LS	35	C	5	10	12	4	1	0	1	1	175	Nil	Nil	0	2
5	68/41/M	45	1 1	LS	30	C	15 5	20 10	12 12	4 4	1 1	0 0	1 1	2	300	270 Nil	Nil	Nil 0	10 2 / 2
6	39/26/M	50	1 1	H	35	C	5 5	10 10	10 13	4 5	1 1	0 0	1 1	2	200	290 Nil	Nil	Nil 0	0 2 / 2
7	23/32/M	42	1 1	H	35	C	5 5	10 10	13 12	5 4	1 1	0 0	1 1	1	120	120 Nil	Nil	Nil 0	0 2 / 2
8	20/43/M	50	1 1	H	25	C	5 10	10 15	12 12	3 4	1 1	0 0	1 1	1	175	210 Nil	Nil	Nil 0	0 2 / 2
9	22/28/M	50	1 1	H	55	C	10 5	15 10	13 12	4 4	1 1	0 0	1 1	1	300	270 Nil	Nil	Nil 0	0 2 / 2
10	33/35/F	80	1 1	H	45	C	10 5	15 10	12 12	4 4	1 1	0 0	1 1	1	250	210 Nil	Nil	Nil 0	10 1 / 2
11	34/21/M	45	1 1	H	60	C	10 10	15 20	12 12	4 4	1 1	0 0	1 1	1	210	210 Nil	Nil	Nil 0	10 2 / 2
12	25/40/M	70	1 1	H	60	C	10 5	15 10	12 10	3 4	1 1	0 0	1 1	1	180	210 Nil	Nil	Nil 0	10 2 / 2
13	26/19/M	50	1 1	LS	45	C	10 5	15 10	12 10	4 4	1 1	0 0	2 1	1	185	200 Nil	Nil	Nil 0	0 2 / 3

Sedation score	3	3	3	3	3	3	3	3	3	3	3	3	3
Hypotension	0	0	0	0	0	0	0	0	0	0	0	0	0
postop complications	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
intraop complications	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
time to perceive pain	210	240	270	300	270	190	180	240	270	250	210	270	200
surgeon satisfaction	2	2	2	2	2	2	2	2	2	2	2	2	2
Patient satisfaction	2	2	2	2	1	1	2	2	2	2	2	2	2
positional pain	0	0	0	0	0	0	0	0	0	0	0	0	0
spinchter relaxation	2	2	2	2	1	1	2	1	2	2	2	2	2
Muscle power	5	5	5	5	5	5	5	4	4	5	5	5	4
sensory dermatome level	10	10	10	8	10	10	10	10	10	10	10	10	10
Time to start surgery	10	15	10	10	10	10	12	10	10	15	10	10	10
Time to onset anaesthesia in min.	5	10	5	5	5	5	7	5	5	10	5	5	5
test/control	T	T	T	T	T	T	T	T	T	T	T	T	T
Duration in Min.	45	60	30	30	20	40	35	30	30	45	60	50	55
SURGERY	H	H	LS	F	F	F	F	F	LS	H	H	H	H
ASA	1	1	1	1	2	1	2	1	1	1	1	1	1
Weight	55	50	50	50	54	55	50	50	51	60	50	50	55
Age/ sex	60/M	25/M	20/M	41/M	32/M	40/F	43/M	27/M	21/F	45/M	48/F	25/M	38/M
S.no	27	28	29	30	31	32	33	34	35	36	37	38	39

Sedation score	3	3	3	3	3	3	3	3	3	6	3

S.no	Age/ sex	Weight	ASA	SURGERY	Duration in Min.	test/control	Time to onset anaesthesia in min.	Time to start surgery	sensory dermatome level	Muscle power	spinchter relaxation	positional pain	Patient satisfaction	surgeon satisfaction	time to perceive pain	intraop complications	postop complications	Hypotension
40	47/M	50	1	H	45	T	5	10	10	5	2	0	2	2	270	Nil	Nil	0
41	55/M	60	1	H	60	T	5	10	10	5	2	0	2	2	200	Nil	Nil	0
42	26/M	51	1	H	50	T	5	10	10	4	2	0	2	2	270	Nil	Nil	0
43	22/M	50	1	H	55	T	7	15	10	4	2	0	2	2	270	Nil	Nil	0
44	20/M	50	1	F	30	T	10	15	10	5	2	0	2	1	240	Nil	Nil	0
45	41/M	55	1	H	45	T	5	10	12	5	2	1	1	1	180	Nil	Nil	0
46	41/M	50	1	H	60	T	5	12	10	4	2	0	2	1	300	Nil	Nil	0
47	45/M	55	1	H	60	T	5	10	10	3	1	0	2	1	270	Nil	Nil	0
48	45/F	55	1	H	45	T	3	10	10	4	2	0	2	2	240	Nil	Nil	0
49	60/M	50	1	H	55	T	3	10	10	3	2	0	1	2	210	Apnoea	Nil	0
50	43/M	54	2	H	60	T	5	12	10	5	2	0	2	2	300	Nil	Nil	0

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Mean time to onset of anaesthesia

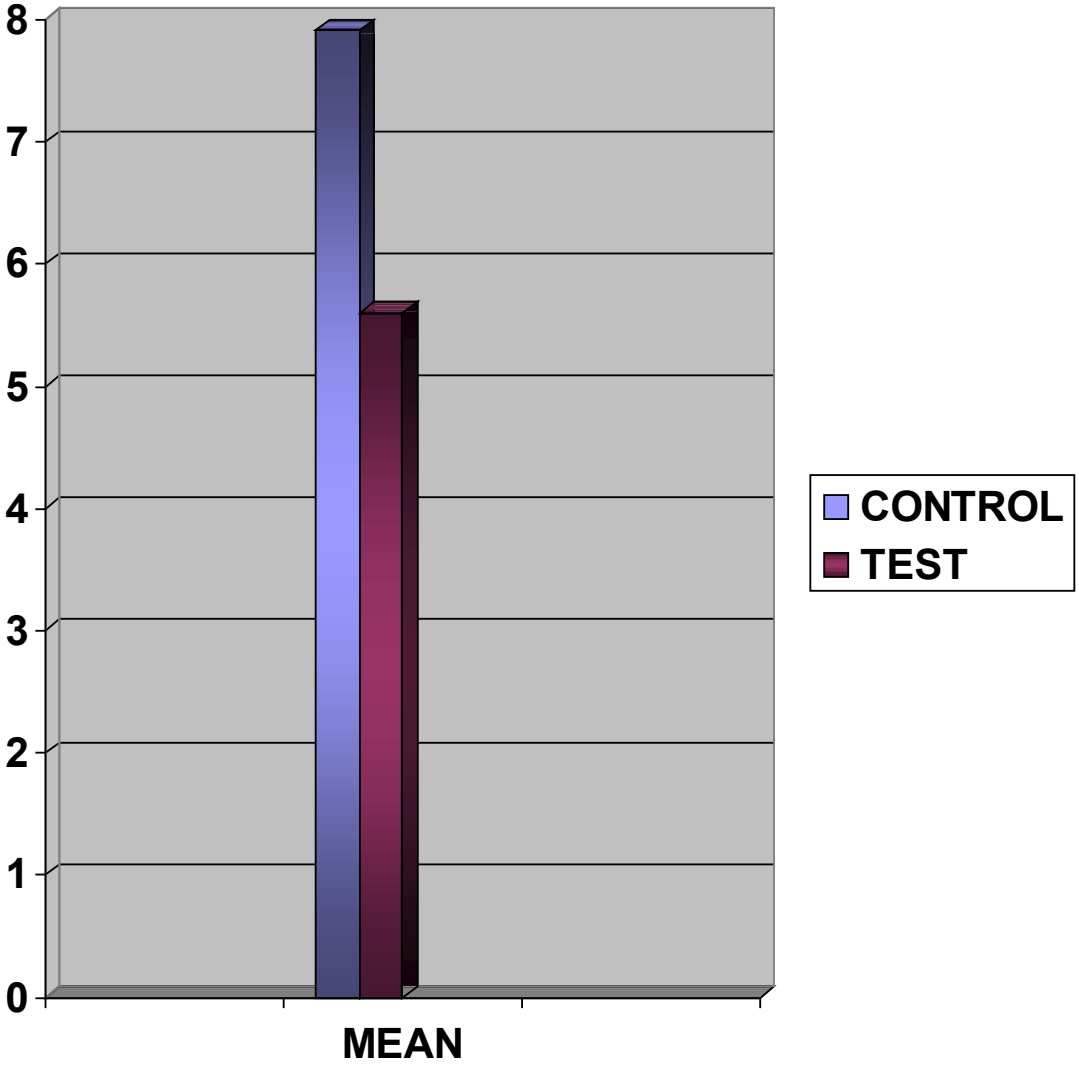

FIG. 1

Y axis MINUTES

Mean Time to start surgery

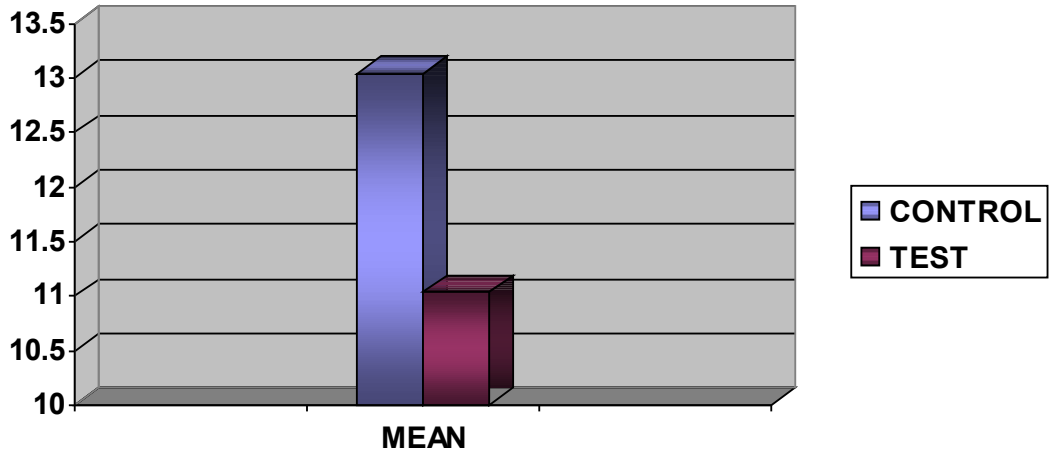

FIG. 2 Y axis in MINUTES

Mean sensory dermatome block level

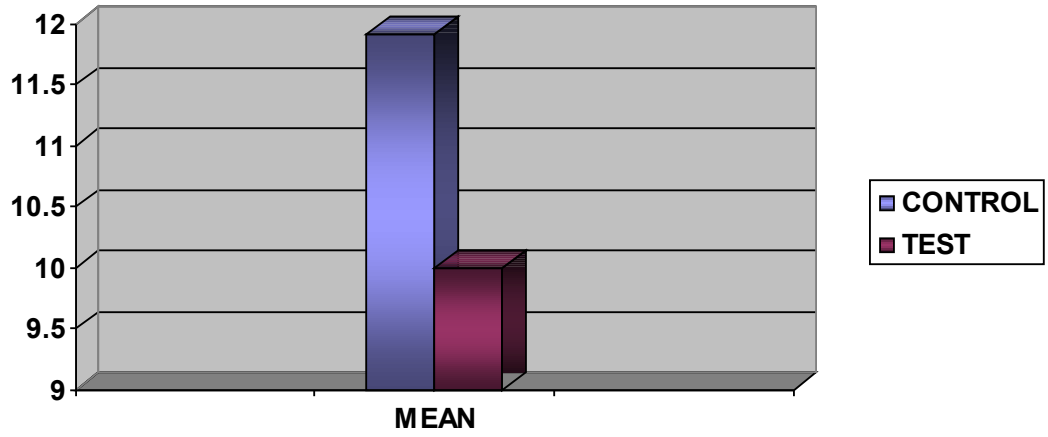

FIG. 3 Y axis DERMATOME LEVEL

Mean muscle power in the lower limb

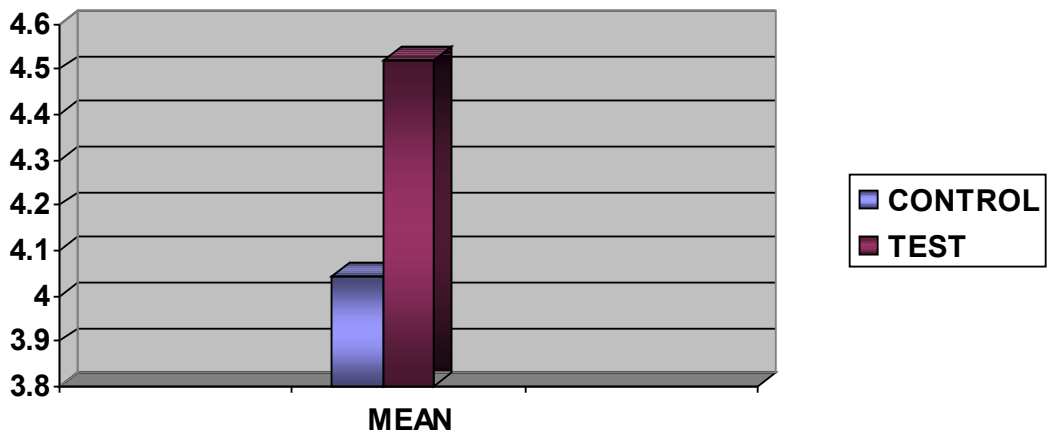

FIG. 4

Mean sphincter relaxation score

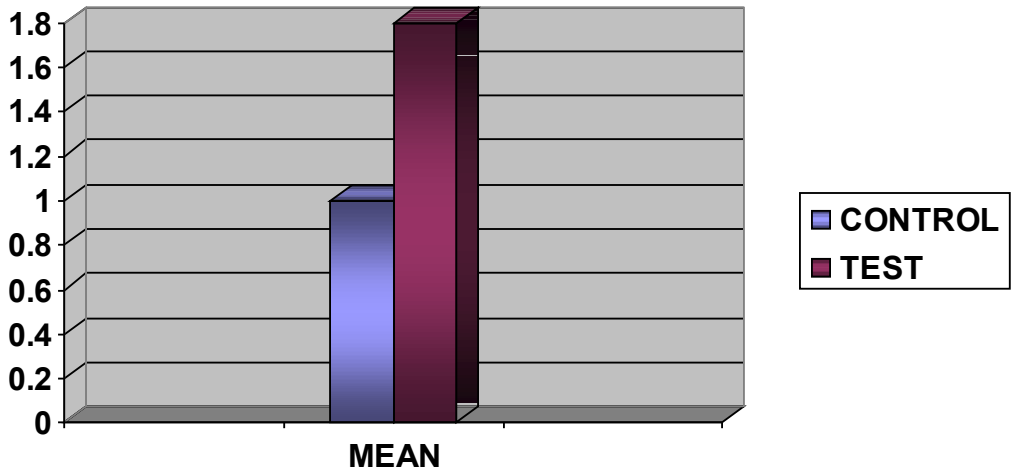

FIG. 5

Mean positional pain score

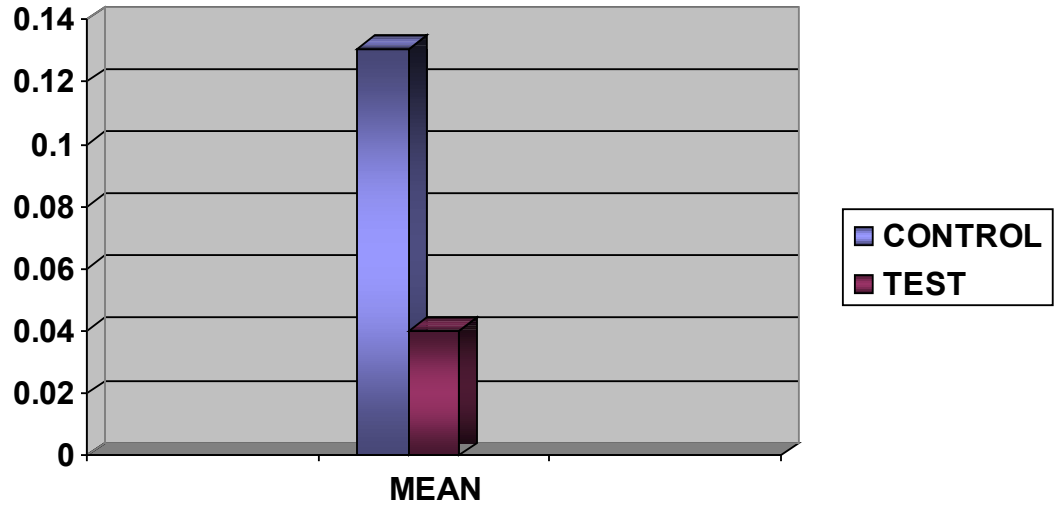

FIG. 6

Mean sedation scores

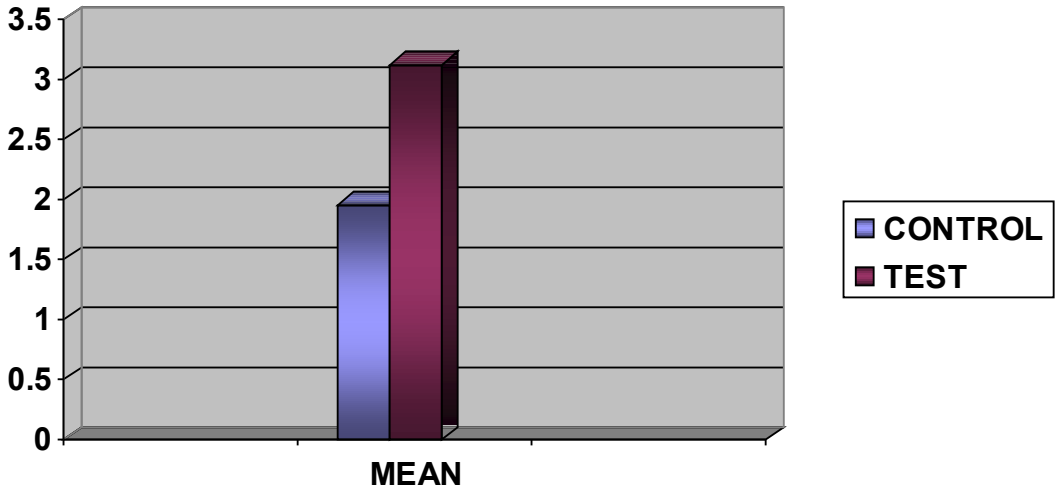

FIG. 7

Mean Surgeon satisfaction score

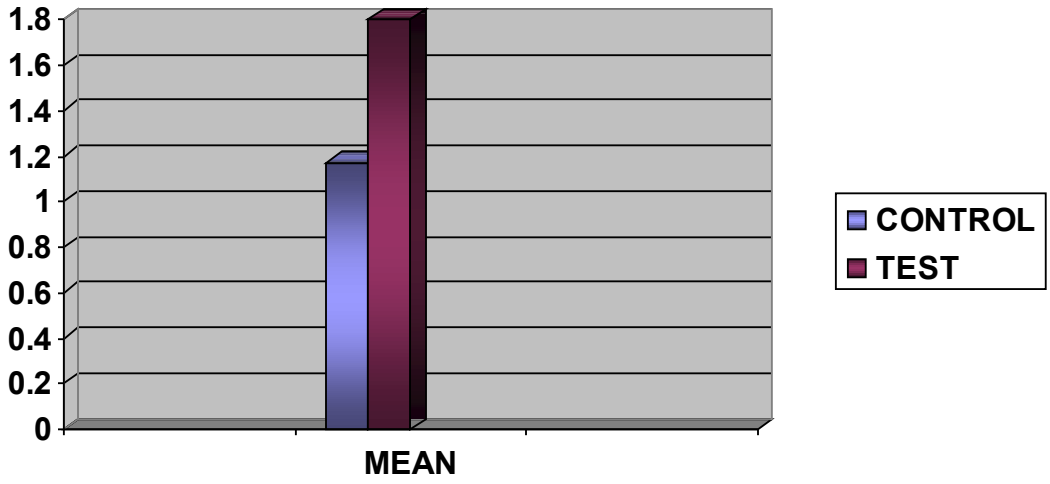

FIG. 8

Mean patient satisfaction score

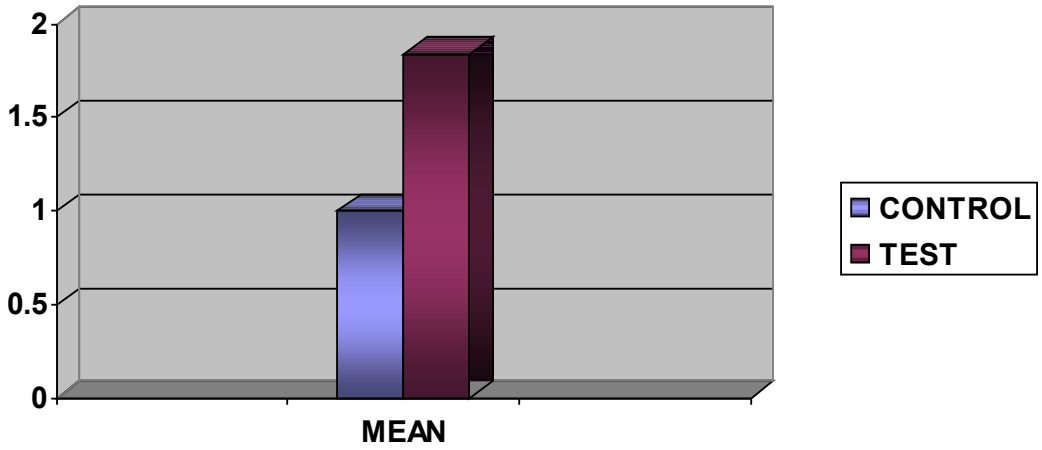

FIG. 9

Mean time to perception of post op pain

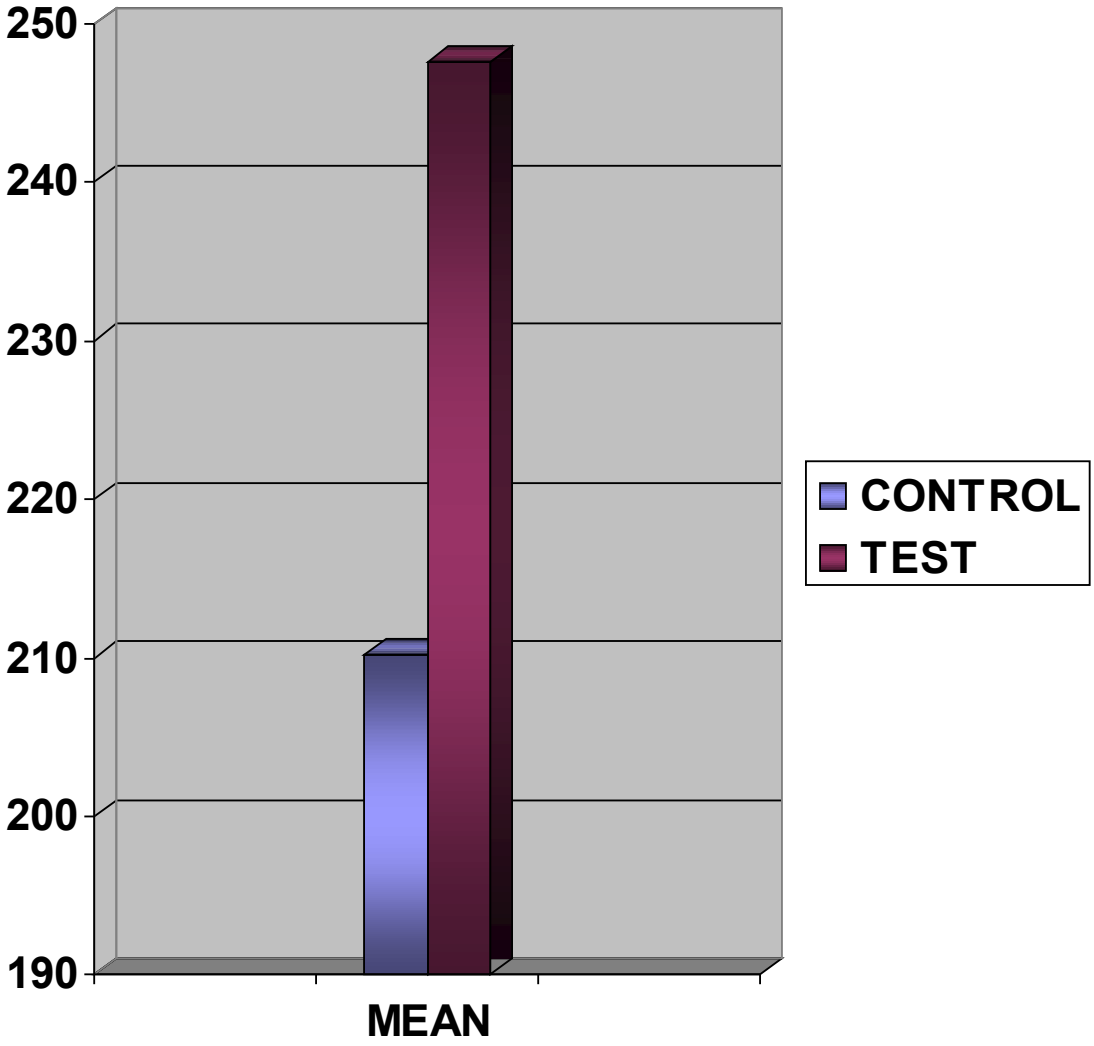

FIG. 10 Y axis in MINUTES

Hypotension

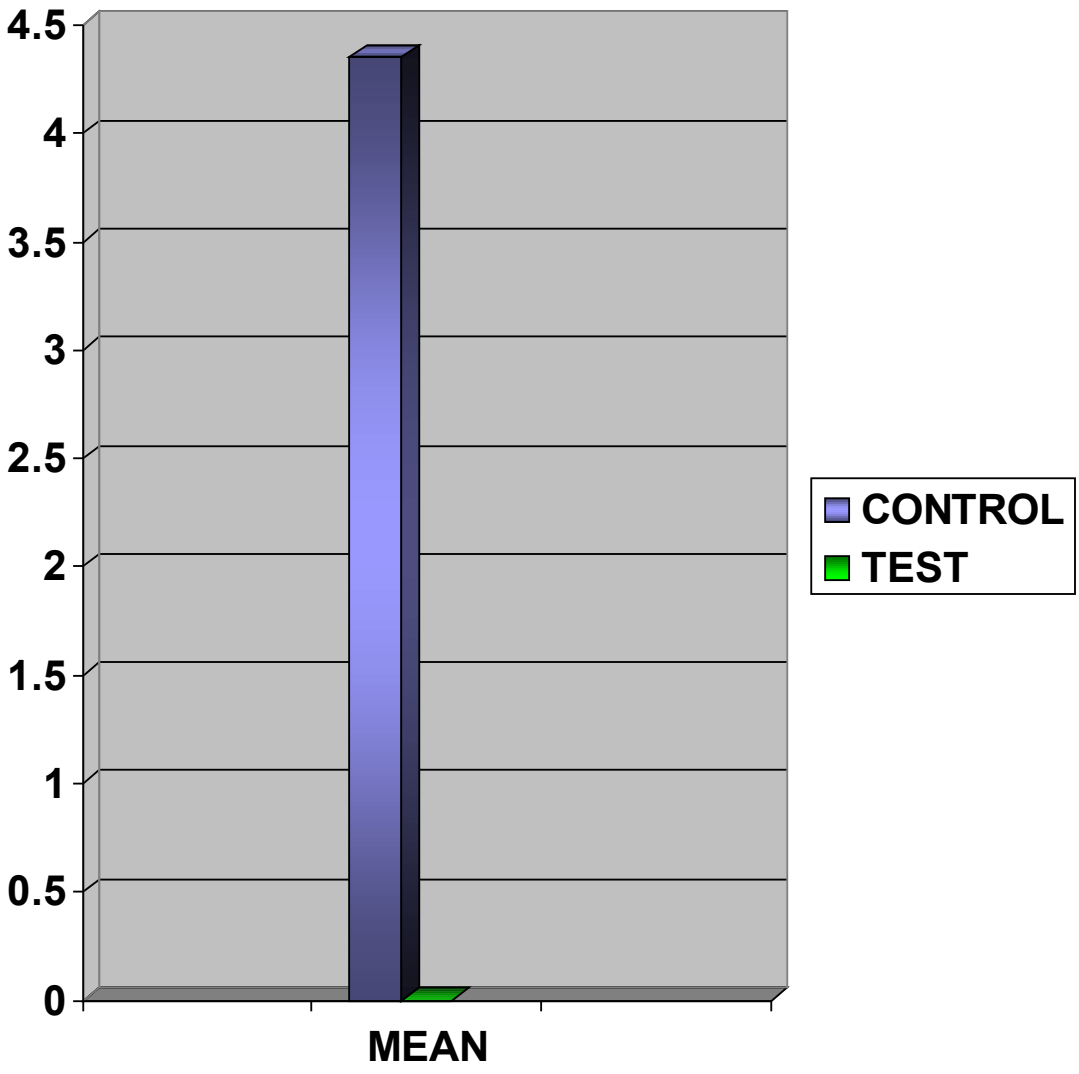

FIG. 11 Y axis in mm of Hg.