PROSPECTIVE RANDOMIZED TRIAL ON EFFECT OF ADDING CLONIDINE TO HYPERBARIC BUPIVACAINE INTRATHECALLY IN PATIENTS POSTED FOR CAESAREAN SECTION

Dissertation submitted to

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

in partial fulfillment for the award of the degree of

DOCTOR OF MEDICINE

IN

ANAESTHESIOLOGY

BRANCH X

DEPARTMENT OF ANAESTHESIOLOGY
MADRAS MEDICAL COLLEGE
CHENNAI – 600 003.

MARCH 2010

CERTIFICATE

This is to certify that the dissertation entitled,

"PROSPECTIVE RANDOMIZED TRIAL ON EFFECT OF ADDING CLONIDINE TO HYPERBARIC BUPIVACAINE INTRATHECALLY IN PATIENTS POSTED FOR CAESAREAN SECTION" Submitted by **Dr.MEENATCHI. R.** in partial fulfillment for the award of the degree of Doctor of Medicine in Anesthesiology by the Tamilnadu Dr.M.G.R. Medical University, Chennai is a bonafide record of the work done by her in the Department of Anesthesiology, Madras Medical College, during the academic year 2007 -2010.

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Every successful venture is a fruit of untiring perspiration and invigorating inspirations coupled with rays of hope in the path of optimism, made easy with poured support all along the path of performance. On completion of my dissertation I would like to acknowledge all those who have made this possible.

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INTRODUCTION

Caesarean section is one of the commonest surgeries performed. Unlike most surgical patients, many parturients express the desire to be awake and alert during and after childbirth. The recovery should be compatible with the initial newborn bonding and frequent feeding. The role of Obstetric Anaesthesiologist has been enhanced to include providing safe and satisfying postoperative pain relief to the parturient.

The advantages of spinal anaesthesia in caesarean section include

- the simplicity of the technique
- rapid onset of anaesthesia
- less neonatal exposure to potentially depressant drugs
- decreased risk of maternal pulmonary aspiration
- awake mother at the birth of the child
- Option of using additives to local anaesthetics for postoperative pain relief.

Bupivacaine was introduced by Eckenstam in 1957 and used clinically by Telivuo in 1963. Although Intrathecal Bupivacaine alone offers blockade upto T5 dermatome, a substantial number of patients still experience some pain or discomfort and require analgesic supplement during Caesarean delivery.

Addition of α2 adrenergic agonist Clonidine to Bupivacaine has a variety of actions

- potentiates the effects of local anaesthetic
- improves the quality of intraoperative anaesthesia
- prolongs the sensory blockade and reduces the requirement of postoperative analgesics
- Does not produce pruritus and respiratory depression unlike spinal opioids.

This study was designed to evaluate the efficacy and adverse effects of 75µg Clonidine added to 0.5% Hyperbaric Bupivacaine administered intrathecally in patients undergoing elective Caesarean section.

AIM OF THE STUDY

This study aims to evaluate the effects of addition of Clonidine, an alpha -2 agonist to 0.5%Hyperbaric Bupivacaine administered intrathecally in patients posted for elective caesarean section comparing with a placebo. (Normal saline).

SPINAL ANAESTHESIA

The first spinal analgesia was administered in 1885 by Leonard Corning(1855-1923), a neurologist in New York. He was experimenting with cocaine on the spinal nerves of a dog when he accidentally pierced the dura mater.

The first planned spinal anaesthesia for surgery in man was administered by August Bier (1861-1949) on 16 August 1898, in Kiel, when he injected 3 ml of 0.5% cocaine solution into a 34 year old labourer After using it on 6 patients, he and his assistant each injected cocaine into the other's spine. They recommended it for surgeries of legs, but gave it up due to the toxicity of cocaine.

Spinal (subarachnoid) Anaesthesia is a form of central neuraxial block in which a temporary interruption of nerve transmission is achieved following injection of local anaesthetic and/or adjuvant solutions into the subarachnoid space.

Spinal anaesthesia is one of the most frequently employed methods of anaesthesia in caesarean section.

ANATOMY OF SPINE: The vertebral canal extends from the foramen magnum to the sacral hiatus. It is formed by the dorsal spine, pedicles and laminae of successive vertebrae (7cervical, 12thoracic, 5lumbar and 5sacral). The vertebrae are held together by a series of overlapping ligaments namely,

- anterior longitudinal ligament
- posterior longitudinal ligament
- ligamentum flavum
- interspinous ligament
- supraspinous ligament
- intervertebral discs.

The spinal cord, a direct continuation of the medulla oblongata begins at the upper border of the atlas and terminates distally in the conus medullaris. The distal termination, because of the differential growth rates between the bony vertebral canal and central nervous system varies from L3 in infant to the lower border of L1 in the adult.

Surrounding the spinal cord in the bony vertebral column are 3 membranes: from within to periphery- piamater, arachnoidmater and duramater. The piamater is a highly vascular membrane that closely invests the spinal cord. The arachnoid mater is a delicate nonvascular membrane closely attached to the

outermost duramater. Between the pia and arachnoid mater is the subarachnoid space. In this space, cerebrospinal fluid, spinal nerves, blood vessels that supply the spinal cord and dentate ligaments are present. Although the spinal cord ends at the level of L1 in adults, the subarachnoid space continues till S2 level. The outermost membrane in the spinal cord is the longitudinally organized fibroelastic membrane, the duramater. This layer is the direct extension of the cranial duramater and extends as the spinal dura from the foramen magnum to S2, where the filum terminale blends with the periosteum of the subdural space which contains only small amounts of serous fluid to allow the dura and arachnoid move over each other. Surrounding the duramater is the epidural space which extends from foramen magnum to the sacral hiatus. Posterior to the epidural space is the ligamentum flavum. Immediately posterior to the ligamentum flavum is the interspinous ligament extending from the external occipital protuberance to the coccyx. Posterior to this structure is the supraspinous ligament.

Lumbar puncture is routinely done below the L3 vertebra down to the L5-S1 interspace to avoid damage to the spinal cord which ends at the lower border of L1 vertebra in adults.

PHYSIOLOGY OF SUBARACHNOID BLOCK

CEREBROSPINAL FLUID:

The cerebrospinal fluid is an ultra filtrate of plasma which is in hydrostatic and osmotic equilibrium. It is a clear, colourless fluid found in the spinal and cranial subarachnoid space and in the ventricles of brain. The average volume in the adults ranges from 120 to150 ml of which 35ml is in the ventricles, 25ml is in the cerebral subarachnoid space and 75 ml is in the spinal subarachnoid space. It is secreted by the choroid plexus at a rate of 0.3 to 0.4ml/minute.

PHYSICAL CHARACTERISTICS OF CEREBROSPINAL FLUID:

PH	7.4
SPECIFIC GRAVITY-at body temperature	1.007
At 4degree Celsius	1.0003
DENSITY	1.0003g/ml
PRESSURE	8-12mmHg/70-80 cm H2O
CELLS	3-5/Cu.mm
PROTEINS	20mg/dl
GLUCOSE	45-80mg/dl

MECHANISM OF SPINAL ANAESTHESIA

Injection of local anaesthetics into the spinal cerebrospinal fluid allows access to the sites of action and the peripheral nerve roots. The nerve roots leaving the spinal canal are not covered by epineurium and are readily exposed to the local anaesthetic within the cerebrospinal fluid. Therefore the afferent impulses leaving via the ventral nerve roots are blocked during spinal anaesthesia. Spinal local anaesthetics block sodium channels and electrical conduction in spinal nerve roots. Local anaesthetics can exert sodium channel block within the dorsal and ventral horns, inhibiting generation and propagation of electrical activity. The order in which nerve fibres are blocked in spinal anaesthesia is

- preganglionic sympathetic B fibres
- temperature fibres (cold before warmth)
- fibres carrying pinprick sensation, touch, deep pressure and proprioception.

  Recovery is roughly in the reverse order.

SPREAD OF LOCAL ANAESTHETIC IN THE SUBARACHNOID SPACE:

The local anaesthetic solution is diluted in the cerebrospinal fluid and therefore its original concentration is of less potency than the actual solution of mass of drug injected. Spread is also determined by the baricity of the injected solution. Baricity

is a ratio comparing the density of LA solution at a specified temperature to the density of cerebrospinal fluid at the same temperature.

A hypobaric solution has a baricity of less than 1.0000 or specific gravity less than 1.0069 (mean value of csf specific gravity).

A hyperbaric solution has a baricity greater than 1.0000 or specific gravity more than 1.0069.

Hypobaric and hyperbaric solutions are prepared from isobaric solutions by addition of various amounts of sterile distilled water and dextrose respectively. Isobaric solutions do not move under the influence of gravity in the cerebrospinal fluid. Spread of solution and consequently height of block is not influenced by position of patient and is somewhat unpredictable. Hyperbaric solutions, being heavier than cerebrospinal fluid, settle to the most dependent aspect of the subarachnoid space, which is determined by the position of the patient. In a supine patient, hyperbaric solutions gravitate to the thoracic kyphosis. Hypobaric solution floats up to the nerves innervating the surgical site. The major factors affecting height of subarachnoid block are the baricity of the solution and the dosage (mass) of drug injected.

FATE OF LOCAL ANAESTHETICS IN SUBARACHNOID SPACE:

Following injection of local anaesthetic solution into the subarachnoid space, its concentration falls rapidly. The initial steep fall is due to mixing with cerebrospinal fluid and subsequent absorption into nerve roots and spinal cord. The egress of local anaesthetic following subarachnoid injection is primarily by vascular absorption with no hydrolysis or degradation taking place in the cerebrospinal fluid. Depending on the type of drug used, it is metabolized in plasma by pseudocholinesterase or in the liver. As duration of anaesthesia is in part, a result of the rate of absorption from the subarachnoid space, the addition of a vasoconstrictor to the local anaesthetic solution will retard absorption of the drug and thus increase the duration of anaesthesia.

CONTRAINDICATIONS OF SUBARACHNOID BLOCK:

- patient refusal
- local sepsis
- uncorrected coagulopathy
- uncontrolled blood loss/ shock
- severe cardiac disease
- fixed cardiac output states
- documented allergy to local anaesthetics

- raised intracranial pressure
- neurological disease
- major spine deformities/ previous surgery on spine

TECHNIQUE OF SPINAL ANAESTHESIA

The first step in the successful application of spinal anaesthesia is proper patient selection. This is accomplished by preanaesthetic evaluation of the patient through history, physical examination, laboratory data and communication with the patient and surgical staff about details of the procedure. Suitable premedication is given to the patient before performing the subarachnoid block. Reliable intravenous access is mandatory. The administration of 500-1000 ml (15-20ml/kg) of crystalloid solution to limit the hypotension that may result from sympathetic block produced by spinal anaesthesia has some merit. The recommended standards for airway management and emergency drugs are kept ready. Spinal anaesthesia should be administered to a cooperative patient who is placed on a table that can be tilted upward or downward.

PROCEDURE

The spinal anesthetic technique can be broken down into a series of steps of 4 p's:

- Preparation

- Position
- Projection
- Puncture

PREPARATION

Preparation of the equipment and drugs is essential for performing a subarachnoid block.

The choice of drug is based on the duration of block desired, the surgical procedure and patient variables.

Spinal needles of various diameters with various types of ends are available. Spinal needles fall into two main categories:

Needles that cut the dural fibres - Quincke- Babcock needle

Needles designed to separate the dural fibres- Whitacre, Sprotte and Greene needles. In order to keep the incidence of post dural puncture headache to a minimum, small bore needles with a rounded, non cutting bevel are preferred.

POSITION

The choice of position of patient for performing the subarachnoid block depends on a number of factors, the proposed surgery being the most important. The three

primary methods of positioning include lateral decubitus, sitting and prone positions; each with its own advantages in specific situations.

In the lateral decubitus position, the patient is placed with his back parallel to the edge of the operating table nearest to the anaesthesiologist, with thighs flexed upon the abdomen and neck flexed to allow the forehead to be as close to the knees as possible.

The sitting position is chosen when low lumbar and sacral levels of adequate for the surgical procedure, when obesity or scoliosis make identification of midline anatomy difficult in the lateral decubitus position or when orthopedic problems of the hip and knee exist.

The prone position is used primarily for the hypobaric technique for rectal and perineal procedures.

PROJECTION AND PUNCTURE

The spinal puncture can be performed either by a midline or a paramedian approach, usually at the L3-L4 or L4-L5 interspace. The procedure is carried out under strict aseptic conditions. The patient's back is widely prepared with an antiseptic solution and sterile drapes applied. A line from the highest point of the iliac crest passes through either the spinous process of L4 or the L4-L5 interspace. The midline approach with patient in lateral position is used in our study.

Depending on the interspace and approach selected, a subcutaneous skin wheal is raised over the intended puncture site with local anaesthetic solution. The needle is inserted in the middle of the interspace with bevel parallel to the longitudinal dural fibres. After traversing the skin and subcutaneous tissue, the needle is advanced in a slightly cephalad direction with the long axis of the vertebral column. A characteristic change in resistance occurs as the needle traverses the supraspinous ligament, interspinous ligament, ligamentum flavum, dura and pierces the arachnoid which becomes quite recognizable as experience is gained. The stylet is removed and appearance of cerebrospinal fluid at the hub of the needle confirms correct position of the needle tip. The hub of the needle is firmly held between the thumb and index finger of the anaesthesiologist's non dominant hand and the back of the hand placed against patient's back to steady the needle, whole syringe containing anaesthetic solution is firmly attached to the needle. After confirming free flow of cerebrospinal fluid by aspiration, the anaesthetic solution is injected. The patient is placed in supine position, cardio vascular and respiratory functions are monitored. Analgesia is checked by loss of sensation to pinprick.

EFFECTS OF PREGNANCY ON SPINAL ANAESTHESIA

TECHNICAL CONSIDERATIONS:

- Enhancement of lumbar lordosis causes reduced vertebral interspinous gap creating technical difficulty.
- Widening of pelvis results in a head down tilt when a parturient is in the lateral position. This may increase the rostral subarachnoid spread of hyperbaric solution when injection is made with patient in the lateral position.
- Apex of thoracic kyphosis is at higher level thus increasing the cephalad spread of local anaesthetic.

EFFECT OF PREGNANCY ON SPINAL ANAESTHETIC DOSE REQUIREMENTS:

Pregnancy enhances the spread of hyperbaric local anaesthetic solution in the subarachnoid space resulting in 25% reduction in the segmental dose requirement. This decrease is attributed to following factors:

- Reduction of spinal cerebrospinal fluid volume, which accompanies distension of vertebral venous plexus.
- Enhanced neural susceptibility to local anaesthetics.

- Inward displacement of intervertebral foraminal soft tissue, resulting from increased abdominal pressure.
- Increased rostral spread caused by the widening of pelvis.
- Higher level of the apex of thoracic kyphosis during late pregnancy.

COMPLICATIONS OF SPINAL ANAESTHESIA

ADVERSE OR EXAGGERATED PHYSIOLOGICAL RESPONSES:

High block or total spinal

Cardiac arrest

Urinary retention

Anterior spinal artery syndrome

Horners syndrome

COMPLICATIONS RELATED TO NEEDLE INSERTION:

- Backache
- Dural leak resulting in PDPH, diplopia or tinnitus.
- Nerve root damage
- Spinal cord damage
- Cauda equina syndrome

- Intraspinal or epidural haematoma
- Arachnoiditis
- Meningitis
- Transient neurological syndrome
- Systemic local anaesthetic toxicity.

PHARMACOLOGY OF BUPIVACAINE

Bupivacaine is an aminoacyl amide local anaesthetic synthesized by A.F.EKENSTAM et al at AB BOTORS (1957), clinically used by TELIVUION in 1963. It is produced for clinical use as a racemic mixture of the enantiomer containing equal proportions of the 'S' and 'R' forms. It is supplied for clinical use as a hydrochloride salt.

CHEMICAL STRUCTURE

DESCRIPTION: 1- butyl-N-(2, 6-dimethyl phenyl)-2- piperidine decarboxamide hydrochloride monohydrate. It has butyl group on the piperidine nitrogen atom of the molecule.

PHYSICO CHEMICAL PROFILE

Molecular weight	288
PKa	8.1
Solubility in alcohol	1 in 8
Solubility in water	1 in 25
Octanol/ water partition coefficient	346
Mean uptake ratio	3.3

Lipid solubility	28
Plasma protein binding	95%

MECHANISM OF ACTION

Bupivacaine exerts its effect by inhibition of sodium channels. It acts to block conduction in the nerves by decreasing or preventing the large transient increases in permeability of the cell membranes to sodium ions that follows depolarization of the membrane. Bupivacaine also reduces the permeability of the resting nerve membrane to potassium as well as sodium ions.

Thus bupivacaine has a stabilizing action on all excitable membranes.

PHARMACOLOGICAL EFFECTS

- LOCAL - nerve blockade
- REGIONAL - pain, temperature, touch, motor power and vasomotor tone supplied by the nerves are blocked
- SYSTEMIC-effects occurring as a result of systemic absorption or intravenous administration.

The clinical profile of nerve blockade produced by bupivacaine differs from that of lignocaine. It is 4 times more potent than lignocaine but the onset of

action is slower. The duration of action is considerably longer. The sensory block produced by bupivacaine tends to be more marked than motor block.

SYSTEMIC EFFECTS

CNS: stimulation can occur producing restlessness, tremors and convulsions in overdosage, followed by drowsiness, unconsciousness and cardiac arrest.

CVS: depresses the automaticity of heart and myocardial contractility. Depending on the membrane potential and the rate of stimulation, bupivacaine depresses Vmax considerably more than lignocaine and results in slowed conduction of cardiac action potential which is manifested as the prolongation of PR and QR intervals on ECG. This results in reentrant phenomenon and ventricular arrhythmias. The sodium channels are blocked in a fast-in slow-out manner which causes difficulty in resuscitation when the ventricular fibrillation has occurred. The cardiotoxicity of Bupivacaine results from high lipid solubility and R-Enantiomer is more toxic than S-Enantiomer. CC/CNS ratio for bupivacaine is 3.7±0.5. Pregnancy increases the cardiotoxic effects of bupivacaine.

PHARMACOKINETICS

- Absorption: rapidly from site of injection
- Peak systemic concentration:5-30 minutes after administration

- Volume of distribution at steady state: 72 litres
- Onset of action: 20-30 minutes
- Relative potency: 8
- Duration of action: 360-720 minutes
- Metabolism: in liver : dealkylation to pipecoloxylidine; aromatic hydroxylation; amide hydrolysis and conjugation
- Clearance: 0.47 litres/ minute
- Excretion; 5% by kidney as unchanged drug and rest as metabolites.

PREPARATIONS AVAILABLE

0.25%, 0.5% solutions in 10ml and 20ml vials

5mg/ml (0.5%) Bupivacaine and 80mg dextrose in 4ml ampoules for intrathecal injection (baricity 1.0207).

CLINICAL APPLICATIONS

- Central neuraxial blocks (intrathecal, epidural and caudal)
- Peripheral nerve blocks
- Infiltration anaesthesia

CONTRAINDICATIONS

- Paracervical block (in Obstetrics)
- Known hypersensitivity to amide local anaesthetics
- Intravenous regional anaesthesia (IVRA).

RECOMMENDED SAFE DOSAGE

CONCENTRATION USED	MAXIMUM PERMITTED DOSE
0.125%-0.5%	3mg/kg body weight
0.75%(not to be used in obstetric epidurals)	Maximum over 4 hours -150mg Over 24 hours-400mg
0.5%(plain/hyperbaric solution) Intrathecal use	20mg

PHARMACOLOGY OF CLONIDINE

STRUCTURE

Clonidine, an Imidazoline derivative is a selective partial agonist for alpha 2 adrenoreceptors. It has a variety of actions including antihypertensive effects as well as the ability to potentiate the effects of local anaesthetic.

PHYSICOCHEMICAL PROFILE

- Structure : 2,6,dichloro N-2 imidazolinyieldene benzenamine hydrochloride
- Molecular weight :266.6
- PKa :8.05
- Solubility in alcohol:1 in 25
- Solubility in water:1 in 13
- Octanol/ water partition coefficient:3.02

  Clonidine hydrochloride is a white crystalline, odourless powder with a bitter taste. It is produced by chemical synthesis.

PHARMACOLOGY

Clonidine is a partial agonist at α adrenoreceptors both within the central nervous system and in the periphery. It is more specific for α2 than for α1 with a ratio of affinities at these sites of approximately 300:1. Within the CNS α2 receptors are

located both presynaptically on terminals of neurons which release a variety of transmitters (norepinephrine, epinephrine, serotonin and acetylcholine) and postsynaptically on nor-adrenergic neurons.

MECHANISM OF CLONIDINE AS AN ADJUVANT IN CENTRAL NEURAXIAL BLOCKADE:

- All α2adrenoreceptors when activated are able to inhibit adenyl cyclase. The resulting decrease in the accumulation of cyclicAMP reduces the stimulation of C-AMP dependent protein kinase and hence the phosphorylation of target regulatory proteins.
- Another effector mechanism is efflux of potassium ions through the inward rectifier or calcium activated potassium channels. This alteration in membrane ion conductance can hyperpolarize the excitable membrane and provide an effective means of suppressing neuronal firing.
- Activation of α2 adrenoreceptors can also suppress calcium entry via voltage operated calcium channels in to the nerve terminals. This action may be responsible for the inhibitory effect that α2 agonists exert on exocytosolic release of neurotransmitter.

EFFECTS ON ORGAN SYSTEMS:

CARDIOVASCULAR SYSTEM: oral or intravenous administration of Clonidine causes a dose dependent fall in blood pressure and heart rate in both supine and erect position, with orthostatic response being more prominent. Following rapid intravenous administration of Clonidine, the hypotensive effect is preceded by a brief pressor phase lasting less than 5 minutes with a rise in mean arterial pressure of less than 10mmHg. Although the onset of hypotensive effect is more rapid following intravenous dosing, for the same dose, the degree of hypotension and the time of maximum effect (1.5-2 hrs) are similar by both routes. The degree of bradycardia is more marked after rapid IV administration. The duration of hypotensive effect is also dose related and extends for up to 24 hours after a single dose of 150-300μg. the magnitude of hypotensive effect is greater in hypertensive than in normotensive subjects.

The hypotensive and bradycardia effects are due to inhibition of sympathetic outflow by stimulation of α2 adrenergic neurons in the medullary vasomotor centre, the nucleus tractus solitarius. The pressor effect of high dose of Clonidine is due to peripheral vasoconstriction mediated by stimulation of postsynaptic α1 /α2 adrenoreceptors on vascular smooth muscle.

RESPIRATORY SYSTEM: the respiratory depressant effect of Clonidine is not remarkable unless massive doses are given. The effect of Clonidine is less potent than that of opioids.

CENTRAL NERVOUS SYSTEM:

- Sedation –mediated by central α2 receptors in locus ceruleus
- Anxiolysis-comparable to that of Benzodiazepines
- Analgesia- mediated by α2 adreno receptors in the superficial layers of dorsal horn, on the sensory afferents and descending noradrenergic fibres from the brain stem, reducing the substance 'p'release. Thus it inhibits the spinal transmission of noxious sensory information. This analgesic action cannot be reversed by opioid antagonist, naloxone, indicating that Clonidine and opioid mediate analgesia through independent receptor mechanism.
- 50% decrease in MAC value of inhalational anaesthetic agents and decreased anaesthetic requirements of opioids.
- Prevents post anaesthetic shivering at doses of 75µg iv
- Effective in suppressing signs and symptoms of withdrawal from opioids, benzodiazepines and ethanol.

ENDOCRINE: endocrine and metabolic effects mediated by α2 adrenoreceptor stimulation are

- Increased TSH and GH secretion
- Decreased ACTH and ADH secretion
- Inhibition of glucose stimulated insulin release (via α2A receptors), but this does not result in severe hyperglycemia in a clinical setting.

GIT: stimulation by Clonidine of peripheral presynaptic α2 adreno receptors on post ganglionic noradrenergic or cholinergic neurons contributes to reduced salivary flow, intestinal motor activity and gastric secretion.

PHARMACOKINETICS:

Oral absorption	100%
Presystemic metabolism	0-25%
Elimination half life	20-25 hours
Volume of distribution	2L/kg
Plasma protein binding	20-40%

METABOLISM

Clonidine is approximately 40% cleared by metabolism predominantly in the liver to five inactive metabolites. The predominant pathways are:

- Hydroxylation of the phenyl ring
- Opening up of the imidazoline ring followed by reductive step with subsequent oxidative cleavage.
- Hydroxylated metabolites undergo secondary conjugation with sulphate or glucuronide and then excreted renally.
- There is no evidence that any metabolites possess significant biological activity.
- Clearance of Clonidine is linearly related to dose over 75-300µg. Total plasma clearance is 3ml/kg/min with renal clearance of 1.8ml/kg. Clearance may be reduced in the presence of abnormal renal function.
- Although Clonidine crosses the placental barrier, it does not appear to reach concentrations sufficient to affect the fetus.

DOSAGE

ROUTE	BOLUS	CONTINUOUS INFUSION
Oral	4-5µ/kg	
Intramuscular	2µ/kg	
Intravenous	4-5µg/kg	2µ/kg/hour
Epidural	75-450µg/kg	12.5-70µg/hour
Intrathecal	30-225µg	8-400µg/day
Peripheral nerve block	1-2µ/kg	
Intra articular	2µ/kg	

USES

- Antihypertensive agent
- Anaesthesia: prolongation of action of local anaesthetic after neuraxial administration, premedication and decreases postanaesthetic shivering.
- Opioid withdrawal syndrome
- Glaucoma(apraclonidine and brimonidine)
- Migraine prophylaxis
- Menopausal symptoms
- Diabetic diarrhea due to autonomic neuropathy

- Chronic pain syndromes

CONTRAINDICATIONS:

- Hypersensitivity to Clonidine
- Severe cardiovascular diseases
- Patients with hemodynamic instability
- Brady arrhythmia or atrioventricular node disease
- Patients with cardiac pacemakers

ADVERSE EFFECTS

- Hypotension may occur and usually responds to intravenous fluids if necessary parenteral ephedrine
- Bradycardia may occur and responds to atropine
- Sedation- desirable effect
- Sleep disturbances, mental depression
- Dryness of mouth, nose, eyes
- Constipation
- Confusion, head ache, hyperaesthesia
- Skin reactions(rash, urticaria, pruritus)

PREPARATIONS

ORAL FORMS

1. Catapres tablets(Boehringer Ingelheim, UK) containing Clonidine hydrochloride 100µg , 200µg , 300 µg
2. Dexarit tablets (Boehringer Ingelheim, UK) containing Clonidine hydrochloride 25µg.

TRANSDERMAL FORM

Catapres TTS delivering Clonidine 100µg, 200µg or 300 µg daily for one week.

PARENTERAL FORM

1. CATAPRES INJECTION (Boehringer Ingelheim, UK) containing Clonidine hydrochloride 150µg/1ml ampoules.

2. CLONEON (Neon labs ltd, Thane) containing Clonidine hydrochloride 150 µg/1ml ampoules.

REVIEW OF LITERATURE

Addition of adjuvants like Clonidine, an α2 adrenergic agonist with local anaesthetic results in a synergistic response. Whether Clonidine has the potential as analgesic as potent opiate narcotics, as anxiolytic and sedating as potent benzodiazepines and as sympatholytic as modern volatile anaesthetic agents has been analysed and reported in several studies.

USE OF CLONIDINE IN OBSTETRIC PATIENTS:

1. **Benhamou Den et al studied** 78 pregnant women at term scheduled for elective caesarean section to compare the analgesic efficacy and side effect profile of a spinal block with Hyperbaric Bupivacaine alone(group B) or combined with 75µg of Clonidine (group BC) or with Clonidine 75µg and Fentanyl 12.5µg(group BCF). Intraoperatively clonidine increased the spread of sensory block and decreased pain and analgesic supplementation. Thus improved analgesia was best with Clonidine- Fentanyl combination. Postoperative analgesia was prolonged only in group BCF(215±79 min Vs 137±35 min and 183±80 min for group BCF Vs group B and BC;($P < 0.05$) BP and HR changes were not significantly different among groups, where as sedation and pruritus will significantly more frequent in group BCF. Nausea and vomiting were decreased in groups BC and BCF. Apgar Scores and umbilical artery blood PH were not different among groups. Adding a small

dose of intrathecal Clonidine to Bupivacaine increases the quality of intraoperative analgesia and decreases pain during caesarean section. Combining Clonidine with fentanyl further improved analgesia.

2. **Michael J. Paech et al** studied the analgesic efficacy and duration of subarachnoid fentanyl 15µg with Morphine, Clonidine or both Morphine and Clonidine for caesarean delivery in 240women. Onset of sensory block, ephedrine requirement and incidence of hypotension, patient satisfaction and recovery were similar. Groups receiving Clonidine had greater sedation, those receiving Morphine had more severe pruritus, and group MC showed a trend to more vomiting intra operatively. Compared with Morphine 100µg and atleast 60µg of Clonidine was found to increase the duration of post caesarean analgesia, reduce opioid requirement and increase intraoperative sedation. The subarachnoid Bupivacaine, Fentanyl, Morphine 100µg and Clonidine 60µg improves pain relief compared with morphine 100µg or Clonidine 150µg alone but increases intraoperative sedation and may increase perioperative vomiting.

3. **Owen MD et al** studied to determine whether the addition of Clonidine and neostigmine to intrathecal Bupivacaine – Fentanyl would increase the duration of analgesia without increasing Side effects for patients in labor. 45 healthy parturients in active labor received 2ml intrathecal dose of one of the following dextrose containing solutions using the combined spinal- epidural

technique:1.Bupivacaine 2.5mg and Fentanyl 25µg(BF) 2.BF+Clonidine 30µg(BFC) 3.BFC+Neostigmine10µg (BFCN). The addition of Clonidine and neostigmine increased the duration of analgesia from intrathecal Bupivacaine-Fentanyl during labor, but neostigmine caused more nausea.

4. **Gautier Philippe et al** studied the effects of low doses of intrathecal Clonidine (15µg and 30µg) combined with Sufentanil in potentiating the analgesic effects of opioids without increasing the side effects. 30µg Intrathecal Clonidine with 25µg or 5µg Intrathecal Sufentanil had significantly increased the duration of analgesia during the first stage of labor without adverse maternal or fetal effects.

5. **Filos Kreton et al** studied to evaluate the effect of intrathecal Clonidine as a sole analgesic on pain following caesarean section. 20 patients who underwent elective caesarean section receive 45 minutes after general anaesthesia either 150µg Clonidine (n=10) or saline (n=10) Intrathecally. Pain scores were lower in Clonidine than saline treated patients from 20-120 minutes after intrathecal injection as measured by a visual pain linear analogue scale($P<0.05$). The results suggest that 150µg Clonidine is effective in controlling pain following caesarean section but is not free of side effects like hypotension, sedation and dryness of mouth.

6. **Goudas Leonidas et al** studied to evaluate the dose response hemodynamics and analgesic profiles of intrathecal Clonidine administered after a standard surgical intervention, without perioperative administration of additional analgesics, local anaesthetics or tranquilizers. In 30 women who underwent LSCS under general anaesthesia, 45 minutes after tracheal intubation, lumbar intrathecal puncture was performed and patients received 150µg (group 1), 300µg (group 2) and 450µg (group 3) Clonidine. Postoperative analgesia was assessed on a visual analogue scale at rest and after deep cough at standard time points up to 24 hours. At the same time blood pressure, heart rate, sedation and respiratory rate were also recorded. The results demonstrated dose dependent analgesia after intrathecal Clonidine at doses as high as 450µg. the nearly immediate analgesic effect was observed after intrathecal injection of 300µg and 400µg Clonidine. A relative hemodynamic stability is observed suggesting a pressor effect at peripheral sites.

USE OF CLONIDINE IN ORTHOPEDIC PROCEDURES

1. Klimscha W et al compared hemodynamic effects of spinal Vs epidural Clonidine alone and after repetitive dosing. 40 patients scheduled for lower extremity orthopaedics surgery under continuous spinal or epidural anaesthesia with Bupivacaine 0.5%(initial dose 5mg and 50 mg) respectively. One half of the patients received Clonidine 150µg in addition to Bupivacaine in either spinal or

epidural technique. Duration of spinal and epidural anaesthesia was increased more than two fold by Clonidine.

2. Wu et al studied the effect of adding Clonidine to hyperbaric Tetracaine spinal anaesthesia in 60ASA class 1 & 2 patients scheduled for orthopedic and lower abdominal surgery. He concluded that addition of 15µg or 30µg Clonidine may be useful as a means of increasing the duration of hyperbaric tetracaine spinal anaesthesia.

3. NIEMI studied the analgesic and circulatory effects of intrathecal Clonidine in patients undergoing knee arthroscopy under spinal anaesthesia. Duration of sensory analgesia and motor blockade was longer in the Clonidine group. Clonidine patients needed fewer supplemental doses of oxycodone(8 doses) than those in the control group (16 doses). More patients in the Clonidine group were sedated 3-6 hours after the injection. Mean arterial pressure and heart rate were significantly lower in the Clonidine group.

4. De Negri et al studied to determine whether intrathecal administration of Clonidine can reduce the dose of local anaesthetic, and the effects of Clonidine on the cardiovascular system and on arousal level. Addition of Clonidine to hyperbaric Bupivacaine seems to be particularly useful in unilateral spinal

anaesthesia, exerting minimal influence on hemodynamic parameters and guaranteeing a satisfactory postoperative analgesia.

5. De Kock M et al studied to evaluate the association of a small dose of intrathecal Ropivacaine with small doses of intrathecal Clonidine for ambulatory surgery. Small dose intrathecal Clonidine 15µg +8mg intrathecal Ropivacaine produces adequate and short lasting anaesthesia for knee arthroscopy.

6. Seah YS et al studied the prolongation of analgesic effect of the hyperbaric Bupivacaine spinal anaesthesia with Clonidine in patients posted for TURP. Results showed that the mean time for two segments regression to L2 and motor blockade were prolonged in the Clonidine group. Side effects such as hypotension and bradycardia commonly occurred in the Clonidine group, but all patients could be effectively treated with ephedrine and atropine respectively.

7. Baker et al studied that intrathecal Clonidine's side effects could be reduced without compromising the duration and quality of analgesia by injecting Clonidine intrathecally in a hyperbaric solution and elevating the patient's trunk.30elderly patients received intrathecally 150µg of either isobaric (ISO) or hyperbaric (HYPER) Clonidine for postoperative analgesia after surgical repair of traumatic hip fracture. Results showed that increasing the baricity of intrathecal Clonidine solution reduces hemodynamic side effects but also analgesic effect of Clonidine.

MATERIALS AND METHODS

This study was conducted at the Institute of Obstetrics and Gynaecology, Madras medical College, Egmore, Chennai. Between January 2009-March 2009 on 100 Patients of ASA Physical status I and II undergoing elective Caesarean Section. This study was done after ethical committee approval and written informed Consent obtained from all the Patients included in this study.

STUDY DESIGN:

This study was done in a prospective, double blind randomized manner. Each group consisted of fifty patients.

Group BC

Patients in this group received 2ml of 0.5% Hyperbaric Bupivacaine + 75µg (0.5ml) of preservative free Clonidine to a total volume of 2.5 ml intrathecally.

Group BN

Patients in this group received 2ml of 0.5% Hyperbaric Bupivacaine + 0.5 ml of normal saline intrathecally. The final volume of injected solution was 2.5ml in both groups.

In this study 0.5% Hyperbaric Bupivacaine in 8% Dextrose manufactured by NEON Labs Ltd, Thane, and Clonidine hydrochloride

(CLONEON) 150µg/ml manufactured by NEON Labs Ltd, Thane and Normal Saline manufactured by HASEEB pharmaceuticals Ltd, Nagpur were used.

All the solutions were prepared under strict aseptic precautions, by the OT in charge anaesthesiologist uninvolved in the administration of SAB or in the Observation of results.

The specific gravity of the injected solution is 1.025, 1.211 in group BC and BN respectively. All the solutions were hyperbaric relative to CSF.

SELECTION OF CASES

Inclusion criteria:

- ASA Physical status I & II
- Age between 18 – 35 years
- Height 145 – 160cm.
- Patients who have given valid Informed consent
- Singleton fetus at term.

Exclusion criteria:

- Not satisfying inclusion criteria
- Age < 18 or > 35
- Preterm

- Hypertensive disorders of Pregnancy
- Cardio vascular, Neurological, Hepatic or Renal disease.
- Known Hypersensitivity to the Study drug
- Contraindication to SAB
- Opioid exposure during pregnancy
- Unconscious, or severely ill Patients

Pre Anaesthetic Evaluation:

Patients included in this study underwent thorough preoperative evaluation which included the following.

HISTORY: of Underlying medical illness

Previous surgery

Anaesthesia

Last Oral intake

PHYSICAL EXAMINATION:

- General condition of Patient
- Height and weight
- Vital Signs
- Examination of CVS, RS, CNS and vertebral column

- Airway assessment

INVESTIGATIONS:

- Hemoglobin, haematocrit
- Bleeding and Clotting time, Platelet count
- Blood sugar
- Renal Function Test
- Electro Cardiogram.

Patients who satisfied the inclusion criteria were explained about the nature of the study and the anaesthetic procedure.

Written informed Consent was obtained from all patients included in the study.

PREPARATION OF THE PATIENT:

The anaesthesia machine checklist and necessary drugs were kept ready Patient shifted to OT in left lateral position. An Intravenous line was secured with 18G IV Cannula. Premedicated with Inj. Ranitidine 150mgIV and Inj Metachlorpramide 10mg IV. Preloading was done with 20 ml/Kg of Ringer's Lactate over 15mts. Baseline reading of Pulse rate, Blood pressure, Arterial Oxygen Saturation (SpO2), Respiratory rate and Fetal Heart sounds were noted.

EQUIPMENTS:

The autoclaved Spinal tray used for performing the block contained the following equipments,

1. No. 25G Spinal needle –Quincke
2. Graduated 2ml syringe
3. No. 22G Hypodermic needle
4. No 18G Hypodermic needle
5. 5 ml syringe with freely moving plunger
6. Skin towel
7. Galley pot with Swabs
8. Sponge holding forceps

DRUGS:

1. Bupivacaine 0.5% hyperbaric solution- 4 ml ampoule

2. Preservative free Clonidine 150µg/ml – 1ml ampoule

PERFORMING THE SUBARACHNOID BLOCK:

The Patient was placed in lateral position on a horizontal table. The back was cleaned with Spirit. The excess of spirit was removed with dry sponge.

The area was draped with sterile towel. L3 – L4 space was selected to perform the block. The space was identified and a lumbar subarachnoid block performed under strict aseptic precautions, using 25guage Quincke needle. Dural tap was performed and after clear free flow of CSF, the drug was injected slowly at a rate of 0.2 ml per second. The patient was turned on the back immediately, Placed in supine position and wedge kept under right gluteal region. 6L of O2 given through face mask till extraction of the baby. Observations were recorded.

OUTCOME MEASURES

SENSORY BLOCK:

- Assessment of loss of pin prick sensation started immediately after intrathecal injection and continued every 15 seconds.
- Onset of sensory block is the time taken from intrathecal injection to loss of pinprick at T10 level.
- Time taken for maximum dermatomal level of sensory block is noted.

- Level of sensory block noted at the end of surgery and assessment is carried out at 15 minutes interval till complete recovery of sensory block to S2 Level.
- Duration of Sensory block – Time from SAB to return of pin pick sensation at L2 Level.
- Duration of effective surgical analgesia: defined as the time to reach VAS score >4 from the time of SAB
- Duration of time for demand analgesia- defined as the time at which patient demands some mode of pain relief. .

MOTOR BLOCK:

Assessed using modified Bromage score.

0 - Free movement of legs and feet with ability to raise extended legs.

1- Inability to raise extended legs and knee flexion is decreased but full flexion of feet and ankle is present.

2- Inability to raise legs or flex knees but flexion of feet &ankle is present.

3- Inability to raise legs; flex knee, ankle or move toes. (complete block)

Assessment of motor block started immediately after intrathecal injection. Tested every 15 seconds till Bromage score of 1 is reached.

- Onset of motor block – time taken to achieve Bromage Score 1 from the time of SAB.

- The time taken for maximum motor block is noted.

- Duration of motor block – time from SAB to return of Bromage score to 1.

INTRAOPERATIVE AND POSTOPERATIVE VITAL SIGNS:

The Systolic and diastolic BP, PR, RR, SpO2 to be recorded every 2 minutes for first 10 min and every 5 min throughout intraoperative period.

Vital signs at the completion of surgery noted. And thereafter every 30 minutes till regression of sensory block.

Hypotension defined as fall of systolic BP 20% from baseline. To be managed with rapid infusion of IV fluids, foot end elevation and Inj. Ephedrine 6mg increments.

Bradycardia defined as HR < 60/ minute and to be managed with Inj. atropine 0.01mg/kg IV.

Respiratary depression defined as RR < 8 / minute or SpO2 < 92 % to be managed with Bag and mask ventilation or intubation and IPPV if necessary.

QUALITY OF SURGICAL ANAESTHESIA:

Excellent - No complaint of pain at any time during surgery.

Good - Minimal pain or discomfort - to be treated with inj.Pentazocine 0.5mg/kg I V

Poor - G A has to be administered.

SEDATION: Assessed using Ramsay Sedation scale

Level1. Anxious and agitated or restless or both

2. Co-operative, oriented and tranquil

3. Responds to commands only

4. Brisk response

5. Sluggish response

6. No response

ASSESSMENT OF NEONATE: By APGAR SCORE

PARAMETERS	0	1	2
Heart rate	Absent	<100	>1
Respiratory rate	Absent	Irregular, slow,	Robust, crying

		shallow or gasping	
Muscle tone	Absent, limp	Some flexion of extremities	Active movement
Reflex irritability	No response	Grimace	Active coughing and sneezing
Colour	Cyanotic	Acrocyanotic- trunk pink, extremities blue	Pink

ASSESSMENT IN POSTOPERATIVE WARD:

Pain assessment using VAS every 15 minutes till VAS Score > = 4 was reached.Sensory & motor block and vital signs monitored.

All patients were monitored for 24 hours to detect the occurence of Side effects like Respiratory depression, nausea, vomiting, pruritus, post dural puncture headache and neurological complications.

Transient neurological Symptoms were defined as pain or dysesthesia in the buttocks, thighs or lower limbs after recovery from Spinal anaesthesia and resolved within 72 hours

OBSERVATION AND RESULTS

This study was conducted at the Institute of Obstetrics and Gynaecology, Egmore, Chennai. 100 patients were included in this double blinded randomized controlled study. The patients were divided in to two groups. Patients in group BC received 2ml (10mg) of 0.5% hyperbaric Bupivacaine plus 0.5ml (75µg) of Clonidine. Patients in group BN received 2ml (10mg) of 0.5% hyperbaric Bupivacaine plus 0.5ml of normal saline. Final volume of injected solution was 2.5ml in both groups.

DEMOGRAPHIC DATA

The two groups were comparable with respect to their age, height and weight. There was no statistically significant difference among two groups in demographic aspects.

DISTRIBUTION OF MEAN AGE (Years) BY GROUPS

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.194
MEAN	24.20	25.28	*NS
S.D	4.31	3.93	

*NS- Not significant

DISTRIBUTION OF MEAN HEIGHT (cm) BY GROUPS

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.887
MEAN	155.56	155.66	*NS
S.D	3.441	3.554	

*NS-Not significant

DISTRIBUTION OF MEAN WEIGHT (Kg) BY GROUPS

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.55
MEAN	59.38	57.74	*NS
S.D	4.480	3.947	

*NS-Not significant

DURATION OF SURGERY

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.268
MEAN	56.90	55.68	*NS
S.D	12.221	11.98	

*NS-Not significant

The two groups were comparable with respect to the duration of surgery. There was no statistically significant difference among two groups in the duration of surgery.

ONSET OF SENSORY BLOCK

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.658
MEAN	116.2	117.8	*NS
S.D	18.28	17.76	

*NS-Not significant

The time taken to achieve a sensory level of L2 from the time of SAB was tested by pinprick. The mean time taken in group BC was 116.2±18.28 seconds and 117.8±17.76 seconds. There was no statistically significant difference among two groups in the onset of sensory block.

TYPES OF SURGERY IN BOTH GROUPS:

TYPE OF SURGERY	GROUP BC	GROUP BN
BOH	1	1
ELDERLY PRIMI,CPD	2	2

FALED INDUCTION	0	4
G3,P2,L1	0	1
POST DATED	1	6
PREV LSCS	27	23
PRIMI, BREECH	2	2
PRIMI,CPD	8	10
ASA 1	50	50
TOTAL	50	50

Both the groups were similar in respect to ASA and types of surgeries.

MAXIMUM LEVEL OF SENSORY BLOCK

PARAMETERS	GROUP BC		GROUP BN		P-VALUE
NO. OF CASES	NO.	%	NO.	%	
T3	6	12	5		0.086
T4	35	70	34	68	*NS
T5	6	12	7	14	
T6	3	6	4	8	

*NS- Not significant

The range of maximum level of sensory block was T3-T6 in both groups. The median of sensory block was T4 in both groups. There was no statistically

significant difference among two groups in the in the maximum level of sensory block.

ONSET OF MOTOR BLOCK

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.123
MEAN	180.70	170.10	*NS
S.D	33.74	34.47	

*NS- Not significant

The mean time taken to achieve grade – 1 motor block in modified Bromage scale was 180.70±33.74 sec in group BC, 170.10±34.47 sec in group BN. There was no statistically significant difference among two groups in the Onset of Motor Block.

MAXIMUM GRADE OF MOTOR BLOCK

The maximum degree of motor block in both groups was grade 3. There was no statistically significant difference among two groups in the maximum grade of motor block.

DURATION OF MOTOR BLOCK

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.000
MEAN	221.4	109.8	*HS
S.D	33.88	18.09	

HS-highly significant

The mean duration of motor block was 221.4±33.88 min in group BC, 109.8±18.09 in group BN. There was statistically significant difference among two groups in Duration of motor block ($P < 0.0001$)

DURATION OF SENSORY BLOCK: The mean time taken for return of pin prick sensation to L1 level was 279.7±31.59 min in group BC, 157.34±25.19 min in group BN. There was statistically significant difference among two groups in the Duration of sensory Block. ($P < 0.001$)

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.000
MEAN	279.7	157.34	HS
S.D	31.59	25.19	

*HS- Highly significant

TIME TO TWO SEGMENT REGRESSION: The mean Time to two segment regression of sensory block was 156.8±20.44 min in group BC, 95.6±16.33 in group BN. There was statistically significant difference among two groups in Time to two segment regression (P<0.0001)

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.000
MEAN	156.8	95.6	*HS
S.D	20.44	16.33	

*HS- Highly significant

QUALITY OF SURGICAL ANAESTHESIA

PARAMETERS	GROUP BC		GROUP BN		P VALUE
	NO	%	NO.	%	0.000
E	50	100	34	68	*HS
G	-	0	16	36	

E-excellent G- good *HS- Highly significant

Quality of surgical anaesthesia was excellent in all patients in group BC, excellent in 68%patients and good in 36% patients of group BN. there was statistically significant difference between the two groups in the quality of surgical anaesthesia.(P<0.0001)

DURATION OF EFFECTIVE SURGICAL ANALGESIA

PARAMETERS	GROUPBC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.000
MEAN	259.3	159.6	*HS
S.D	36.23	24.15	

*HS- Highly significant

The mean Duration of effective surgical analgesia (defined as the time to reach VAS Score > 4 from the time of SAB) was 259.3±36.23 min in group BC, 159.6±24.15 in group BN. There was statistically significant difference among two groups in the Duration of effective surgical analgesia. (P< 0.0001).

DURATION OF TIME FOR DEMAND ANALGESIA

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.000
MEAN	276.9	163.9	*HS
S.D	33.75	21.88	

*HS- Highly significant

The mean time for demand analgesia (defined as the time at which patient demands some mode of pain relief) was 276.9±33.75 min in group BC,

163.9±21.88 min in group BN. There was statistically significant difference among two groups in the duration of time for demand analgesia (P<0.0001)

SAB TO EXTRACTION OF FETUS

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.092
MEAN	6.9	7.3	*NS
S.D	1.18	1.16	

*NS- Not significant

The mean duration to extraction of fetus was 6.9±1.18 min in group BC and 7.3±1.16 min in group BN which is not statistically significant.

APGAR SCORE

PARAMETERS	GROUP BC	GROUP BN	P VALUE
NO. OF CASES	50	50	0.088
MEAN	7.2	7.02	*NS
S.D	0.67	0.79	

*NS- Not significant

The mean Apgar score at 1st minute in group BC was 7.2 ±0.67 min, and 7.02±0.79 min in group BN. Apgar score at 5th minute was 9 min in both the groups. There

was no statistically significant difference in the Apgar score between the two groups.

SEDATION:

PARAMETERS	GROUP BC		GROUP BN		P VALUE
	NO.	%	NO.	%	0.000
SCORE 1	0	0	4	8	*HS
SCORE 2	0	0	46	92	
SCORE 3	50	100	0	0	

*HS- Highly significant

Ramsay sedation score was 3 in all 50 patients of group BC, score 2 in 46 patients and score 1 in 4 patients. There was statistically significant sedation in group BC. ($P<0.0001$)

COMPLICATIONS:

PARAMETERS	GROUP BC		GROUP BN		P VALUE
	NO.	%	NO.	%	
HYPOTENSION	50	100	42	84	0.003
BRADYCARDIA	12		3	6	0.01
SHIVERING	-	0	12	24	0.000

NAUSEA &VOMITING	2	4	6	12	0.000
RESPIRATORY DEPRESSION	0	0	0	0	

The incidence of hypotension was 100% in group BC and 84 % in group BN. The incidence of bradycardia was 24% in group BC and 6% in group BN. There was statistically significant difference in the incidence of hypotension and bradycardia.

SHIVERING: shivering was present in 24% of patients in group BN and absent in group BC. There was statistically significant shivering in patients of group BN.

NAUSEA &VOMITING: vomiting was present in 4% of patients in group BC and 12% of patients in group BN. There was statistically significant difference in the incidence of vomiting between the two groups.

DISCUSSION

Till today spinal anaesthesia is the most versatile block available and being used for various surgeries on the lower half of the body. The advantages of spinal anaesthesia includes simplicity, easier to perform and has a definitive end point. It is ideal in situations when rapid onset of action and profound motor blockade is required. In addition spinal anaesthesia may help to prevent complications due to polypharmacy, nausea, vomiting, deep vein thrombosis associated with delayed immobilization following general anaesthesia.

There has been a growing interest in the use of analgesic additives to spinal local anaesthetics. α2 agonist, like Clonidine added to subarachnoid local anaesthetics has been shown to provide excellent surgical anaesthesia.

In this study 75µg of Clonidine was added to 10mg (2ml) of 0.5%hyperbaric Bupivacaine and its efficacy as an adjuvant to subarachnoid Bupivacaine was studied in 100 patients undergoing elective caesarean section.

ONSET OF SENSORY BLOCK: The mean time to onset of sensory block was 116.2 seconds in group BC, 117.8 seconds in group BN. In our study, the addition of Clonidine 75 µg to hyperbaric Bupivacaine did not enhance the onset of sensory block.

This correlated with the study done by **Klimscha et al** who studied intrathecally administred 0..5% Bupivacaine 5mg and 150µg Clonidine and without Clonidine and observed that there was no statistically significant difference between the two groups as regards to the onset time of sensory block at T 11 dermatome level.

Acalvoschi lurie et al in his study found that there is no statistically significant difference in the onset tine for Clonidine 2 µg/kg combined with Meperidine 1% 1mg per kg (3.9 ± 0.9min) and meperidine alone. (3.6 ± 0.6 min).

Maximum Level of Sensory Block

The median of the upper limit of sensory block was T4 in group BC and group BN, There was no statistically significant difference among the two groups in the maximum level of sensory block.

The addition of Clonidine 75 µg to hyperbaric Bupivacaine did not increase the spread of sensory level. Though studies conducted

By **Juliao Mc et al** who found that on addition of Clonidine 30µg to intrathecal 15mg 0.5% Bupivacaine, the sensory block to pin- prick was higher for Clonidine than for control group.

De Kock et al found in his study that addition of intrathecal Clonidine in increasing doses (15µg, 45µg, 75 µg) with 8mg of Ropivacaine increased the level of sensory block as the dose of Clonidine increases.

Onset of Motor Block

The mean time to achieve grade-1 on modified Bromage scale was 180.70 seconds in group BC, 170.10 seconds in group BN. The addition of Clonidine 75µg to 0.5% Bupivacaine did not have any effect on the onset of motor block.

This correlated with the study by **Acalovsehi lurie et a**l who found that addition of Clonidine 2µg/kg with 1mg/kg Meperidine 1% intrathecally had no significant difference compared to meperidine slone and meperidine combined with epinephrine 200 µg in the onset of motor blockade.

Maximum Grade of Motor Block

The median of maximum grade of motor block at the 30 minute testing time measured using modified Bromage scale was grade-3 in two groups. There is no statistically significant difference among two groups. There is no statistically significant difference among two groups. The Clonidine induced intensity of motor block was correlated by study of **Klimscha et al** showed that intrathecal

Clonidine 150µg added to 0.5% Bupivacaine significantly increased the intensity of motor block.

Bonnet et al in his study found that the intensity and duration of motor block was prolonged with increasing the dose of Clonidine from 75 µg to 150µg added to 0.5 Tetracaine 15mg.

Duration of Motor Block

In our study the mean duration of motor block was 221.4min in group BC and 109.8 minutes in group BN. The addition of Clonidine 75µg to 0.5% Bupivacaine significantly prolonged the duration of motor block.

The duration of motor block produced by subarachnoid hyperbaric Bupivacaine combined with Clonidine is shown to be dose dependent.

This correlated with the study by **Wu CI et al** that increasing the dose of Clonidine (15µg, 30µg, 45µg) during hyperbaric Tetracaine spinal anaesthesia increased the duration of motor blockade (48%, 70%, 74%) respectively.

Juliao Mc et al in their study found that addition of Clonidine 30µg to hyperbaric Bupivacaine 15mg intrathecally prolonged the duration of motor blockade. **De Negri et al** in their study found that addition of Clonidine 105µg with hyperbaric Bupivacaine 1% intrathecally prolonged the motor blockade.

Time for Two Segment Regression

The mean time taken to two segment regression was 156.8 minutes in group BC and 95.6 minutes in group BN. The addition of Clonidine 75 µg to 0.5% Bupivacaine significantly prolonged the time of two segment regression when compared to control group.

This correlated with the study of **Fogarty D et al** who concluded that addition of 75µg of Clonidine with 2.75ml of 0.5% hyperbaric Bupivacaine prolonged the time to two segment regression below L-4 level by 216±97.1 minutes compared with control 138± 59.9 minutes.

Fukuda et al found in their study that the time to two segment regression of sensory block was significantly prolonged when Clonidine 150µg was added to 0.5% Tetracaine compared with 0.5% Tetracaine alone.

Wu CI et al in their study found that increasing doses of Clonidine (15µg, 30µg, 45µg) with hyperbaric Tetracaine spinal anaesthesia increased the duration of two segment regression time to L-I level by 42%,47% and 60% respectively.

Niemi L found in his study that addition of 3µg/kg of Clonidine with 15mg of 0.5% Bupivacaine prolonged the two segment regression to L-2 level compared with 0.5% Bupivacaine alone.

Duration of Sensory Block

The mean duration of sensory block (time to return of pin-prick sensation at L1) was 279.7 minutes in group BC and, 157.34 minutes in group BN. There was significant difference among the two groups.

The duration of sensory block was longest in group BC. The addition of Clonidine 75µg to 0.5% Bupivacaine significantly prolonged the duration of sensory block in Clonidine group.

This correlated with the findings of **Fogarty et al** who found that intrathecal Clonidine 75µg prolonged the effect of local anaesthetic 0.5% Bupivacaine 2.7ml in terms of spinal block.

Klimscha W et al in their study found that Clonidine 150µg combined with 0.5% 5mg Bupivacaine intrathecally prolonged the duration of sensory block and two segment regression time. **Niemi L** found in his study that addition of Clonidine 3µg / kg with 0.5% 15mg Bupivacaine spinal analgesia was prolonged by 217 minutes (mean) compared with the control group Bupivacaine alone by 160 minutes (mean).

De Negri et al in their study found that addition of Clonidine 105µg to intrathecal hyperbaric Bupivacaine 1% prolonged the duration of sensory block.

Quality of Surgical Anaesthesia

In our study sixteen (16) patients in group BN complained of pain or discomfort intraoperatively and required supplementation with intravenous pentazocine 0.6mg/kg. The quality of surgical anaesthesia was "Excellent" in Group BC.

This was correlated with the study by **De Kock M et al** that small dose intrathecal Clonidine 15µg plus 8mg intrathecal ropivacaine produces adequate and shortlasting anaesthesia for knee arthroscopy.

Juliao Me et al in their study found that intrathecal (15µg and 30µg) Clonidine prolonged sensory block, duration of motor block and analgesia.

Duration of Effective surgical Analgesia: The mean duration of effective surgical analgesia was 259.3 minutes in group BC and 159.6 minutes in Group BN. There was statistically significant difference in the duration of analgesia among the two groups.

This correlated with the study of **Fogarty et al** who found that intrathecal Clonidine 75µg prolonged the duration of Bupivacaine 0.5% (2.75 ml) spinal

Block and the time to first analgesia (mean278±93 minutes).

Klimscha W et al in their study found that Clonidine 150µg added to 5mg of 0.5% Bupivacaine intrathecally prolonged spinal anaesthesia (276±23 minutes).

Racle et al in their study found that intrathecal Clonidine 150µg prolonged Bupivacaine spinal anaesthesia in elderly patients undergoing hip surgery and their technique was superior to the addition of adrenaline 200µg to Bupivacaine.

Juliao et al in their study found that intrathecal 15µg and 30µg Clonidine combined with 15mg 0.5% Bupivacaine increased the duration of analgesia.

Complications

In our study the incidence of hypotension was 100% in group BC, and 84% in group BN. The hypotension was dose dependent on Clonidine and Bupivacaine administered intrathecally.

This was correlated by study of **Wu CI et al** who found that incidence of hypotension was more in 45µg group compared with 15µg and 30µg group combined with 10mg Tetracaine intrathecally.

Filos Kriton et al in their study found that hypotension is the main side effect. This finding is in concurrence with the findings in our study.

Eisenach James C et al in their study found that hypotension is observed with upper thoracic injection of low doses of lipid soluble drug Clonidine, whereas

no hypotension was observed with upper thoracic injection of large doses or after cervical or lumbar injection of any dose of Clonidine or after injection of poor lipid soluble Clonidine. Decrease in blood pressure after thoracic intrathecal Clonidine injection is the result of α2 adrenoreceptor and muscarinic neuronal activation.

Klimscha et al in their study found that intrathecal local anaesthetic decrease mean arterial pressure and sympathetic outflow by blocking axonal transmission along the spinal nerves. Therefore, one would expect the spinal preganglionic sympathetic cellular inhibition by Clonidine would be hidden by dense axonal blockade by local anaesthetic, thus explaining intrathecal Clonidine does not decrease blood pressure more with large dose of (15mg) Bupivacaine than with a small dose of (5mg) Bupivacaine.

The incidence of bradycardia was 24% group BC and 6% group BN. Clonidine reduces heart rate partly by presynaptically mediated inhibition of nor – epinephrine released at the neuro receptor junction and partly by vagomimetic effect. Clonidine also depress the atrioventricular nodal conduction and produce severe bradyarryhthmias. The delayed onset of bradycardia may be due to cephalad spread by rostral distribution after intrathecal administration. This correlated with the study by **Filos Kriton S et al** who found that increasing dose of Clonidine produces bradycardia.

In our study Ramsay sedation score was 3 in all the patients of group BC and the score was 2 in 92% and score 1 in 8% of patients in group BN. This shows that Clonidine causes sedation. The incidence of shivering was 24% in group BN and none of the patient in group BC had shivering which was statistically significant in group BN. This shows that Clonidine reduces shivering. These patients were treated with oxygenation with face mask.

Pruritus, respiratory depression, urinary retention and transient neurological symptoms did not occur in any of the patients included in our study.

In our study the incidence of intra operative nausea and vomiting was 4% in group BC and 12% in group BN. Addition of Clonidine decreased the intra operative nausea and vomiting and the anti emetic requirements. This correlated with the study of **Benhamou et al**.

In the present study, follow –up to 24 hours postoperatively did not reveal symptoms suggestive of post dural puncture headache or radicular irritation. None of the patients required supplementation with general anaesthesia in our present study. There were no differences in neonatal APGAR scores among the groups, which were similar with observations of **Benhamou et al** study.

SUMMARY

This double blinded prospective randomized controlled trial was designed to evaluate the efficacy of 75 µg (0.5ml) Clonidine added to 10 mg (2ml) of 0.5% hyperbaric Bupivacaine intrathecally, in patients aged 18- 35years undergoing elective caesarean section. Patients receiving 0.5ml of normal saline with 2ml of Bupivacaine intrathecally served as the control.

The following observations were made.

- The addition of Clonidine significantly prolonged the two segment Regression time.
- The addition of Clonidine significantly prolonged the duration of effective surgical analgesia.
- The addition of Clonidine significantly prolonged the sensory block and motor block.
- The addition of Clonidine significantly prolonged the duration of time for demand analgesia.
- The addition of Clonidine intrathecally had no effect on the onset of sensory and motor block.

- The incidence of side effects was limited to the occurrence of hypotension, bradycardia and sedation in the groups that received Clonidine intrathecally.
- Addition of Clonidine did not have any effect on the fetal APGAR score.
- Addition of Clonidine decreased the intra operative and post operative shivering.
- Addition of Clonidine decreased the intra operative nausea and vomiting.

CONCLUSION

This study confirms the efficacy of 75µg of Clonidine as a safe and effective adjuvant to 0.5% hyperbaric Bupivacaine in subarachnoid block for caesarean section. The addition of 75 µg of Clonidine to 2 ml of 0.5% hyperbaric Bupivacaine improved the quality of surgical anaesthesia. Clonidine 75 µg added to 10mg of 0.5% hyperbaric Bupivacaine intrathecally prolonged post operative analgesia and reduces the post operative analgesic requirements.

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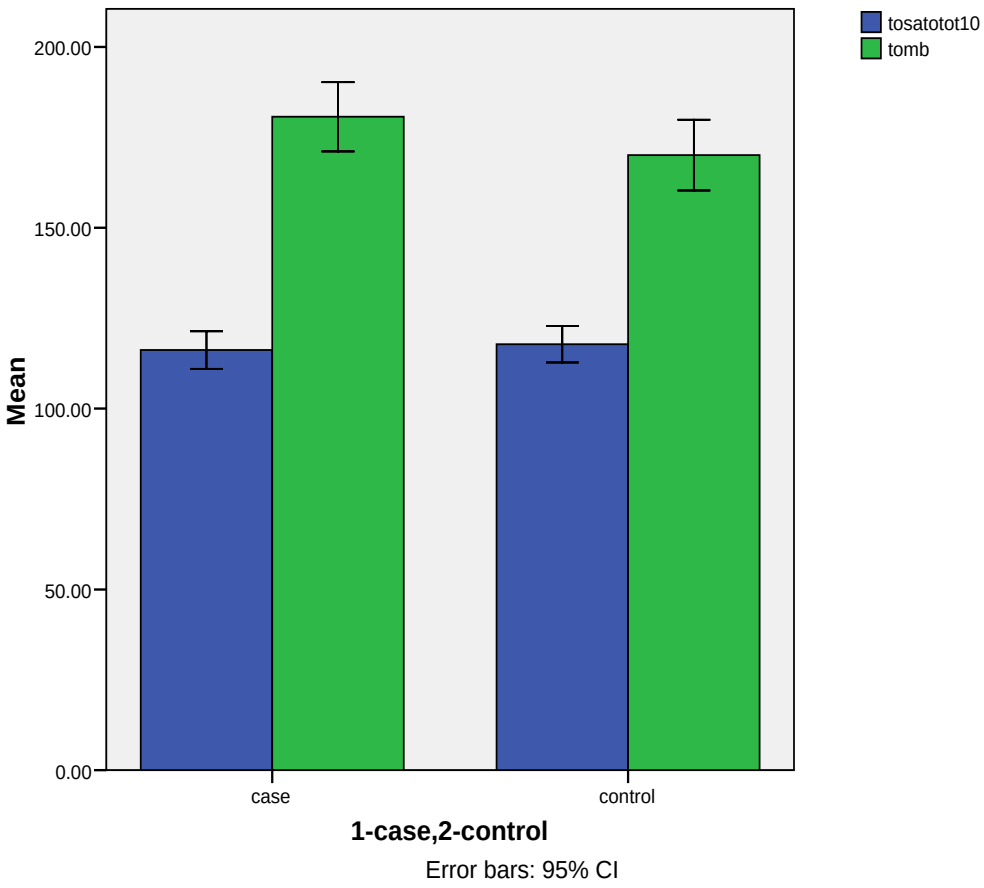

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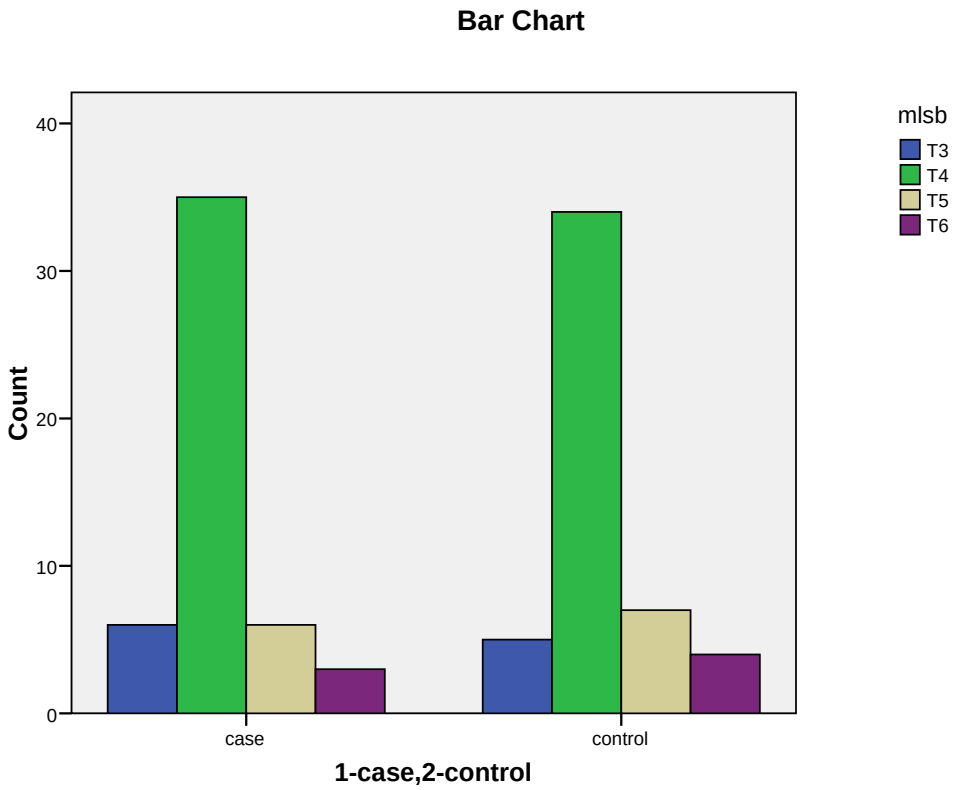
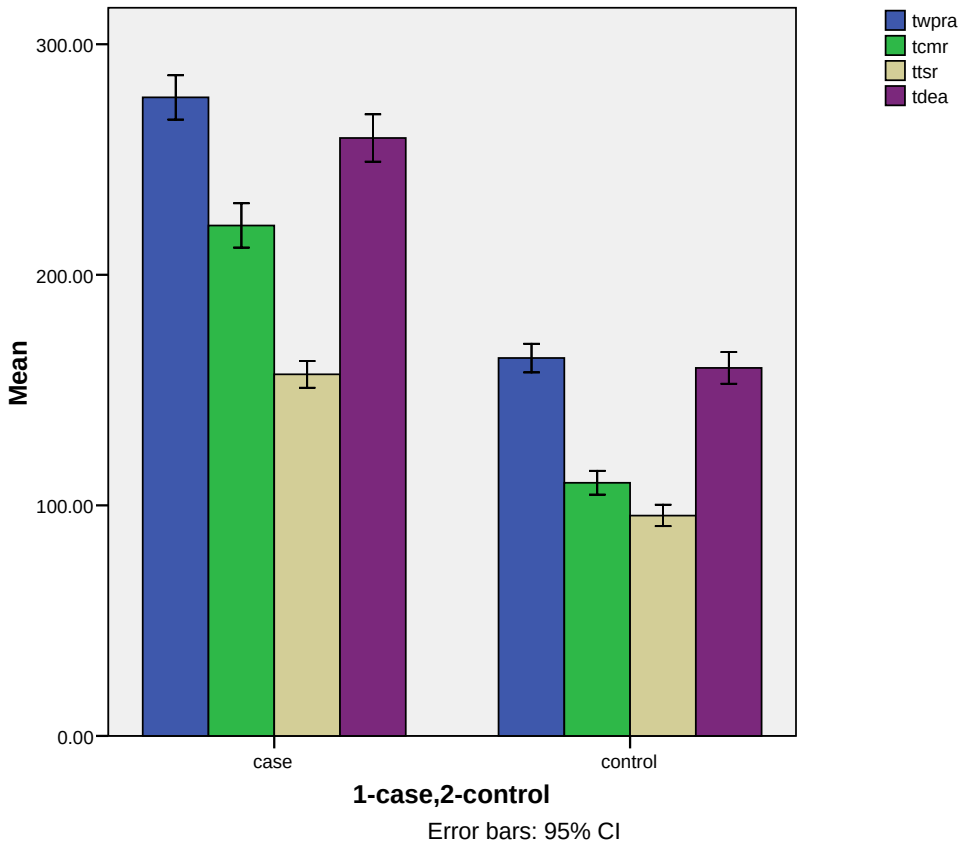
Tosa- time for onset of sensory block to T10

Tomb- time for onset of motor block



Mlsb-maximum level of sensory block



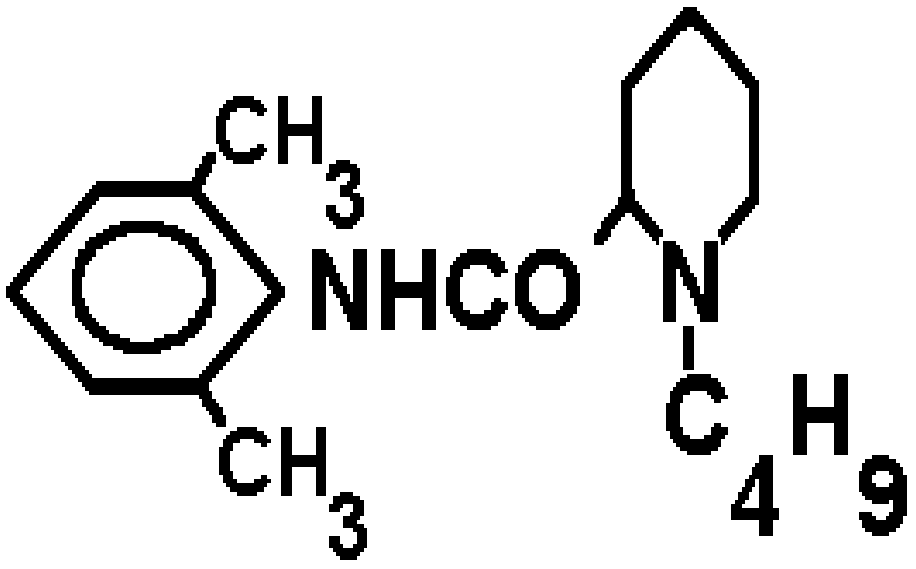
Twpra- time when patient requested for analgesia

Tcmr- time for complete motor regression

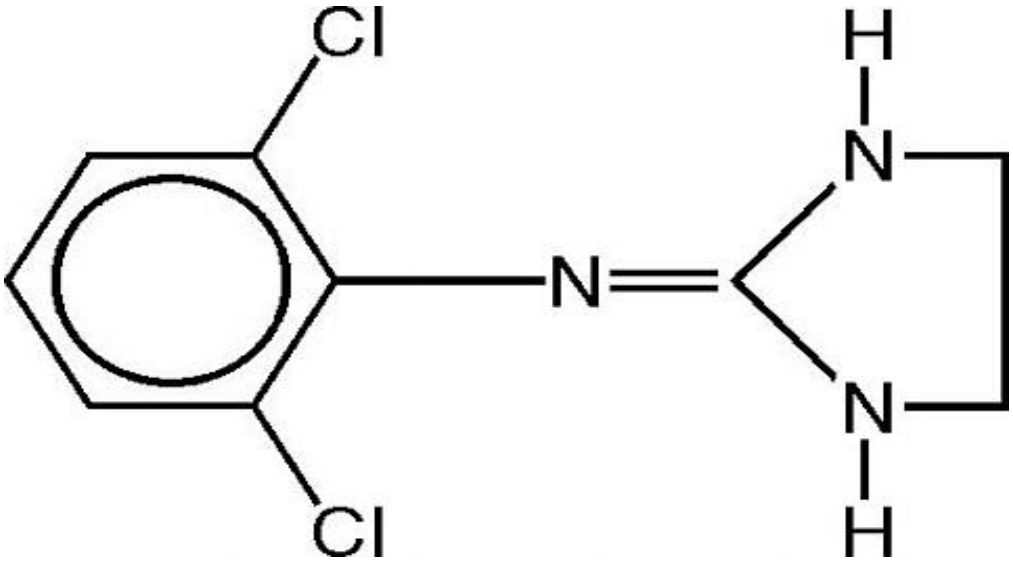
Ttsr-time for two segment regression

Tdea- total duration of effective analgesia

STRUCTURE OF BUPIVACAINE



STRUCTURE OF CLONIDINE



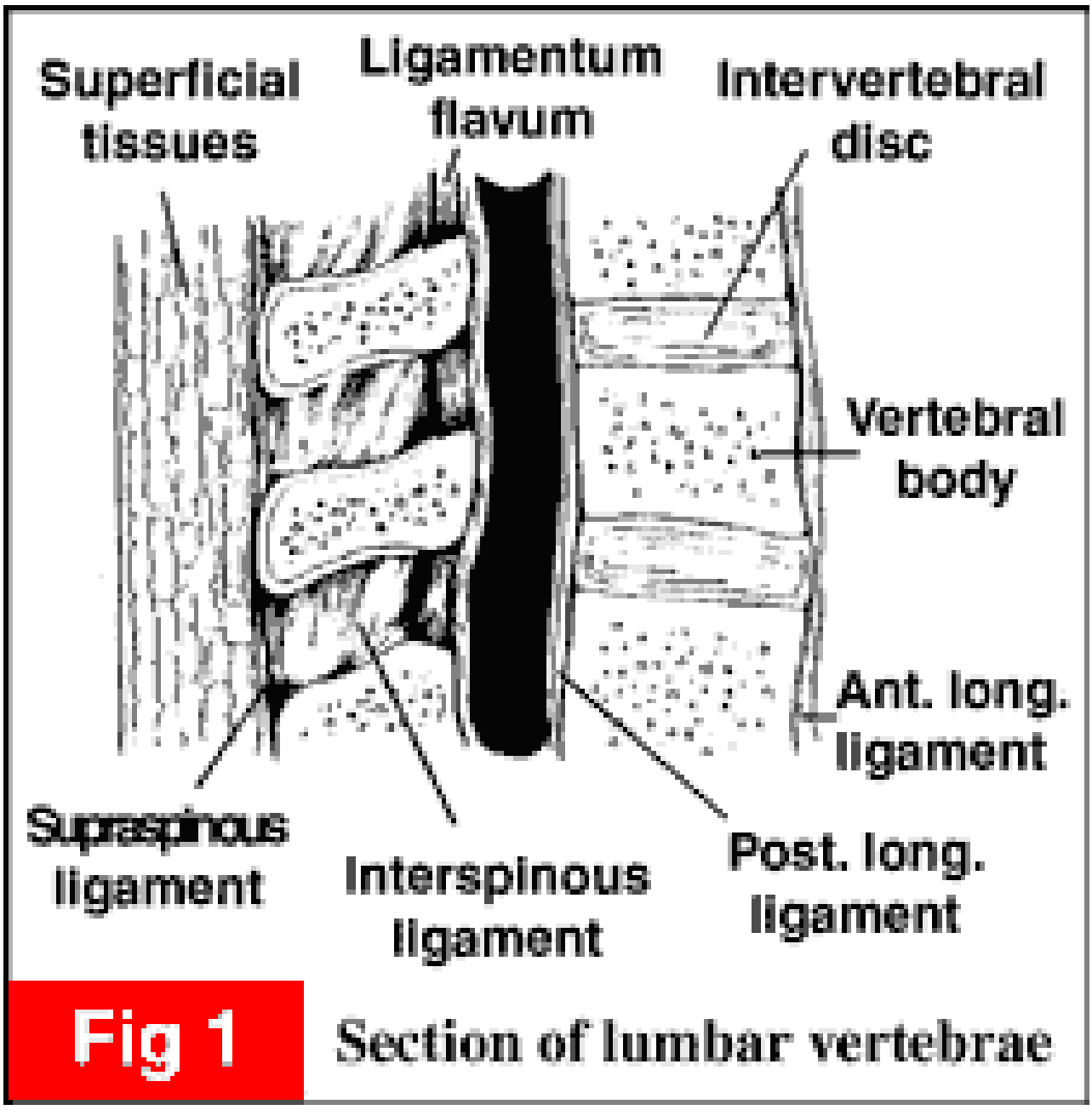


Fig 1 Section of lumbar vertebrae

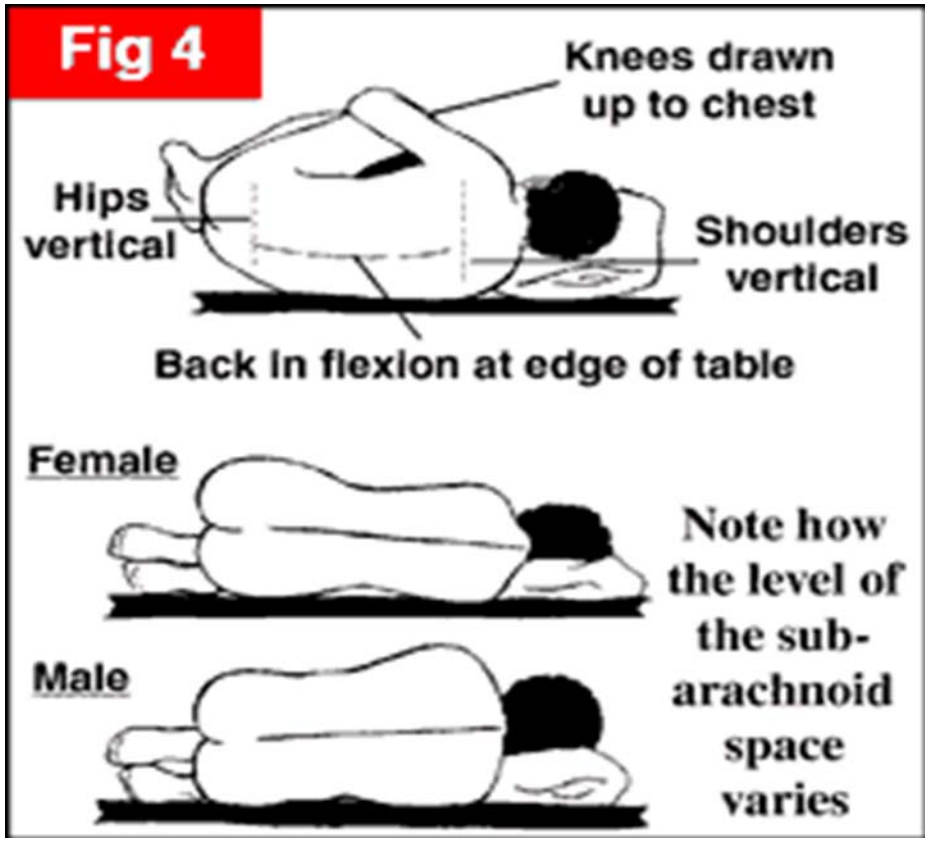
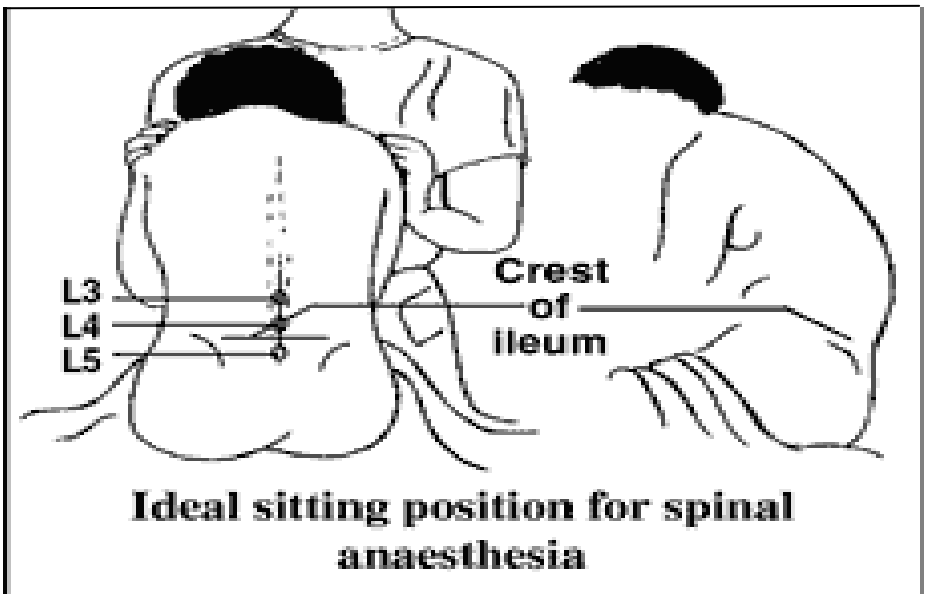


Fig 4
Knees drawn up to chest
Hips vertical
Shoulders vertical
Back in flexion at edge of table
Female
Male
Note how the level of the sub-arachnoid space varies


L3
L4
L5
Crest of ileum
Ideal sitting position for spinal anaesthesia

PROFORMA

NAME: AGE: I.P. NO: DATE:

OBSTETRIC CODE: G_ P_ L_ A_ INDICATION: (elective /semi elective)

PREOP ASSESSMENT:

H/O MEDICAL ILLNESS

H/O PREVIOUS SURGERY

GENERAL EXAMINATION:

Height: weight: PR: BP: RR:

CVS: RS: CNS: SPINE:

AIRWAY :

INVESTIGATIONS:

Hb: BT: CT: BLOOD GROUPING & TYPING:

BLOOD SUGAR: UREA: CREATININE:

ECG: URINE ANALYSIS:

ASA:

PREMEDICATION	
PRELOADING	

SAB:

SPACE	NEEDLE	SIZE	APPROACH	POSITION	DRUG

SENSORY CHARACTERS:

Time for onset of sensory block at T10 :

Maximum level of sensory block :

Time for two segment regression :

Time for sensory regression to L1 :

Total duration of sensory block :

Total duration of effective analgesia :

Time for demand analgesia :

MOTOR CHARACTERS:

Bromage score	0	1	2	3
Onset				
Regression				

Time for onset of motor block :

Total duration of motor block :

Time of Intrathecal injection to delivery interval:

APGAR SCORE	1min	5min

QUALITY OF SURGICAL ANAESTHESIA	EXCELLENT	GOOD	POOR

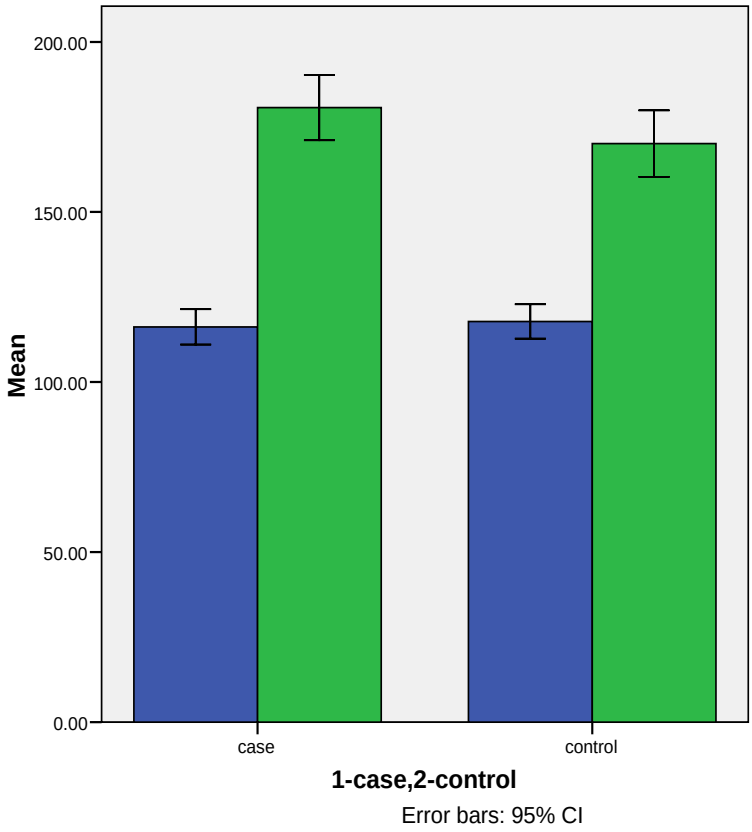
TOTAL DURATION OF SURGERY:

VITAL SIGNS:

	BASAL																							
HR																								
SBP																								
DBP																								
MAP																								
SPO2																								
RR																								
RSS																								

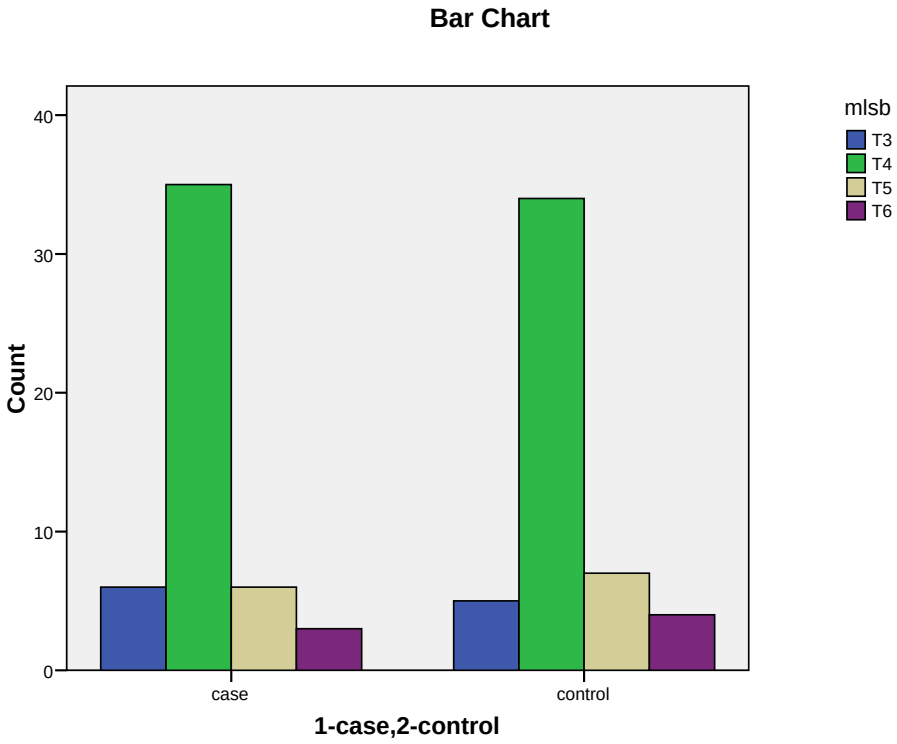
SIDE EFFECTS:

	Intra- op	Post- op	Treatment details
Shivering			
Bradycardia			
Hypotension			
Resp depression			
Nausea, vomiting			
Excess sedation			
Neurological			

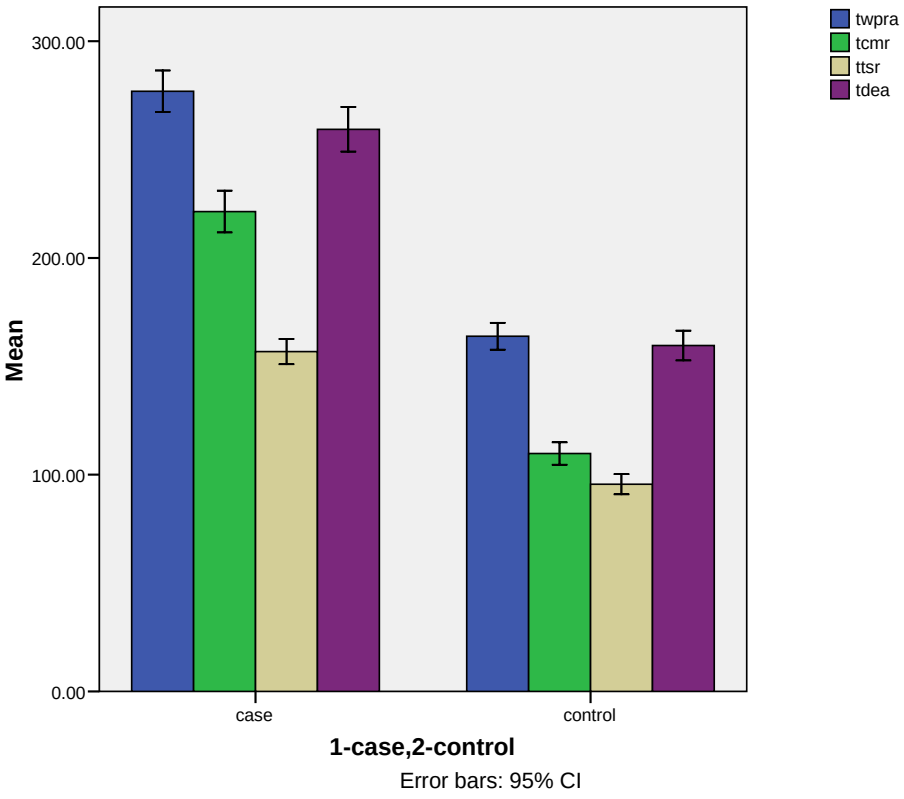


Tosa - time for onset of sensory block to T10

Tomb - time for onset of motor block



Mlsb - maximum level of sensory block



Twpra - time when patient requested for analgesia

Tcmr - time for complete motor regression

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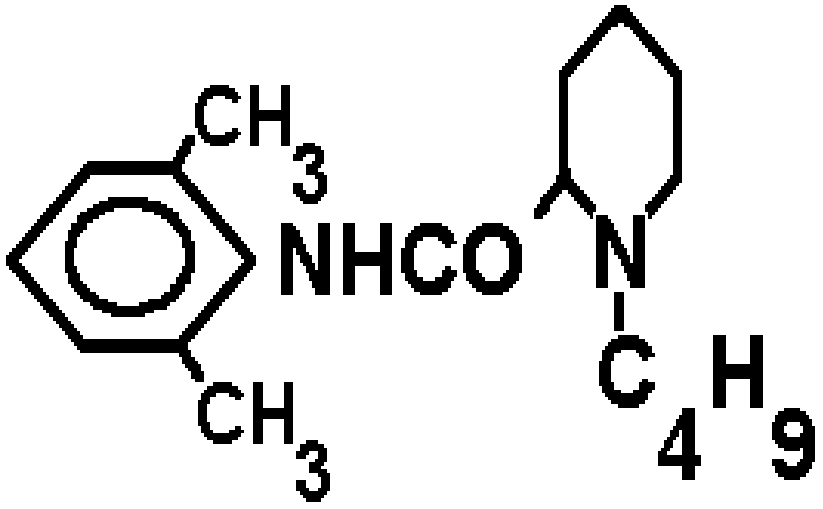
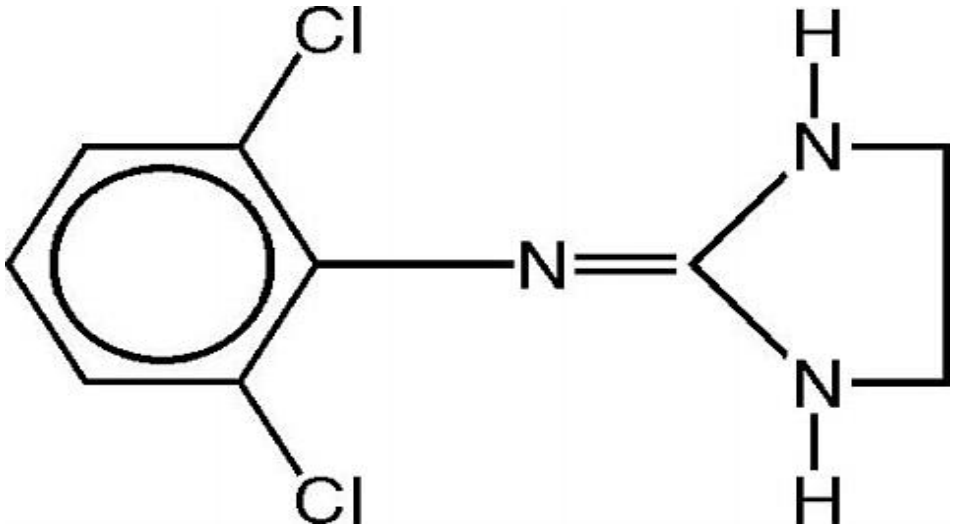
Tdea - total duration of effective analgesia

STRUCTURE OF BUPIVACAINE



STRUCTURE OF CLONIDINE



ANATOMY OF SPINAL CORD

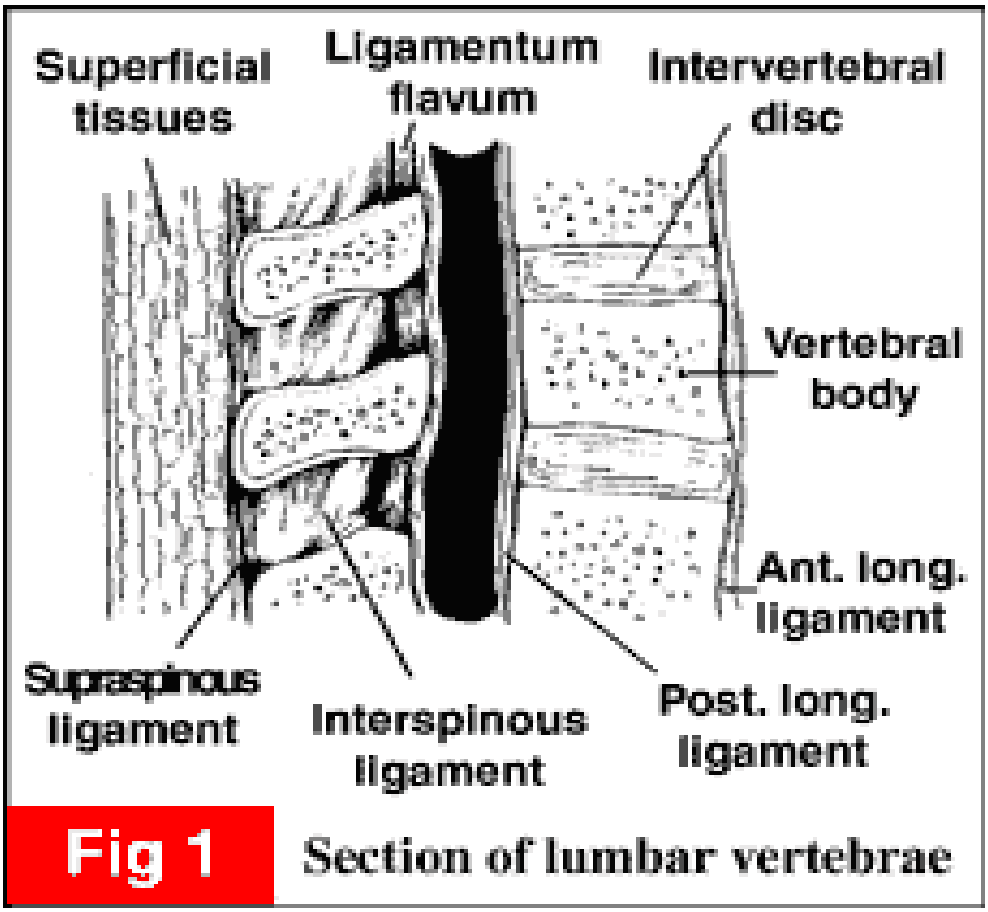
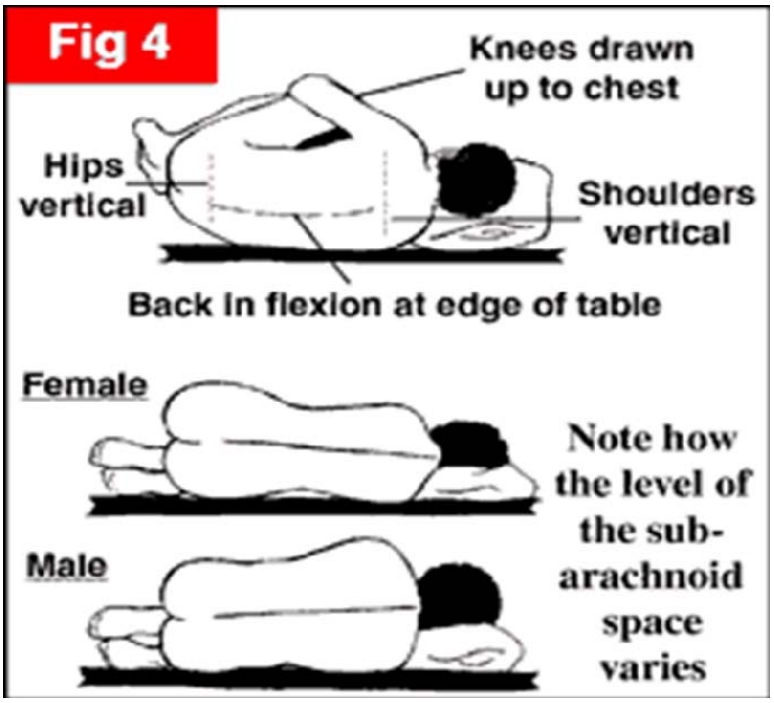
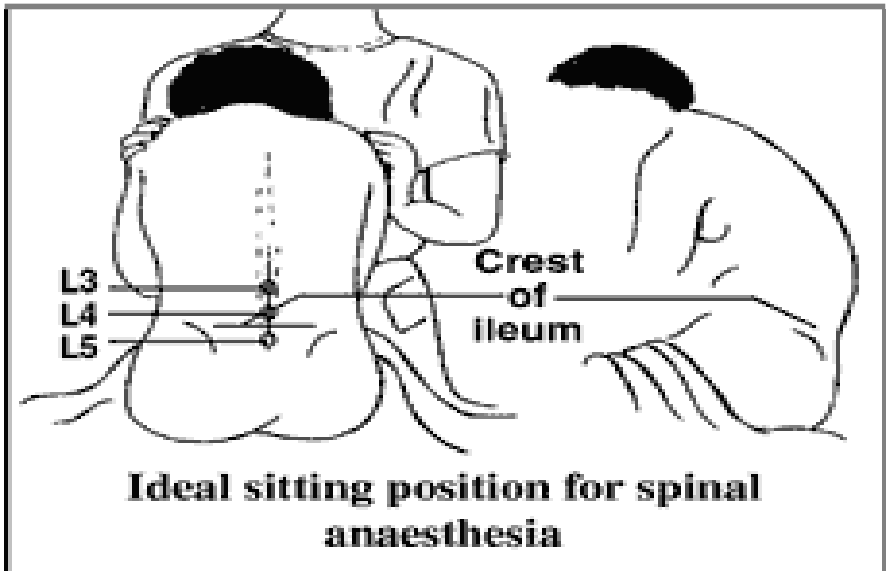


Fig 1 Section of lumbar vertebrae

POSITION OF THE PATIENTS





GROUP BC 2CC OF0.5% HYPERBARIC BUPIVACAINE+75µg CLONIDINE

S.NO	AGE	WEIGHT	HEIGHT	DIAGNOSIS	SURGERY	ASA	DURN OF SURGERY	TOSATO T10	MLSB	TTAHLSA	TTSR	TDEA	TSR TO L1
	YRS	KG	CM				MIN	SEC		SEC	MIN	MIN	MIN
1	25	56	156	PREV LSCS,CPD		II	70	100	T3	180	150	275	360
2	21	66	158	PRIMI,POSTDATED	ELECTIVE LSCS	II	50	130.0	T4	280	120	260	280
3	28	63	154	PREV LSCS,CPD	ELECTIVE LSCS	II	60	90	T4	240	160	280	275
4	22	65	149	PRIMI,POSTDATED	ELECTIVE LSCS	II	40	120	T4	300	150	320	300
5	19	60	156	PRIMI,CPD	ELECTIVE LSCS	II	45	120	T5	180	180	300	250
6	23	55	162	PREV LSCS,CPD	ELECTIVE LSCS		65	100	T4	200	160	250	325
7	22	58	148	PREV LSCS,CPD	ELECTIVE LSCS	II	80	90	T4	240	175	290	340
8	18	52	158	PRIMI,CPD	ELECTIVE LSCS	II	40	140	T4	420	140	200	310
9	25	64	155	PREV LSCS,CPD	ELECTIVE LSCS	II	55	120	T3	260	150	250	280
5	26	60	154	PREV LSCS,CPD	ELECTIVE LSCS	II	85	110	T4	360	165	275	270
11	21	62	159	PRIMI,POSTDATED	ELECTIVE LSCS	II	45	130	T4	300	170	280	280
12	30	58	158	ELDERLY PRIMI,CPD	ELECTIVE LSCS	II	40	110	T6	240	180	300	300
13	22	64	155	PRIMI,POSTDATED	ELECTIVE LSCS	II	45	100	T4	180	140	175	305
14	25	60	156	PREV LSCS,CPD	ELECTIVE LSCS	II	65	100	T4	220	150	280	310
15	26	74	145	PREV LSCS,CPD	ELECTIVE LSCS	II	70	90	T4	300	175	260	260
16	19	68	149	PRIMI, BREECH	ELECTIVE LSCS	II	40	110	T4	420	180	275	280
17	23	56	152	PREV LSCS,CPD	ELECTIVE LSCS	II	55	120	T6	280	125	280	320
18	20	58	160	PRIMI,CPD	ELECTIVE LSCS	II	45	110	T4	280	150	300	310
19	35	61	161	ELDERLY PRIMI,CPD	ELECTIVE LSCS	II	45	120	T5	300	140	320	280
20	24	60	153	PREV LSCS,CPD	ELECTIVE LSCS	II	60	130	T4	260	150	275	300
21	22	55	151	PRIMI,POSTDATED	ELECTIVE LSCS	II	40	110	T4	420	175	280	290
22	32	54	150	PRIMI,POSTDATED	ELECTIVE LSCS	II	50	100	T5	300	160	250	270
23	25	56	152	PRIMI,POSTDATED	ELECTIVE LSCS	II	65	130	T4	200	180	280	280
24	28	55	155	PREV LSCS,CPD	ELECTIVE LSCS	II	70	100	T3	320	130	275	280
25	30	60	156	PREV LSCS,CPD	ELECTIVE LSCS	II	65	150	T4	180	120	200	250
26	20	65	155	PRIMI,BREECH	ELECTIVE LSCS	II	50	110	T4	240	140	280	290
27	24	58	158	PREV LSCS,CPD	ELECTIVE LSCS	II	68	160	T4	200	150	275	300
28	28	55	154	PREV LSCS,CPD	ELECTIVE LSCS	II	75	120	T6	280	120	220	250

29	19	60	158	PRIMI,CPD	ELECTIVE LSCS	II	50	120	T4	300	125	200	240
30	23	62	159	PREV LSCS,CPD	ELECTIVE LSCS	II	65	100	T4	200	130	290	305
31	20	63	158	PRIMI,POSTDATED	ELECTIVE LSCS	II	55	130	T4	420	130	225	240
32	21	58	157	PRIMI,POSTDATED	ELECTIVE LSCS	II	45	100	T5	120	140	275	290
33	19	55	154	PRIMI,CPD	ELECTIVE LSCS	II	60	90	T3	240	150	300	310
34	22	56	153	PREV LSCS,CPD	ELECTIVE LSCS	II	65	160	T4	400	125	280	290
35	26	59	156	PREV LSCS,CPD	ELECTIVE LSCS	II	70	120	T4	220	150	295	310
36	28	56	158	PREV LSCS,CPD	ELECTIVE LSCS	II	58	100	T4	180	160	200	210
37	23	54	155	PREV LSCS,CPD	ELECTIVE LSCS	II	62	90	T4	240	175	225	240
38	22	68	154	PRIMI,POSTDATED	ELECTIVE LSCS	II	46	110	T5	360	180	250	260
39	26	62	159	PREV LSCS,CPD	ELECTIVE LSCS	II	76	110	T4	320	180	275	280
40	20	64	155	PRIMI,CPD	ELECTIVE LSCS	II	45	120	T4	280	175	205	230
41	24	55	156	PREV LSCS,CPD	ELECTIVE LSCS	II	75	140	T4	300	160	280	290
42	31	53	156	PREV LSCS,CPD	ELECTIVE LSCS	II	70	130	T4	180	190	210	230
43	18	58	158	PRIMI,CPD	ELECTIVE LSCS	II	40	110	T4	240	180	220	240
44	26	62	159	PREV LSCS,CPD	ELECTIVE LSCS	II	55	120	T5	280	150	280	300
45	25	60	155	PREV LSCS,CPD	ELECTIVE LSCS	II	60	160	T6	220	175	275	280
46	36	53	157	PREV LSCS,CPD	ELECTIVE LSCS	II	65	140	T3	300	180	200	220
47	22	60	159	PRIMI,POSTDATED	ELECTIVE LSCS	II	45	100	T4	200	165	290	310
48	24	59	156	PREV LSCS,CPD	ELECTIVE LSCS	II	55	110	T4	180	170	205	240
49	20	58	158	PRIMI,CPD	ELECTIVE LSCS	II	40	120	T5	240	175	230	250
50	32	56	159	PREV LSCS,CPD	ELECTIVE LSCS	II	60	110	T5	300	190	250	275

S.NO	TWPRA	TDSA	TOMB	QMBBS	TCMR	QSA	SAB TO EXTRACTION OF FETUS	APGAR		SEDATION	SIDEEFFECTS	DRUGS USED
	MIN	MIN	SEC	GRADE	MIN		MIN	1'	5'	3		
1	350	350	120	3	220	E	7	7	9	3		
2	275	275	150	3	180	E	5	8	9	3		
3	300	275	180	3	180	E	6	8	9	3		
4	310	300	150	3	250	E	8	7	9	3		
5	275	250	180	3	180	E	8	6	9	3		
6	320	320	220	3	250	E	7	8	9	3		
7	325	325	240	3	280	E	6	7	9	3		
8	300	315	200	3	260	E	8	7	9	3		
9	275	275	140	3	240	E	5	8	9	3		
5	290	275	120	3	220	E	7	8	9	3		
11	300	280	180	3	180	E	8	7	9	3	VOMITING	ONDANSETRON
12	275	275	200	3	200	E	6	7	9	3		
13	320	310	240	3	240	E	8	8	9	3		
14	300	300	220	3	280	E	5	7	9	3		
15	250	250	240	3	240	E	10	8	9	3		
16	270	275	180	3	180	E	7	7	9	3		
17	300	300	160	3	260	E	8	6	9	3		
18	320	315	180	3	280	E	6	8	9	3		
19	275	275	200	3	200	E	8	7	9	3		
20	300	300	180	3	180	E	5	7	9	3		
21	300	290	160	3	180	E	7	8	9	3		
22	280	275	200	3	200	E	8	8	9	3		
23	290	280	150	3	180	E	6	7	9	3		
24	280	275	120	3	220	E	7	6	9	3		
25	250	250	130	3	230	E	5	7	9	3		
26	300	300	140	3	240	E	8	8	9	3		
27	300	300	120	3	220	E	6	7	9	3		
28	240	250	150	3	250	E	7	7	9	3		

29	250	250	180	3	180	E	8	8	9	3		
30	310	310	180	3	280	E	7	8	9	3		
31	230	240	200	3	200	E	6	8	9	3		
32	300	300	240	3	240	E	8	7	9	3		
33	300	300	220	3	250	E	5	6	9	3		
34	280	290	220	3	220	E	8	7	9	3		
35	290	300	200	3	200	E	8	7	9	3		
36	200	200	180	3	180	E	6	7	9	3		
37	225	225	160	3	160	E	7	8	9	3		
38	250	250	180	3	200	E	8	8	9	3		
39	275	275	200	3	225	E	7	7	9	3		
40	215	220	160	3	200	E	8	6	9	3		
41	280	275	175	3	240	E	6	7	9	3		
42	225	225	180	3	200	E	5	8	9	3	VOMITING	ONDANSETRON
43	225	220	180	3	190	E	8	7	9	3		
44	300	290	200	3	275	E	7	7	9	3		
45	275	275	220	3	250	E	6	6	9	3		
46	210	215	240	3	200	E	7	7	9	3		
47	300	300	180	3	280	E	8	8	9	3		
48	225	225	180	3	210	E	5	8	9	3		
49	240	240	160	3	220	E	8	7	9	3		
50	270	275	150	3	250	E	7	8	9			

PULSE RATE

S.NO													PULSE	RATE											
	BASELINE	0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240	270	300
1	88	92	98	86	88	76	74	68	66	62	64	62	65	60	62	61	62	68	72	66	74	72	76	78	82
2	104	98	90	82	80	64	62	60	61	62	68	68	60	61	62	63	65	64	68	66	68	66	70	68	74
3	110	108	96	88	87	77	71	65	62	58	87	64	66	62	66	69	67	64	78	69	66	63	68	64	62
4	82	80	98	92	87	89	76	79	75	74	70	65	60	64	62	66	66	64	68	66	64	76	76	71	74
5	80	78	76	84	96	88	74	68	74	74	75	76	76	82	78	74	76	74	74	75	74	72	72	76	78
6	93	95	92	98	86	89	76	71	68	63	69	64	62	68	64	72	76	71	74	78	82	87	86	84	80
7	114	108	110	90	93	86	71	70	62	68	56	90	68	64	67	68	69	68	63	62	64	65	68	69	69
8	94	92	88	79	71	74	74	75	79	78	68	67	64	69	62	69	70	76	71	72	86	82	85	84	87
9	120	110	96	90	82	86	85	84	74	76	75	72	65	68	69	76	71	68	71	73	62	65	64	63	63
5	83	85	78	76	87	71	74	70	60	65	69	63	65	64	68	66	66	64	60	63	67	69	70	77	78
11	80	76	92	89	85	88	86	80	76	70	69	62	66	69	64	65	60	69	58	66	68	77	76	78	88
12	82	84	86	87	89	74	76	60	65	62	68	64	67	78	62	66	64	62	68	79	74	75	70	65	68
13	86	85	74	78	79	75	65	61	66	63	62	60	60	65	64	67	64	63	67	68	70	78	92	96	80
14	100	98	86	82	75	79	74	76	70	69	66	63	65	66	62	60	63	64	68	64	61	69	60	68	69
15	97	85	80	74	78	60	63	62	60	68	63	60	55	60	65	62	67	68	64	60	67	69	64	65	70
16	99	96	86	80	82	83	70	60	66	64	68	69	67	63	64	68	67	66	69	63	67	62	61	65	68
17	95	90	82	76	67	68	66	60	68	62	66	69	63	63	60	62	62	64	64	62	69	60	76	70	75
18	80	90	88	84	80	83	84	82	78	70	76	69	61	63	64	68	67	69	63	64	66	69	70	77	78
19	98	88	87	86	85	80	87	98	78	62	67	63	69	60	64	63	60	68	69	76	74	78	85	84	82
20	88	86	78	77	74	75	74	70	74	75	70	71	76	71	70	68	66	64	67	69	64	63	68	67	69
21	86	80	85	89	92	87	78	68	68	68	66	64	66	63	65	69	64	61	62	69	67	64	62	61	63
22	86	88	96	90	91	78	71	79	90	67	61	87	66	62	65	64	63	61	69	68	87	78	77	71	77
23	80	85	84	80	83	78	71	70	66	54	80	70	66	61	60	60	64	62	63	66	69	64	62	70	78
24	106	102	90	80	85	71	60	65	64	68	69	63	64	62	64	63	68	67	61	69	63	70	75	72	74
25	88	90	80	75	70	68	63	64	63	50	56	85	60	63	64	69	67	61	62	64	68	67	68	64	62
26	105	101	87	98	78	71	72	69	64	62	64	61	63	60	67	69	61	66	64	68	78	70	72	78	71
27	95	96	88	85	71	76	69	64	62	63	69	64	65	60	63	62	66	67	61	64	68	60	72	82	79
28	93	92	96	74	73	60	66	49	82	76	71	73	69	69	64	62	61	63	64	69	67	67	62	64	62

29	95	92	90	84	70	76	71	68	64	60	62	68	66	64	62	68	66	63	60	61	73	78	75	79	70
30	92	90	82	76	70	98	72	65	66	69	63	61	64	56	89	82	70	66	63	64	69	75	74	76	72
31	88	92	73	71	72	71	75	69	74	76	70	74	76	79	72	74	75	78	87	89	86	84	85	82	89
32	83	80	82	78	74	68	66	65	63	62	64	69	68	67	63	62	61	64	69	65	68	62	63	63	69
33	84	78	93	90	79	78	75	69	68	65	69	63	62	64	67	62	68	69	69	68	71	72	74	75	75
34	92	80	76	85	80	76	65	63	69	68	68	76	79	69	63	65	62	66	63	64	69	68	69	63	64
35	100	90	82	85	74	76	68	65	64	63	61	68	66	67	64	66	69	64	62	66	63	64	78	80	87
36	84	82	86	78	74	72	86	69	59	85	72	63	65	64	69	68	69	63	62	63	64	68	75	85	90
37	93	88	78	68	65	64	62	69	68	63	64	56	68	63	64	69	69	68	63	63	65	62	69	79	85
38	96	94	93	87	74	75	76	72	79	74	71	72	76	73	79	75	72	71	76	73	71	73	75	76	74
39	95	90	76	70	63	64	68	65	62	61	63	67	69	68	64	65	62	61	68	68	67	64	76	74	76
40	106	98	85	79	85	72	68	64	62	69	68	65	69	62	63	64	69	68	64	72	70	71	74	96	98
41	92	102	96	82	76	75	71	74	76	79	68	64	65	69	63	62	63	69	64	63	62	61	70	78	87
42	86	92	97	76	70	68	64	69	65	62	68	57	80	64	62	68	67	69	69	63	64	69	76	89	85
43	88	86	85	72	78	65	66	69	65	66	63	61	64	66	63	68	64	69	66	64	62	63	68	84	72
44	83	94	92	79	68	64	79	68	59	98	83	64	69	67	62	64	63	69	68	64	63	68	69	62	63
45	99	104	85	83	64	68	82	72	68	68	74	76	98	56	89	72	64	63	68	64	63	64	74	79	74
46	102	90	93	69	62	62	67	85	64	70	64	62	66	64	63	68	67	64	62	61	64	69	63	68	61
47	84	86	80	70	61	63	69	64	62	68	72	71	68	63	64	65	68	64	69	67	64	62	64	69	68
48	78	80	72	64	63	61	72	61	63	62	63	67	68	69	64	62	68	64	62	63	68	64	63	62	64
49	90	88	73	65	68	62	79	63	75	70	71	72	76	79	78	73	74	65	68	64	62	68	64	64	66
50	96	94	72	69	63	70	63	68	72	68	64	69	65	62	65	69	68	64	68	78	69	72	72	79	85

S.NO										**BLOODPRESSURE**													
	BASELINE	0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240
1	130/80	120/71	119/77	116/74	115/79	110/90	110/80	103/67	84/51	89/54	93/52	86/42	89/40	90/64	92/64	98/70	99/54	105/64	122/82	122/80	124/80	129/80	120/80
2	116/82	117/72	116/80	116/82	118/84	116/82	90/52	93/52	85/52	72/54	86/42	83/34	85/42	89/54	80/64	94/43	90/62	101/66	113/74	126/80	126/80	120/80	122/80
3	130/86	130/80	126/80	120/78	110/80	90/64	114/70	103/67	106/54	79/50	101/59	96/60	93/66	80/60	93/52	101/54	106/50	101/59	96/60	100/60	106/68	110/70	110/68
4	122/74	113/67	124/67	117/69	112/64	82/64	80/56	103/67	93/52	78/53	89/54	94/43	98/70	99/54	94/43	99/54	92/62	100/80	110/70	116/70	116/74	118/70	120/70
5	125/74	120/80	120/80	110/80	110/80	90/64	92/70	90/64	90/64	90/70	93/52	77/49	83/42	100/60	106/70	102/70	93/49	106/59	114/70	116/70	118/74	120/74	120/74
6	124/76	128/88	124/80	120/90	97/50	101/66	79/50	90/50	82/64	70/39	89/60	93/49	73/30	106/50	86/36	99/54	93/66	106/62	128/75	126/70	124/72	126/70	124/70
7	130/72	130/82	137/87	130/70	127/68	93/66	100/60	85/52	79/50	92/70	90/52	86/60	86/60	86/36	103/66	101/54	94/43	98/53	114/72	114/70	114/70	118/70	118/74
8	120/80	122/83	127/87	121/80	100/72	94/65	94/50	53/35	80/62	90/64	73/30	103/66	101/54	90/50	80/60	90/52	82/64	94/65	120/70	130/70	120/90	124/90	124/90
9	118/81	113/84	123/74	119/78	116/76	110/90	88/62	98/53	84/51	89/54	93/52	86/42	89/40	90/64	92/64	98/70	99/54	93/66	120/80	118/80	122/80	110/70	114/70
5	132/84	130/82	137/87	130/70	106/78	116/82	110/80	103/67	85/52	72/54	86/42	83/34	85/42	89/54	92/64	94/43	90/62	100/72	120/80	130/70	130/80	130/80	126/80
11	130/90	130/86	130/80	126/80	120/78	90/64	90/52	93/52	106/54	79/50	101/59	96/60	93/66	80/60	80/64	101/54	106/50	100/76	130/90	120/70	110/70	110/70	120/70
12	127/90	126/80	120/78	120/72	106/48	82/64	114/70	103/67	93/52	78/53	89/54	94/43	98/70	99/54	93/52	99/54	92/62	106/78	120/90	120/90	110/70	110/70	120/70
13	105/69	106/66	112/66	111/63	106/66	90/64	80/56	90/64	90/64	90/70	93/52	77/49	83/42	100/60	94/43	102/70	93/49	105/64	92/70	90/70	96/74	114/80	110/80
14	107/80	108/80	110/80	106/74	96/74	101/66	92/70	90/50	82/64	70/39	89/60	93/49	73/30	106/50	106/70	99/54	93/66	103/67	110/70	120/70	116/70	120/70	120/70
15	114/71	116/82	117/72	116/80	116/82	93/66	79/50	85/52	79/50	92/70	90/52	86/60	86/60	86/36	86/36	101/54	94/43	100/64	112/61	118/80	120/80	120/70	124/70
16	130/90	130/84	130/82	137/87	100/80	94/65	100/60	53/35	80/62	90/64	73/30	103/66	101/54	90/50	103/66	90/52	82/64	100/80	126/77	120/70	118/70	124/80	120/80
17	120/90	120/80	122/83	127/87	121/80	110/90	94/50	98/53	84/51	89/54	93/52	86/42	89/40	90/64	80/60	98/70	99/54	106/59	120/80	122/80	120/80	120/80	120/70
18	110/70	114/71	112/66	111/63	90/62	116/82	88/62	103/67	85/52	72/54	86/42	83/34	85/42	89/54	92/64	94/43	90/62	90/68	130/80	120/80	118/80	120/80	116/80
19	130/80	132/68	130/64	129/63	124/60	120/70	110/80	93/52	106/54	79/50	101/59	96/60	93/66	80/60	92/64	101/54	106/50	92/70	120/70	122/70	120/70	120/80	120/80
20	132/82	136/70	105/68	111/67	116/61	100/60	90/52	103/67	93/52	78/53	89/54	94/43	98/70	99/54	80/64	99/54	92/62	97/50	126/84	128/82	128/80	126/86	122/88
21	130/80	130/80	126/80	120/78	98/70	90/64	114/70	90/64	90/64	90/70	93/52	77/49	83/42	100/60	93/52	102/70	93/49	94/68	106/70	100/70	100/80	106/70	110/80
22	130/80	130/87	110/63	113/64	117/63	82/64	80/56	90/50	82/64	70/39	89/60	93/49	73/30	106/50	94/43	99/54	93/66	105/64	122/90	120/90	124/90	124/90	126/90
23	120/80	113/84	123/74	119/78	99/54	90/64	92/70	85/52	79/50	92/70	90/52	86/60	86/60	86/36	106/70	101/54	94/43	104/72	116/70	120/80	120/82	120/80	120/84
24	123/70	110/70	110/70	100/70	120/80	101/66	79/50	53/35	80/62	90/64	73/30	103/66	101/54	90/50	86/36	90/52	82/64	106/60	108/60	108/60	108/60	110/70	110/70
25	130/90	130/80	130/80	126/80	92/64	93/66	100/60	98/53	84/51	89/54	93/52	86/42	89/40	90/64	103/66	98/70	82/64	107/74	128/90	126/86	120/90	122/90	120/86
26	130/79	120/71	119/77	116/74	115/79	94/65	94/50	103/67	85/52	72/54	86/42	83/34	85/42	89/54	80/60	94/43	99/54	100/51	120/78	116/80	118/70	118/80	116/80
27	120/75	113/67	124/67	117/69	112/64	110/90	88/62	93/52	106/54	79/50	101/59	96/60	93/66	80/60	92/64	101/54	90/62	101/62	110/70	112/70	114/70	116/70	118/70
28	111/60	104/67	106/66	112/66	94/50	116/82	110/80	103/67	93/52	78/53	89/54	94/43	98/70	99/54	92/64	99/54	106/50	102//60	110/80	110/70	114/70	120/70	120/70

29	116/84	113/84	123/74	119/78	116/76	90/64	90/52	90/64	90/64	90/70	93/52	77/49	83/42	100/60	80/64	102/70	92/62	106/70	110/84	112/80	110/84	114/80	116/80
30	113/82	113/67	113/64	116/64	90/52	82/64	114/70	90/50	82/64	70/39	89/60	93/49	73/30	106/50	93/52	99/54	93/49	100/60	112/70	112/70	116/70	120/70	118/70
31	128/73	110/70	110/70	108/70	100/60	90/64	80/56	85/52	79/50	92/70	90/52	86/60	86/60	86/36	94/43	101/54	93/66	108/80	124/70	124/68	126/70	126/72	126/70
32	126/77	107/78	109/60	104/64	92/70	101/66	92/70	53/35	80/62	90/64	73/30	103/66	101/54	86/36	106/70	101/54	94/43	104/82	110/64	110/70	110/70	110/72	110/70
33	134/73	132/68	130/64	129/63	124/60	93/66	79/50	98/53	84/51	89/54	93/52	86/42	89/40	90/50	86/36	90/52	82/64	99/64	132/70	130/70	132/70	130/70	130/70
34	130/70	130/68	130/64	129/63	94/65	94/65	100/60	103/67	85/52	72/54	86/42	83/34	85/42	90/64	103/66	98/70	82/64	100/70	126/80	124/80	124/80	120/80	120/80
35	130/76	113/84	123/74	119/78	116/76	110/90	94/50	93/52	106/54	79/50	101/59	96/60	93/66	89/54	80/60	94/43	99/54	101/54	110/80	108/80	110/80	110/78	110/80
36	120/90	122/80	110/80	114/80	98/53	116/82	88/62	107/67	93/52	78/53	89/54	94/43	98/70	80/60	92/64	101/54	90/62	100/76	106/60	110/60	110/70	112/70	110/70
37	119/81	111/71	110/61	102/61	102/61	90/64	110/80	90/64	90/64	90/70	93/52	77/49	83/42	99/54	92/64	99/54	106/50	106/70	110/80	110/82	110/80	110/84	112/84
38	120/70	116/80	114/60	110/60	96/60	82/64	90/52	90/50	82/64	70/39	89/60	93/49	73/30	100/60	80/64	102/70	92/62	106/84	110/70	110/70	120/74	120/70	124/80
39	126/84	110/70	110/70	108/70	100/60	90/64	114/70	85/52	79/50	92/70	90/52	86/60	86/60	106/50	93/52	99/54	93/49	106/73	110/70	110/74	114/70	120/70	120/74
40	126/72	110/80	100/70	100/68	89/54	101/66	80/56	53/35	80/62	90/64	73/30	103/66	101/54	86/36	94/43	101/54	93/66	102/62	122/80	120/80	122/78	120/80	122/82
41	130/79	120/70	110/70	114/70	110/60	93/66	92/70	98/53	84/51	89/54	93/52	86/42	89/40	86/36	106/70	94/43	94/43	106/54	127/76	126/70	128/80	126/80	124/82
42	115/85	113/84	114/67	111/73	94/53	94/65	79/50	103/67	85/52	72/54	86/42	83/34	85/42	90/50	86/36	90/52	82/64	106/76	110/70	112/70	112/72	110/70	112/70
43	120/70	107/78	109/60	109/60	104/64	110/90	100/60	93/52	106/54	79/50	101/59	96/60	93/66	90/64	103/66	98/70	82/64	102/70	126/84	122/84	120/84	122/86	120/80
44	120/90	116/80	114/60	110/60	110/64	116/82	94/50	103/67	93/52	78/53	89/54	94/43	98/70	89/54	80/60	94/43	99/54	104/70	118/84	118/80	116/80	120/80	118/80
45	120/80	116/80	114/60	110/61	90/62	90/64	88/62	90/64	90/64	90/70	93/52	77/49	83/42	80/60	92/64	101/54	90/62	102/64	110/70	100/80	110/70	100/80	110/70
46	130/87	110/80	114/82	116/82	118/80	82/64	110/80	90/50	82/64	70/39	89/60	93/49	73/30	99/54	92/64	99/54	106/50	90/64	130/90	120/80	136/90	130/80	130/86
47	127/68	114/71	112/61	112/63	107/66	90/64	90/52	85/52	79/50	92/70	90/52	86/60	86/60	100/60	80/64	102/70	92/62	96/70	100/60	114/70	110/90	120/80	122/80
48	130/80	132/77	106/69	101/63	99/54	101/66	114/70	53/35	80/62	90/64	73/30	103/66	101/54	106/50	93/52	99/54	93/49	106/78	110/80	110/80	112/80	110/70	118/70
49	130/90	129/63	124/61	117/66	124/61	93/66	80/56	98/53	84/51	89/54	93/52	86/42	89/40	86/36	94/43	101/54	93/66	94/70	124/80	122/80	126/80	130/80	130/80
50	107/78	106/68	106/68	119/86	94/50	94/65	92/70	103/67	85/52	72/54	86/42	83/34	85/42	86/36	106/70	94/43	94/43	101/59	120/80	120/80	120/80	120/80	120/80

Sl.No.																**MEAN ARTERIAL PRESSURE**										
	270	300	BASEL	0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240	270
1	124/80	120/82	97	77	91	88	91	97	90	76	62	66	66	57	87	73	73	79	69	78	95	94	95	95	93	95
2	120/80	124/80	93	87	92	93	95	93	58	66	63	60	57	50	99	66	69	60	61	78	93	95	95	93	94	93
3	112/70	110/72	101	97	95	92	90	87	77	64	59	70	69	56	93	78	66	56	66	83	72	73	81	83	82	84
4	120/70	120/70	90	86	85	80	73	85	97	77	47	58	56	77	73	76	69	78	81	86	83	85	88	86	86	86
5	120/70	120/70	91	93	93	90	90	73	64	76	71	59	72	75	69	66	70	69	83	75	85	85	89	89	89	86
6	124/72	126/74	92	99	95	100	66	83	70	77	73	66	66	66	60	79	69	69	72	77	92	89	89	89	88	91
7	120/70	118/70	91	98	104	90	88	73	59	63	73	77	66	58	56	73	82	81	64	68	86	85	85	86	89	87
8	126/80	126/80	93	96	100	94	81	78	72	63	71	49	69	64	44	69	51	69	75	75	87	90	100	101	101	95
9	116/70	120/80	93	94	90	92	89	75	66	41	59	77	65	69	69	53	78	70	60	75	93	93	94	83	85	85
5	132/80	126/80	100	98	104	90	87	75	71	68	65	73	44	78	70	63	69	65	71	81	93	90	97	97	95	97
11	122/70	124/70	103	101	97	95	92	97	90	76	62	66	66	57	56	73	73	79	69	84	103	87	83	83	87	87
12	110/80	114/70	102	95	92	88	67	93	58	66	63	60	57	50	56	66	69	60	61	87	100	100	83	83	87	90
13	110/80	110/82	81	79	81	79	79	73	64	76	71	59	72	75	69	66	70	69	83	78	77	77	81	91	90	90
14	120/90	122/90	89	89	90	80	81	83	70	77	73	66	66	66	60	79	69	69	72	76	83	84	85	87	100	100
15	122/70	130/70	85	93	87	92	93	73	59	63	73	77	66	58	56	73	82	81	64	73	78	93	93	87	88	87
16	118/80	126/80	103	100	98	97	86	78	72	63	71	49	69	64	44	69	51	69	75	86	93	87	86	88	93	93
17	118/90	120/80	100	93	96	100	94	75	66	41	59	77	65	69	69	53	78	70	60	75	93	94	93	93	87	99
18	110/80	116/80	83	85	81	79	61	75	71	68	65	73	44	78	70	63	69	65	71	79	97	93	93	93	92	90
19	122/80	122/88	97	89	86	85	81	97	90	76	62	66	66	57	56	73	73	79	69	77	87	87	87	93	93	94
20	126/90	126/90	99	92	80	82	79	93	58	66	63	60	57	50	56	66	69	60	61	66	98	97	96	99	99	102
21	116/80	116/80	97	97	95	92	79	73	64	76	71	59	72	75	69	66	70	69	83	77	82	80	87	82	90	92
22	126/90	126/90	97	101	79	80	81	83	70	77	73	66	66	66	60	79	69	69	72	78	101	100	101	101	102	102
23	126/80	124/80	93	94	90	92	69	73	59	63	73	77	66	58	56	73	82	81	64	83	85	93	95	93	96	95
24	110/70	112/74	88	88	76	76	77	78	72	63	71	49	69	64	44	69	51	69	75	75	76	76	76	83	83	83
25	124/86	124/86	103	97	97	95	73	75	66	41	59	77	65	69	69	53	78	70	60	85	103	99	100	101	97	99
26	118/70	118/80	96	77	91	88	91	75	71	68	65	73	44	78	70	63	69	65	71	68	92	92	86	93	92	86
27	120/70	118/70	90	82	86	85	90	97	90	76	62	66	66	57	56	73	73	79	69	74	83	84	85	85	86	87
28	120/70	126/70	77	79	79	81	66	93	58	66	63	60	57	50	56	66	69	60	61	82	90	83	85	87	87	87

29	116/84	120/80	95	94	90	92	89	73	64	76	71	59	72	75	69	66	70	69	83	72	93	91	93	91	92	95
30	120/70	120/70	92	82	80	81	65	83	70	77	73	66	66	66	60	79	69	69	72	89	84	84	85	87	86	87
31	124/70	126/70	91	83	83	83	73	73	59	63	73	77	66	58	56	73	82	81	64	89	88	87	89	90	89	88
32	110/70	110/70	93	88	76	77	77	78	72	63	71	49	69	64	44	69	51	69	75	74	79	83	83	85	83	83
33	130/70	130/70	93	89	86	85	81	75	66	41	59	77	65	69	69	53	78	70	60	80	91	90	91	90	90	90
34	122/80	122/80	90	89	86	85	75	75	71	68	65	73	44	78	70	63	69	65	71	70	95	95	95	93	93	94
35	112/80	110/80	94	94	90	92	87	97	90	76	62	66	66	57	56	73	73	79	69	84	90	89	90	89	90	91
36	110/76	110/80	100	95	90	89	68	93	58	66	63	60	57	50	56	66	69	60	61	82	75	77	83	84	83	87
37	112/84	116/84	94	84	77	75	75	73	64	76	71	59	72	75	69	66	70	69	83	91	90	91	90	93	93	93
38	120/80	122/80	87	92	78	77	72	83	70	77	73	66	66	66	60	79	69	69	72	84	83	83	89	87	95	93
39	120/70	120/76	98	83	83	83	73	73	59	63	73	77	66	58	56	73	82	81	64	75	83	85	85	87	89	87
40	120/80	120/78	90	90	80	79	66	78	72	63	71	49	69	64	44	69	51	69	75	71	94	93	93	93	95	93
41	124/80	126/80	96	87	83	85	77	75	66	41	59	77	65	69	69	53	78	70	60	86	93	89	96	95	96	95
42	110/70	110/70	95	94	83	86	67	75	71	68	65	73	44	78	70	63	69	65	71	81	83	84	85	83	84	83
43	126/80	122/80	87	88	76	76	77	97	90	76	62	66	66	57	56	73	73	79	69	81	98	97	96	98	93	95
44	120/80	120/80	100	92	78	77	79	93	58	66	63	60	57	50	56	66	69	60	61	77	95	93	92	93	93	93
45	110/70	110/80	93	92	78	78	61	73	64	76	71	59	72	75	69	66	70	69	83	73	83	87	83	81	83	83
46	130/86	130/84	101	90	93	93	93	89	70	77	73	66	66	66	60	79	69	69	72	79	103	93	92	97	101	101
47	124/84	124/90	88	85	78	79	80	73	72	63	73	77	66	58	56	73	82	81	64	77	73	85	97	93	94	97
48	116/70	116/80	97	95	81	70	69	78	72	63	71	49	69	64	44	69	51	69	75	87	90	90	91	83	86	85
49	128/80	128/82	103	85	82	83	82	75	66	41	59	77	65	69	69	53	78	70	60	77	95	94	95	97	97	96
50	120/80	120/80	88	81	81	87	66	75	71	68	65	73	44	78	70	63	69	65	71	83	93	93	95	93	93	93

	Sl.No.												RESPIRATORYRATE											
300		BASELINE	0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240	270
94	1	16	16	15	16	16	16	16	18	17	16	16	14	16	15	14	17	18	16	15	15	16	15	18	16
95	2	18	18	18	20	20	20	18	18	18	16	16	16	18	18	18	16	20	20	18	18	18	16	16	16
85	3	20	20	22	22	20	18	18	18	18	18	18	18	18	20	20	20	20	22	20	20	18	18	18	18
86	4	22	20	20	20	18	18	18	18	16	16	18	16	18	16	18	16	18	16	18	16	18	18	18	18
86	5	17	18	18	16	16	18	18	16	18	18	18	16	18	16	18	16	16	18	18	18	20	18	18	16
91	6	18	20	20	18	18	18	22	18	18	20	20	22	20	22	22	20	20	20	20	18	18	18	18	18
86	7	16	18	16	14	14	15	14	16	16	16	14	14	14	16	16	14	14	14	14	16	16	16	16	14
95	8	18	18	18	16	16	16	16	14	14	14	14	14	16	16	16	18	18	18	18	18	18	18	16	16
93	9	20	18	18	18	18	18	18	18	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
95	5	22	20	20	20	20	18	18	18	18	20	22	22	22	22	22	20	20	22	18	18	18	18	18	20
88	11	14	16	16	14	16	16	16	16	14	14	12	14	14	14	14	16	16	16	16	16	16	16	16	16
85	12	17	18	18	18	16	16	16	16	16	16	16	16	16	16	18	18	18	18	18	18	18	18	18	18
91	13	15	16	16	16	16	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
101	14	16	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	16	16	16	16	16
90	15	18	18	20	20	22	20	20	20	20	20	20	20	20	20	18	18	18	18	18	18	18	18	18	18
95	16	17	18	18	18	18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	18
93	17	16	18	18	18	18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	14	14	14	14	14
92	18	15	14	14	14	14	14	14	14	14	16	16	16	16	16	16	16	16	16	16	16	16	16	16	18
99	19	20	22	22	22	20	20	20	20	20	18	18	18	18	18	18	18	18	18	18	18	18	18	20	20
102	20	20	22	22	22	22	20	20	20	20	20	18	18	18	18	18	18	18	18	18	18	18	20	20	20
92	21	22	18	18	18	18	18	18	18	18	16	16	16	16	16	16	16	18	18	18	18	18	18	18	18
102	22	18	20	20	20	22	20	20	20	20	18	18	18	16	18	18	14	16	16	16	16	16	16	16	18
95	23	18	18	16	16	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
87	24	16	14	14	14	14	14	14	14	14	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
99	25	16	16	16	14	14	14	14	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
93	26	18	18	18	18	18	18	20	20	20	20	18	18	18	18	18	18	18	18	18	18	20	18	18	18
86	27	18	20	20	20	20	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	16	16	16	16
89	28	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

93	29	22	20	20	20	18	18	18	18	18	18	18	18	18	18	18	18	18	20	20	20	20	20	18	18
87	30	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
89	31	15	16	16	16	16	16	16	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
83	32	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
90	33	19	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
94	34	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	18	18	18
90	35	17	18	18	18	18	18	18	18	18	18	18	18	16	16	16	16	16	16	16	16	16	16	16	16
90	36	20	20	20	20	20	20	20	20	20	20	18	18	18	18	18	18	18	18	18	18	18	18	18	18
95	37	18	18	18	18	20	20	20	20	20	20	16	16	16	16	16	16	16	16	16	16	16	16	16	16
94	38	14	14	14	14	14	14	14	14	14	14	16	16	16	16	16	16	16	16	16	16	16	16	16	16
91	39	18	20	20	20	20	20	20	20	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
92	40	18	18	18	18	18	18	18	18	18	18	18	18	18	18	20	20	20	20	20	20	20	20	20	20
96	41	16	16	16	16	16	16	16	16	16	16	16	16	16	16	14	14	14	14	14	14	14	14	14	14
83	42	18	18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
94	43	19	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	20	20	20	20	20	20	18
93	44	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
90	45	22	22	22	22	22	22	22	22	22	22	22	22	22	20	20	20	20	20	20	20	20	18	18	18
99	46	18	18	18	18	18	18	18	18	18	18	20	20	20	20	20	20	20	20	20	20	20	20	20	20
101	47	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	14	14	14	14	14	14
92	48	14	14	14	14	14	14	14	14	14	14	16	16	16	16	16	16	16	16	16	16	16	16	16	16
97	49	19	18	18	18	18	18	18	18	18	18	18	18	18	18	16	16	16	16	16	16	16	16	16	16
93	50	16	16	15	15	16	16	16	15	14	16	16	16	16	18	17	16	16	16	16	16	16	16	16	16

	Sl.No.																O2 SATURATION									
300		BASELINE		0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240	270
16	1	99		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
18	2	99		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
18	3	99		99	99	99	99	99	99	98	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
20	4	100		100	100	100	100	100	100	100	100	100	100	100	100	98	99	100	100	100	100	100	99	100	100	100
16	5	98		98	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	6	99		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	98
14	7	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	99	99	98	99	99	100	100
16	8	100		100	100	100	100	100	99	99	99	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100
20	9	98		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
20	5	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
16	11	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
16	12	99		99	99	99	99	99	99	99	99	99	99	99	99	99	98	99	99	99	99	98	99	99	99	99
17	13	100		100	100	100	100	100	99	98	99	99	99	99	99	99	100	99	100	100	100	100	100	100	100	100
18	14	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	15	100		100	100	100	100	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	100
16	16	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
14	17	100		100	100	100	100	100	100	100	100	100	100	99	99	100	100	100	100	100	100	100	100	100	100	100
16	18	99		99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
20	19	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
22	20	99		99	99	99	99	98	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
18	21	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100
16	22	100		100	100	100	100	100	100	100	99	97	99	100	100	100	100	100	100	100	100	100	100	100	100	100
14	23	100		99	99	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
16	24	99		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
16	25	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	26	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99
16	27	99		99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99
14	28	100		100	100	100	100	100	100	100	99	99	99	98	99	100	100	100	100	100	100	100	100	100	100	100

18	29	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
16	30	99		99	99	99	99	99	99	99	99	99	98	99	99	99	99	99	98	99	99	99	99	99	99	99
14	31	100		100	100	100	100	99	100	100	99	99	100	100	100	100	100	100	100	100	100	100	100	99	100	100
16	32	100		100	100	100	100	100	100	100	100	100	99	99	99	100	100	100	100	100	100	100	100	100	100	100
18	33	100		100	100	100	100	100	100	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100
15	34	100		100	100	99	99	99	99	100	100	100	100	100	99	99	99	100	100	100	100	100	100	100	100	100
16	35	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	99	99	99	99	99	99	100
16	36	99		99	99	99	99	99	99	99	99	99	99	98	99	99	99	99	99	99	99	99	99	99	99	99
16	37	99		100	100	100	100	100	100	100	100	99	99	99	99	99	99	99	99	99	99	99	100	100	100	100
14	38	99		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	39	100		100	100	100	100	100	99	99	99	98	99	99	99	99	99	100	100	100	100	100	100	100	100	100
16	40	99		99	99	99	99	99	99	99	99	99	99	99	98	98	98	98	98	98	98	98	98	98	98	98
14	41	100		100	100	100	100	100	100	100	100	100	99	99	99	99	99	99	99	99	99	99	99	99	99	99
16	42	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	43	100		100	100	100	100	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
16	44	99		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	45	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
20	46	99		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
14	47	100		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
16	48	99		99	99	99	99	99	99	99	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100
16	49	100		100	100	100	100	100	100	100	100	100	100	100	100	100	99	99	99	99	99	99	99	99	100	100
16	50	99		99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99

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MASTER CHART

SNO	AGE	WEIGHT	HEIGHT	DIAGNOSIS	SURGERY	ASA	DURATION OF SURGERY	TOSA	MLSB	TTAHLSA	TTSR	TDEA	TSR TO L1	TWPRA	TDSA	TOMB
	YRS	KG	CM				MINUTES	SECONDS		SEC	MIN	MIN	MIN	MIN	MIN	SEC
	GROUP BN 2 cc of 0.5% Bupivacaine + 0.5 cc normal saline															
1	26	58	154	PREV LSCS	ELECTIVE LSCS	2	65	110	T4	210	90	150	140	160	150	120
2	29	56	155	PREV LSCS	ELECTIVE LSCS	2	55	100	T4	180	70	120	130	130	140	150
3	24	62	159	PRIMI,CPD	ELECTIVE LSCS	2	45	120	T4	360	110	160	150	150	160	170
4	35	56	158	ELDERLY PRIMI	ELECTIVE LSCS	2	50	90	T3	300	115	180	170	175	170	180
5	19	52	150	PRIMI,BREECH	ELECTIVE LSCS	2	40	110	T5	200	120	180	190	180	180	200
6	22	54	152	POSTDATED	ELECTIVE LSCS	2	35	110	T4	250	65	110	120	125	110	220
7	28	58	156	BOH	ELECTIVE LSCS	2	40	120	T3	260	90	160	175	175	160	120
8	27	68	163	PREV LSCS	ELECTIVE LSCS	2	55	100	T4	280	100	200	200	200	190	150
9	24	57	154	PRIMI,CPD	ELECTIVE LSCS	2	35	160	T4	270	60	140	150	150	150	220
10	31	59	156	PREV LSCS	ELECTIVE LSCS	2	45	100	T6	300	110	180	180	180	195	200
11	26	64	157	PREV LSCS	ELECTIVE LSCS	2	50	130	T5	150	80	150	160	150	155	180
12	28	52	150	PREV LSCS	ELECTIVE LSCS	2	50	120	T4	180	120	160	175	165	170	220
13	29	60	159	PREV LSCS	ELECTIVE LSCS	2	45	120	T4	180	110	180	180	190	180	160
14	30	58	152	ELDERLY PRIMI	ELECTIVE LSCS	2	30	130	T4	250	100	170	175	175	165	160
15	22	56	157	PRIMI,CPD	ELECTIVE LSCS	2	40	140	T4	225	90	150	150	155	150	140
16	18	51	148	PRIMI,CPD	ELECTIVE LSCS	2	45	130	T4	200	90	160	150	165	150	130
17	19	54	150	PRIMI,BREECH	ELECTIVE LSCS	2	55	120	T3	275	100	180	175	175	175	150
18	26	57	156	PREV LSCS	ELECTIVE LSCS	2	50	150	T4	300	110	175	175	185	175	140
19	22	59	158	PREV LSCS	ELECTIVE LSCS	2	40	140	T5	250	120	180	182	185	180	130
20	21	62	160	PRIMI,CPD	ELECTIVE LSCS	2	45	120	T4	240	110	180	190	195	190	150
21	24	59	158	FAILED INDUCTION	ELECTIVE LSCS	2	30	90	T4	300	120	200	200	200	195	180
22	23	58	154	PREV LSCS	ELECTIVE LSCS	2	55	100	T4	280	100	180	180	175	175	200
23	28	52	155	PREV LSCS	ELECTIVE LSCS	2	75	110	T3	300	90	150	140	140	145	140
24	27	57	157	PREV LSCS	ELECTIVE LSCS	2	70	110	T4	240	85	125	110	125	120	130
25	26	56	153	PREV LSCS	ELECTIVE LSCS	2	60	120	T5	270	100	140	125	150	155	120
26	34	68	161	G3P2L1,CPD	ELECTIVE LSCS	2	50	120	T4	180	80	120	100	125	120	170
27	28	64	159	PREV LSCS	ELECTIVE LSCS	2	60	110	T4	175	60	130	120	140	130	160
28	24	59	148	FAILED INDUCTION	ELECTIVE LSCS	2	55	130	T6	200	120	180	170	175	170	140
29	21	52	150	PRIMI,CPD	ELECTIVE LSCS	2	30	120	T4	300	100	160	175	175	170	150
30	22	54	158	PRIMI,CPD	ELECTIVE LSCS	2	40	100	T5	400	90	140	150	150	165	160
31	29	56	158	PREV LSCS	ELECTIVE LSCS	2	55	90	T4	280	100	180	160	165	170	180
32	19	55	154	POSTDATED	ELECTIVE LSCS	2	45	100	T4	250	110	200	205	200	200	220
33	20	55	156	POSTDATED	ELECTIVE LSCS	2	40	90	T4	220	70	110	120	125	120	240

34	27	57	157	PREV LSCS	ELECTIVE LSCS	2	60	160	T4	320	90	130	125	130	140	180
35	29	55	155	PREV LSCS	ELECTIVE LSCS	2	45	110	T5	180	100	180	175	180	180	150
36	24	52	152	FAILED INDUCTION	ELECTIVE LSCS	2	45	120	T4	360	90	150	155	155	150	140
37	20	54	156	PRIMI,CPD	ELECTIVE LSCS	2	50	130	T4	420	110	170	175	180	175	150
38	26	59	158	PREV LSCS	ELECTIVE LSCS	2	66	140	T4	250	75	140	130	150	135	140
39	28	56	156	PREV LSCS	ELECTIVE LSCS	2	60	120	T3	280	120	190	175	200	175	180
40	24	58	154	POSTDATED	ELECTIVE LSCS	2	50	110	T4	275	80	110	120	125	130	200
41	22	57	154	FAILED INDUCTION	ELECTIVE LSCS	2	45	130	T4	200	100	175	170	175	180	220
42	20	60	157	PRIMI,CPD	ELECTIVE LSCS	2	50	100	T4	340	75	140	130	150	140	210
43	27	62	152	PREV LSCS	ELECTIVE LSCS	2	60	90	T4	380	100	180	165	180	180	240
44	29	59	155	PREV LSCS	ELECTIVE LSCS	2	55	110	T4	180	90	175	160	180	175	250
45	30	63	157	BOH	ELECTIVE LSCS	2	55	120	T6	180	90	160	150	165	160	180
46	25	64	164	POSTDATED	ELECTIVE LSCS	2	40	110	T4	150	100	180	175	175	170	170
47	21	57	162	PRIMI,CPD	ELECTIVE LSCS	2	45	130	T3	180	75	150	150	160	150	160
48	27	61	156	PREV LSCS	ELECTIVE LSCS	2	65	140	T4	200	110	160	150	160	150	160
49	28	60	158	PREV LSCS	ELECTIVE LSCS	2	68	150	T4	200	100	170	160	175	175	175
50	26	55	155	POSTDATED	ELECTIVE LSCS	2	45	110	T4	180	90	140	130	145	140	120

SNO	QMBBS	TCMR	QSA	SAB TO EXTRACTION OF FETUS	APGAR1'	5'	SEDATION	SIDE EFFECTS	DRUGS	SNO
	GRADE	MIN		MIN			RAMSAY SCORE			
1	3	90	E	6	8	9	2			1
2	3	120	G	8	7	9	2	SHIVERING	PENTAZOCINE	2
3	3	135	E	9	6	9	2	VOMITING	ONDANSETRON	3
4	3	100	E	6	8	9	2			4
5	3	110	E	5	6	9	2			5
6	3	120	G	7	7	9	2		PENTAZOCINE	6
7	3	180	E	6	8	9	2			7
8	3	140	E	8	8	9	1	VOMITING	ONDANSETRON	8
9	3	130	G	8	6	9	2		PENTAZOCINE	9
10	3	100	E	8	6	9	2			10
11	3	90	G	9	6	9	2	SHIVERING	PENTAZOCINE	11
12	3	100	E	7	8	9	2			12
13	3	140	E	8	8	9	2			13
14	3	110	E	6	7	9	2			14
15	3	110	E	5	6	9	1			15
16	3	140	G	8	7	9	2	SHIVERING	PENTAZOCINE	16
17	3	130	E	7	7	9	2			17
18	3	120	E	7	7	9	2			18
19	3	120	E	7	8	9	2	VOMITING	ONDANSETRON	19
20	3	90	E	8	8	9	2			20
21	3	120	E	9	8	9	2	SHIVERING	PENTAZOCINE	21
22	3	100	E	9	7	9	2			22
23	3	100	E	6	7	9	2			23
24	3	90	G	6	7	9	2	SHIVERING	PENTAZOCINE	24
25	3	120	E	7	7	9	2			25
26	3	90	G	8	6	9	2		PENTAZOCINE	26
27	3	120	G	6	6	9	2		PENTAZOCINE	27
28	3	100	E	9	8	9	1			28
29	3	90	E	7	8	9	2	VOMITING	ONDANSETRON	29
30	3	90	G	6	8	9	2		PENTAZOCINE	30
31	3	95	E	8	6	9	2			31
32	3	120	E	9	6	9	2			32
33	3	110	G	6	7	9	2	SHIVERING	PENTAZOCINE	33

34	3	100	E	8	7	9	2			34
35	3	100	E	8	6	9	2			35
36	3	100	G	9	6	9	2	SHIVERING	PENTAZOCINE	36
37	3	120	E	7	7	9	2			37
38	3	100	G	7	7	9	2	SHIVERING	PENTAZOCINE	38
39	3	100	E	6	8	9	2			39
40	3	110	G	9	7	9	2		PENTAZOCINE	40
41	3	130	E	8	7	9	2			41
42	3	110	G	8	8	9	2	SHIVERING	PENTAZOCINE	42
43	3	90	E	7	8	9	2			43
44	3	90	E	7	6	9	2			44
45	3	100	E	8	6	9	1	VOMITING	ONDANSETRON	45
46	3	100	E	6	6	9	2	VOMITING	ONDANSETRON	46
47	3	110	G	5	7	9	2	SHIVERING	PENTAZOCINE	47
48	3	90	E	8	7	9	2	SHIVERING	PENTAZOCINE	48
49	3	100	E	7	8	9	2			49
50	3	120	G	8	7	9	2	SHIVERING	PENTAZOCINE	50

	PULSE RATE																							SNO
BASELINE	0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240	270	300	
86	84	84	76	76	80	80	86	82	78	80	76	76	76	78	82	80	78	76	79	90	93	94	96	86	1
96	90	92	88	86	88	88	84	82	84	84	86	88	88	90	86	84	84	89	74	85	75	97	96	90	2
92	86	88	90	90	93	90	86	96	96	98	94	90	88	86	90	92	90	87	85	79	76	92	74	76	3
86	86	95	96	90	92	92	90	90	90	88	86	78	85	82	96	78	79	90	95	78	64	82	87	86	4
68	96	89	82	78	96	102	122	93	90	88	78	90	93	85	84	86	76	72	70	76	79	89	86	90	5
78	82	80	86	110	102	96	90	78	86	89	80	74	96	98	75	75	85	86	84	82	87	78	96	75	6
94	120	113	93	73	81	86	82	91	73	81	91	87	82	93	71	83	82	93	95	91	70	80	82	92	7
96	104	100	96	85	76	96	96	85	84	82	82	89	85	88	56	86	88	99	87	83	83	82	80	89	8
93	96	90	85	86	81	71	73	73	76	75	71	75	76	75	76	74	75	68	69	66	69	78	78	82	9
87	97	92	94	82	88	86	86	84	95	90	82	88	86	89	82	81	82	82	93	82	87	82	98	92	10
90	106	122	104	93	94	98	71	75	85	82	80	81	83	82	89	92	87	82	93	94	59	78	89	89	11
96	97	82	81	78	85	89	71	72	79	95	95	78	97	91	81	79	82	97	95	97	94	84	76	98	12
93	74	85	87	89	69	68	62	68	78	74	78	78	98	95	87	78	101	104	108	98	97	102	102	108	13
86	85	82	78	98	95	77	122	108	99	96	78	89	98	84	85	86	98	78	98	92	95	95	91	92	14
86	95	130	104	106	96	89	69	98	96	98	90	90	91	93	95	98	85	88	87	81	80	87	93	98	15
90	94	98	102	90	89	87	82	83	81	86	89	88	76	76	79	75	72	71	77	79	92	90	78	92	16
96	87	89	98	96	92	91	91	79	79	89	85	89	88	80	81	79	79	75	70	79	76	74	72	79	17
86	88	86	79	76	75	75	79	76	89	82	81	80	88	86	72	120	87	88	89	80	84	89	90	94	18
86	100	99	97	92	98	79	89	89	85	82	80	98	96	92	97	94	95	78	71	76	76	79	92	91	19
94	99	95	89	102	122	110	110	108	109	108	108	102	101	100	104	90	98	90	97	96	96	94	95	90	20
86	90	97	93	78	79	85	82	84	86	87	84	86	98	78	74	88	88	85	85	87	86	87	81	85	21
72	85	105	96	97	90	90	97	78	58	68	69	78	98	90	99	90	99	96	78	78	74	78	79	76	22
86	96	112	102	100	105	106	106	96	98	95	97	96	96	95	94	94	90	79	89	79	80	85	80	83	23
74	89	86	80	81	79	70	70	65	69	66	64	63	66	66	65	69	62	60	64	69	68	78	78	72	24
110	85	86	89	78	96	96	92	94	97	87	85	86	82	80	84	88	86	89	82	78	72	70	70	77	25
89	72	86	88	89	87	75	76	82	90	90	91	98	93	82	81	86	84	82	92	72	72	82	72	85	26
73	96	98	97	92	92	90	82	82	88	87	82	88	84	82	80	86	87	78	71	76	92	92	91	98	27
86	78	80	85	87	86	82	72	73	71	79	74	76	75	71	70	72	73	79	76	96	91	82	83	84	28
107	115	108	104	92	93	94	98	93	93	91	95	92	85	82	83	81	83	86	78	88	82	82	95	93	29
92	110	122	125	124	105	106	96	97	93	96	90	91	93	97	105	98	88	86	92	91	97	100	102	108	30
93	87	98	96	92	78	72	69	64	68	62	60	68	78	75	76	82	89	81	98	92	90	97	96	93	31
90	106	110	102	93	87	85	82	82	86	83	81	81	87	89	96	94	78	85	75	71	79	89	85	86	32
110	130	120	104	108	109	106	109	96	94	90	93	78	82	86	83	92	90	97	82	83	81	83	82	85	33

84	99	90	78	75	76	85	98	72	72	73	75	76	74	75	71	85	82	88	83	82	81	87	89	89	34
77	85	88	99	92	93	91	97	87	84	85	86	85	84	82	80	83	81	80	83	81	86	82	82	84	35
110	122	108	100	92	72	72	82	83	81	86	84	72	72	73	69	67	66	61	75	75	76	76	79	79	36
84	98	92	98	78	82	82	81	83	83	81	87	85	86	86	88	95	96	92	94	92	92	90	94	97	37
77	87	88	80	83	84	87	85	86	85	75	71	72	74	72	76	79	78	75	74	78	79	76	79	75	38
110	109	108	110	100	96	93	91	97	95	92	92	90	92	85	82	88	82	81	83	84	85	88	82	83	39
106	101	92	92	99	97	92	94	88	82	81	82	80	81	83	84	82	84	82	88	87	81	83	81	84	40
97	90	89	92	91	91	82	82	83	81	87	85	87	88	86	84	82	75	75	71	72	72	72	79	78	41
92	96	90	85	82	84	82	84	81	78	70	70	76	79	75	74	71	72	78	82	85	85	84	86	88	42
102	103	99	96	89	89	87	89	85	86	85	82	81	80	83	81	82	88	87	80	80	83	81	80	84	43
90	89	80	76	70	80	66	65	69	68	67	69	78	78	72	72	75	74	76	78	79	75	75	74	85	44
88	85	80	78	79	75	76	85	84	85	86	87	89	89	96	98	95	94	99	98	96	98	92	90	97	45
100	96	90	97	98	95	97	82	89	82	86	89	96	92	91	95	95	98	95	96	93	99	100	108	105	46
95	87	86	89	82	81	82	80	70	70	76	76	78	75	79	89	85	84	86	82	87	88	98	85	89	47
80	88	86	88	80	78	74	76	79	79	76	72	70	78	88	85	80	83	84	86	89	87	85	87	78	48
93	93	90	88	78	74	78	79	106	89	93	91	92	94	96	94	95	95	98	95	94	95	95	95	92	49
108	102	100	90	98	92	89	88	82	82	78	78	75	71	76	85	82	88	82	82	83	87	82	81	83	50

		BLOOD PRESSURE																						SNO
BASELI	0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240	270	300	
130/87	110/63	113/64	117/63	116/66	95/64	73/30	120/71	89/40	124/84	110/66	106/64	119/77	116/74	110/70	120/80	115/79	110/9	110/80	110/80	116/90	120/80	120/8	122/80	124/80	1
127/68	105/61	104/66	102/66	111/64	106/62	105/65	93/37	106/60	86/57	108/62	114/68	97/63	98/68	116/68	126/78	117/72	116/8	116/82	118/84	120/84	120/82	120/8	120/80	124/80	2
130/80	130/80	126/80	120/78	104/76	100/70	110/80	120/70	122/66	130/73	134/68	130/80	120/72	124/72	60/40	90/50	106/80	110/8	114/80	120/80	120/80	124/80	124/8	124/80	110/72	3
130/90	130/90	130/90	130/86	130/80	130/90	134/70	130/70	115/62	112/65	115/62	117/60	130/80	124/80	116/60	118/60	136/84	130/9	120/80	136/90	130/80	130/86	130/8	130/84	120/70	4
107/78	109/60	109/60	104/64	99/41	102/64	106/69	113/67	129/82	122/77	121/73	107/61	124/67	117/69	112/63	114/70	112/64	100/6	114/70	110/90	120/80	122/80	124/8	124/90	120/70	5
110/70	110/70	100/70	120/80	120/80	120/80	110/80	100/80	117/66	124/61	119/69	119/67	110/80	130/80	131/65	128/67	120/80	110/8	110/80	112/80	110/70	118/70	116/7	116/80	126/74	6
130/80	110/70	110/70	108/70	100/60	102/60	70/50	100/70	106/72	106/72	104/70	110/74	120/60	120/70	112/74	110/70	122/70	124/8	122/80	126/80	130/80	130/80	128/8	128/82	118/70	7
120/80	120/80	110/70	120/80	120/90	124/80	122/88	120/80	120/80	120/90	104/70	100/60	120/80	110/80	110/80	126/90	110/70	120/8	120/80	120/82	120/80	120/80	120/8	120/80	126/80	8
120/90	70/60	80/70	90/70	120/82	120/80	126/80	128/80	103/66	102/69	109/65	98/52	110/70	120/90	108/66	110/80	120/90	120/9	122/90	124/90	120/90	120/90	120/9	120/90	120/80	9
124/82	120/86	124/84	120/90	120/82	120/80	122/80	110/80	93/63	99/67	99/66	98/69	114/80	120/70	124/80	126/80	100/80	104/8	104/82	110/80	114/82	116/82	118/8	118/80	126/80	10
124/78	105/60	86/42	88/52	97/59	102/61	104/64	124/84	92/70	80/60	100/60	100/70	105/62	100/63	110/80	120/80	108/62	106/7	122/80	120/80	118/80	120/80	118/8	120/80	124/70	11
113/84	123/74	119/78	116/76	121/73	118/71	120/73	119/71	103/63	105/63	105/63	110/70	116/73	122/70	110/70	100/60	124/70	118/7	124/80	114/80	116/80	120/80	116/7	118/78	114/70	12
126/81	136/92	111/71	110/61	102/61	98/69	105/66	85/47	96/60	98/60	109/65	115/74	101/60	110/61	103/65	106/64	116/63	120/7	124/68	124/70	122/80	120/80	120/8	120/82	110/82	13
116/80	116/80	114/60	110/60	110/64	110/66	100/60	120/80	120/60	110/60	113/62	116/60	110/60	110/70	110/70	112/70	120/70	130/8	130/80	120/90	120/90	120/82	120/9	120/90	122/90	14
122/86	122/86	114/76	110/68	117/76	117/74	114/73	112/74	111/62	98/65	98/45	110/57	123/84	126/80	111/65	116/69	126/82	128/8	128/80	126/80	126/84	124/82	126/8	126/82	130/70	15
124/76	132/68	130/64	129/63	124/60	117/66	124/61	119/69	100/66	127/90	107/60	100/60	119/67	120/65	110/70	120/74	128/77	128/7	126/70	124/70	124/72	120/70	124/7	124/74	126/80	16
120/80	120/80	116/80	110/70	100/70	90/60	100/70	110/70	110/90	100/90	120/80	116/80	120/80	120/80	120/84	124/80	110/70	110/7	106/70	110/70	114/70	114/70	112/7	112/70	120/80	17
113/67	113/64	96/63	86/36	111/84	127/79	128/84	120/82	120/80	130/80	126/80	126/80	112/83	113/78	120/80	130/80	115/78	110/7	114/70	110/70	112/70	114/76	116/7	114/78	116/80	18
120/90	130/90	120/90	120/90	110/80	110/80	120/80	130/90	117/76	116/74	121/67	117/68	130/70	120/70	120/65	122/75	120/80	120/8	122/80	118/80	120/82	120/82	120/8	120/84	122/88	19
128/82	115/74	119/74	130/68	120/80	96/60	85/60	100/64	119/72	112/63	119/63	129/83	124/68	118/68	126/86	128/80	124/68	124/7	120/80	124/80	124/76	124/80	124/8	124/80	126/90	20
104/67	106/66	112/66	111/63	94/54	94/67	106/66	106/65	96/60	94/60	90/60	116/80	126/64	128/80	120/80	106/80	126/80	128/8	128/82	124/86	124/86	128/86	128/8	128/80	116/80	21
126/87	126/89	124/86	102/66	93/56	110/61	109/60	90/58	122/90	120/90	120/80	122/80	94/69	96/60	124/90	120/90	100/60	102/6	102/64	108/72	110/70	116/70	116/7	120/70	126/90	22
127/84	130/82	132/78	130/84	117/70	127/84	120/70	112/61	130/80	126/80	110/80	100/60	123/62	127/67	110/70	114/70	123/64	130/6	128/60	130/60	126/60	128/60	126/7	124/72	124/80	23
110/70	110/70	100/70	92/70	102/70	80/60	90/70	106/70	108/72	118/73	110/63	108/62	108/70	108/70	105/61	106/60	110/70	112/7	110/70	110/70	112/70	110/70	110/7	110/72	112/74	24
115/73	120/68	101/64	99/66	98/76	99/72	123/75	118/79	110/80	120/80	120/80	120/60	103/68	113/60	120/70	130/90	115/75	116/7	118/72	118/72	118/74	116/74	116/7	118/70	124/86	25
130/80	110/80	100/70	100/68	98/70	100/70	102/70	124/70	129/63	122/66	119/67	108/45	116/80	126/76	118/67	117/70	126/80	124/8	126/78	126/80	124/80	124/82	126/8	126/80	118/80	26
114/86	117/68	119/66	99/39	97/48	122/61	116/67	118/74	96/56	112/65	110/70	115/69	124/82	122/69	110/70	114/68	106/69	110/7	112/70	112/72	114/72	114/72	116/8	116/82	118/70	27
120/80	130/76	130/76	120/70	110/70	100/70	110/70	110/80	102/63	107/61	102/63	110/68	120/80	110/70	103/68	110/73	120/80	110/7	116/72	118/70	118/72	118/74	118/7	118/72	126/70	28
120/80	120/80	120/80	104/70	102/70	96/66	110/90	106/80	112/75	124/74	119/76	115/70	120/70	122/80	122/82	116/80	120/80	122/8	124/80	122/80	120/80	120/80	120/8	120/80	120/80	29
130/82	137/87	130/70	127/68	121/70	109/60	109/69	112/60	94/74	106/80	124/80	111/66	113/60	119/69	109/61	110/70	120/70	118/7	120/74	122/70	120/72	120/74	120/7	120/72	120/70	30
110/80	120/80	116/80	110/70	112/74	114/70	110/80	112/80	116/52	88/68	113/61	119/68	112/80	110/80	128/67	126/70	112/82	1110/8	112/80	114/82	114/80	116/80	116/8	114/80	126/70	31
136/70	105/68	111/67	116/61	124/76	119/96	93/69	106/67	108/65	109/61	102/68	105/60	117/70	113/65	109/60	110/60	109/68	106/6	110/64	112/70	114/70	112/70	114/7	112/70	110/70	32
108/80	110/80	106/74	110/70	110/70	100/70	100/80	110/80	118/60	124/73	114/60	122/61	110/80	116/80	124/66	108/65	114/80	112/8	114/82	120/80	118/80	118/72	118/8	118/80	130/70	33

100/80	100/80	90/60	70/40	90/60	90/60	110/80	120/90	124/70	120/70	110/70	110/60	110/70	116/70	130/70	128/80	110/60	98/60	100/60	110/80	120/90	122/90	122/9	122/90	122/80	34
130/90	130/90	130/80	120/80	120/80	110/80	120/90	120/90	100/60	110/60	100/70	110/80	110/70	110/70	110/80	110/80	120/90	122/9	120/90	122/86	120/80	122/80	120/8	120/80	110/80	35
120/70	120/70	110/70	114/70	110/60	110/64	110/64	110/70	111/72	116/64	111/69	111/64	104/64	120/80	107/68	104/65	120/80	120/8	128/90	126/90	126/90	128/90	126/9	126/90	110/80	36
110/80	110/60	110/80	100/70	100/70	100/80	80/60	100/60	102/63	116/61	112/60	108/63	110/60	120/70	110/70	110/70	120/70	120/7	120/80	120/80	122/80	120/80	122/8	120/82	116/84	37
122/83	127/87	121/80	112/80	113/67	114/72	115/66	118/76	120/80	120/90	130/80	130/70	112/69	107/61	120/70	130/70	122/84	120/8	110/80	120/80	124/80	120/80	122/8	124/80	122/80	38
128/89	103/69	103/69	120/67	109/68	95/52	110/65	129/69	108/87	120/79	103/62	97/45	124/70	120/70	98/49	104/61	110/90	120/9	120/90	124/90	122/90	122/90	122/9	122/90	120/76	39
113/84	114/67	99/63	97/63	107/47	101/68	97/69	105/62	117/70	120/70	120/74	120/74	108/60	108/64	120/74	120/80	110/70	110/7	110/70	110/70	110/76	110/80	110/8	110/80	120/78	40
125/86	111/73	98/61	93/64	112/63	89/52	87/50	112/68	129/85	125/82	112/72	98/63	100/66	99/64	110/61	116/68	109/69	100/7	102/70	100/80	110/80	116/80	118/8	124/82	126/80	41
129/62	119/76	116/73	103/68	112/69	111/64	109/68	118/69	108/70	110/60	110/70	110/72	128/86	122/90	110/62	110/70	120/80	120/8	122/84	122/86	124/84	124/86	122/8	122/80	110/70	42
106/68	106/68	119/86	110/86	96/60	110/60	112/70	104/67	120/74	122/68	98/60	120/70	110/72	108/70	116/64	112/68	110/70	112/7	110/70	110/72	110/70	110/70	110/7	110/70	122/80	43
130/80	132/80	126/90	110/70	120/90	118/90	126/90	120/90	110/90	110/90	100/80	80/50	110/90	116/90	100/60	118/64	120/90	120/9	120/90	120/90	120/90	120/90	120/9	120/90	120/80	44
120/90	120/90	120/90	118/68	112/70	110/70	100/70	90/50	90/70	100/80	100/70	80/53	100/70	110/70	110/70	110/70	112/80	114/8	118/70	120/80	120/82	122/80	120/8	120/80	110/80	45
105/69	108/72	108/72	97/68	96/67	96/60	109/65	115/74	106/64	110/70	103/65	106/64	92/70	90/70	96/74	114/80	110/80	110/8	110/82	126/70	128/80	126/80	124/8	124/80	126/80	46
107/80	90/60	83/34	85/42	106/50	120/60	113/62	116/60	114/68	116/68	110/70	112/70	110/70	120/70	116/70	120/70	120/70	120/9	122/90	112/70	112/72	110/70	112/7	110/70	110/70	47
114/71	112/61	112/63	107/66	111/62	111/62	98/45	110/57	130/80	60/40	111/65	116/69	112/61	118/80	120/80	120/70	124/70	122/7	130/70	122/84	120/84	122/86	120/8	126/80	122/80	48
130/90	120/90	87/43	90/53	95/60	100/66	107/60	100/60	117/60	116/60	110/70	120/74	126/77	120/70	118/70	124/70	120/80	118/8	126/80	118/80	116/80	120/80	118/8	120/80	120/80	49
120/90	120/90	120/90	104/80	100/80	110/90	120/80	116/80	107/61	112/63	120/84	124/80	120/80	122/80	120/80	120/80	120/70	118/9	120/80	100/80	110/70	100/80	110/7	110/70	110/80	50

	MEAN ARTERIAL PRESSURE																							SNO
BASELINE	0	2	4	6	8	10	15	20	25	30	35	40	45	50	75	90	105	120	150	180	210	240	270	300	
101	79	80	81	83	74	44	77	56	97	81	78	91	88	83	93	91	97	90	90	99	93	97	94	95	1
88	76	79	78	80	77	78	56	75	67	77	83	74	78	84	94	87	92	93	95	96	95	93	93	95	2
97	97	95	92	85	80	90	87	85	92	90	97	88	89	47	63	89	92	91	93	93	95	95	95	85	3
103	103	103	101	97	103	91	90	80	81	80	79	97	95	79	79	101	103	93	92	97	101	101	99	86	4
88	76	76	77	60	77	81	82	98	92	89	76	96	85	79	85	80	73	85	97	93	94	97	101	86	5
83	88	80	93	93	93	90	87	83	82	86	84	90	97	87	87	93	90	90	91	83	86	85	92	91	6
97	83	83	83	73	74	63	80	83	83	81	86	80	87	87	83	87	95	94	95	97	97	96	97	86	7
93	93	83	93	100	95	99	93	93	100	81	73	93	90	90	102	83	93	93	95	93	93	93	93	95	8
100	63	73	83	95	93	95	96	78	80	80	67	83	100	80	90	100	100	101	101	100	100	100	100	93	9
96	97	97	100	95	93	95	90	73	78	77	79	89	87	95	95	87	92	89	90	93	93	93	93	95	10
93	75	57	64	72	75	77	97	77	67	73	80	76	78	90	93	77	87	94	93	93	93	93	93	88	11
94	90	92	89	89	87	89	87	76	77	77	83	87	87	83	73	88	87	95	91	92	93	91	91	91	12
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		RESPIRATORY RATE																						SNO
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				O2 SATURATION																				
BASELINE	**0**	**2**	**4**	**6**	**8**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**75**	**90**	**105**	**120**	**150**	**180**	**210**	**240**	**270**	**300**
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