"PROSPECTIVE STUDY OF ANALGESIC EFFICACY OF RECTUS SHEATH BLOCK IN PATIENTS UNDERGOING LAPAROTOMY FOR POSTOPERATIVE PAIN CONTROL IN COMPARISION WITH CONVENTIONAL ANALGESIC TECHNIQUES"

BY

Dr. KAVITHA GONDESI M.B.B.S

DISSERTATION SUBMITTED TO SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR, KARNATAKA.

In partial fulfillment of the requirements for the degree of

M.S. GENERAL SURGERY

UNDER THE GUIDANCE OF

Prof. DR. SHASHIREKHA C.A.
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PRIOR PERMISSION TO START OF STUDY

The Institutional Ethics Committee of Sri Devaraj Urs Medical College, Tamaka, Kolar has examined and unanimously approved the synopsis entitled **"Comparative study of analgesic Efficacy between rectus sheath catheter block and conventionalanalgesic techniqes in patients undergoing midline laparotomy for postopertive pain control"** being investigated by **Dr.Kavitha Gondesi** & Dr.Shashi Rekha.C.A in the Department of General Surgery at Sri Devaraj Urs Medical College, Tamaka, Kolar. **Permission is granted by the Ethics Committee to start the study.**

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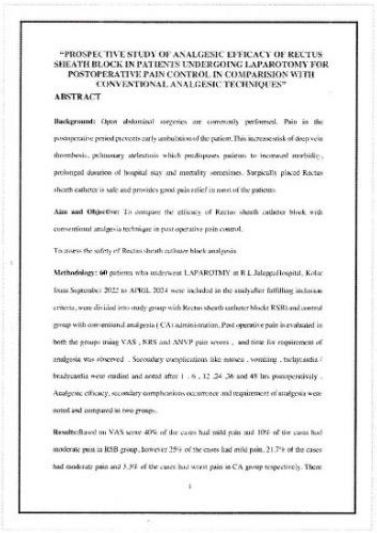

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ABSTRACT

Background: Open abdominal surgeries are commonly performed. Pain in the postoperative period prevents early ambulation of the patient.This increase risk of deep vein thrombosis, pulmonary atelectasis which predisposes patients to increased morbidity, prolonged duration of hospital stay and mortality sometimes. Surgically placed Rectus sheath catheter is safe and provides good pain relief in most of the patients.

Aim and Objective: To compare the efficacy of Rectus sheath catheter block with conventional analgesia technique in post operative pain control.

To assess the safety of Rectus sheath catheter block analgesia.

Methodology: 60 patients who underwent LAPAROTOMY at B L Jalappa Hospital, Kolar from September 2022 to APRIL 2024 were included in the study after fulfilling inclusion criteria, were divided into study group with Rectus sheath catheter blocks RSB) and control group with conventional analgesia (CA) administration. Post operative pain is evaluated in both the groups using VAS , NRS and AMVP pain scores , and time for requirement of analgesia was observed . Secondary complications like nausea , vomiting , bradycardia / bradycardia were studied and noted after 1 , 6 , 12 ,24 ,36 and 48 hrs postoperatively . Analgesic efficacy, secondary complications occurrence and requirement of analgesia were noted and compared in two groups.

Results: Based on VAS score 40% of the cases had mild pain and 10% of the cases had moderate pain in RSB group ,however 25% of the cases had mild pain, 21.7% of the cases had moderate pain and 3.3% of the cases had severe pain in CA group respectively. There

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To assess the safety of Rectus sheath catheter block analgesia Methodology: 60 patients who underwent LAPAROTMY at R.L.JalappaHospital, Kolar from September 2022 to APRIL 2024 were included in the studyafter fulfilling inclusion criteria, were divided into study group with Rectus sheath catheter block(RSB) and control group with conventional analgesia (CA) administration. Post operative pain is evaluated in both the groups using VAS , NRS and ANVP pain scores , and time for requirement of analgesia was observed . Secondary complications like nausea , vomiting , tachycardia / bradycardia were studied and noted after 1 , 6 , 12 ,24 ,36 and 48 hrs postoperatively . Analgesic efficacy, secondary complications occurrence and requirement of analgesia were noted and compared in two groups. Results:Based on VAS score 40% of the cases had mild pain and 10% of the cases had moderate pain in RSB group, however 25% of the cases had mild pain, 21.7% of the cases had moderate pain and 3.3% of the cases had worst pain in CA group respectively. There was significant association noted between RSB group and CA group for pain in our study (p value =0.035).On assessing the pain based on NRS 33.3%, 15% and 1.7% of the patients had mild, moderate and severe pain in RSB group respectively while 20%, 21.7% and 8.3% of the cases had mild, moderate and severe pain among CA group respectively. The association between RSB group and CA group cases based on VAS for pain was significant (p value =0.037).Based on ANVP scale significant difference was noted between the groups at 1st hour, 6 hours and 12 hours of postopeeative period with p values of 0.002, 0.0002 and 0.010 respectively. However, difference in ANVP score at 24 hours to 48 hours was noted as insignificant. Specific adverse events like Hypotension, Bradycardia and PONV was seen among 14.3% of the cases in RSB group each while in CA group 14.3%, 14.3% and 28.6% of the cases had Hypotension, Bradycardia and PONV respectively. No significant was association recorded between the two groups based on specific adverse events. Rescue analgesia within 24 hrs were required among 1.7% of the patients in RSB group and 20% of the cases in CA group. There was highly significant statistical association noted for rescue analgesia between the groups with CA group cases requiring more rescue analgesia (p value =0.0005).the median diclofenac consumption was 75 mg and 150 mg among RSB group and CA group respectively. The median diclofenac requirement was statistically significant between the groups (p value = <0.0001 Conclusion: Rectus sheath catheter block provides good postoperative analgesia with out any complications like tachycardia ,postoperative nausea nd vomiting and very rare requirement of rescue analgesia INTRODUCTION Pain is defined as "An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" by the International Association for the Study of Pain1. Midline incision-requiring laparotomies frequently resulted in postoperative pain, which was usually linked to the neuroendocrine stress response1,2. In addition to improving early mobilisation, postoperative analgesia lowers the risk of deep vein thrombosis and postoperative pneumonia3,4. Extreme pain following surgery was increased by 86% as a result of midline abdominal operations, which are extremely painful procedures5. For these patients, postoperative pain management is essential since severe pain is linked to atelectasis, reduced movement, and trouble sleeping6,7. Due to delayed hospital discharge, decreased patient satisfaction, postoperative mobilisation that takes longer than expected, and increased chronic postoperative pain, these factors will increase health care costs8. For patients undergoing midline abdominal procedures, analgesic treatments such as thoracic epidural analgesia (TEA), abdominal field blocks, and parenteral analgesics are currently gaining popularity9. TEA is the gold standard choice for analgesia after major abdominal surgeries, but, can not be used for all cases because of individual patient contraindications, lack of expert anesthesiologist, risk of hypotension, the need for more anaesthetic personnel, time constraints in the operating room, arisnd 6–8% technical difficulties10.Following abdominal procedures, the TAP block has become more common; nevertheless, this block does not ensure an incision that extends above the umbilicus11,12. Incisional pain is the focus of recent multimodal techniques rather than visceral pain, which is what causes abdominal field block13. Numerous surgical procedures have been reported to benefit from the use of RSBs, such as midline laparotomies, open gynaecological procedures, major open urological pelvic surgeries, and repairs of umbilical and epigastric hernias14,15. RSB is displayed in four locations. On either side of the umbilicus, there are 5 cm of caudad-5 cm lateral and 5 cm of cephalad, 5 cm

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DR. KAVITHA GONDESI

"PROSPECTIVE STUDY OF ANALGESIC EFFICACY OF RECTUS SHEATH BLOCK IN PATIENTS UNDERGOING MIDLINE LAPAROTOMY FOR POST OPERATIVE PAIN CONTROL IN COMPARISION WITH CONVENTIONAL ANALGESIC TECHNIQUES"

ABSTRACT

Background: Open abdominal surgeries are commonly performed. Pain in the postoperative period prevents early ambulation of the patient. This increases risk of deep vein thrombosis, pulmonary atelectasis which predisposes patients to increased morbidity, prolonged duration of hospital stay and mortality sometimes. Surgically placed Rectus sheath catheter is safe and provides good pain relief in most of the patients.

Aims and Objectives:

To compare the efficacy of Rectus sheath catheter block with conventional analgesia technique in post operative pain control.

To assess the safety of Rectus sheath catheter block analgesia

Methodology: 60 patients who underwent laparotomy at R.L.Jalappa Hospital, Kolar from September 2022 to June 2024 were included in the study after fulfilling inclusion criteria , patients were divided into study group with Rectus sheath catheter block(RSB) and control group with conventional analgesia (CA) administration. Post operative pain is evaluated in both the groups using VAS, NRS and ANVP pain scores, and time for requirement of analgesia was observed .secondary complications like nausea, vomiting, tachycardia / bradycardia were studied and noted after 1, 6, 12, 24,36 and 48 hours postoperatively . Analgesic efficacy, secondary complications occurrence and requirement of analgesia were noted and compared in two groups.

Results: Based on VAS score 40% of the cases had mild pain and 10% of the cases had moderate pain in RSB group, however 25% of the cases had mild pain, 21.7% of the cases had moderate pain and 3.3% of the cases had worst pain in CA group respectively. There was significant association noted between RSB group and CA group for pain in our study (p value =0.035).On assessing the pain based on NRS 33.3%, 15% and 1.7% of the patients had mild, moderate and severe pain in RSB group respectively while 20%, 21.7% and 8.3% of the cases had mild, moderate and severe pain among CA group respectively. The association between RSB group and CA group cases based on VAS for pain was significant (p value =0.037).Based on ANVP scale significant difference was noted between the groups at 1st hour, 6 hours and 12 hours of postoperative period with p values of 0.002, 0.0002 and 0.010 respectively. However, difference in ANVP score at 24 hours to 48 hours was noted as insignificant. Specific adverse events like hypotension, bradycardia and PONV were seen among 14.3% of the cases in RSB group each while in CA group 14.3%, 14.3% and 28.6% of the cases had hypotension, bradycardia and PONV respectively. No significant association was recorded between the two groups based on specific adverse events. Rescue analgesia within 24 hrs were required among 1.7% of the patients in RSB group and 20% of the cases in CA group. There was highly significant statistical association noted for rescue analgesia between the groups with CA group cases requiring more rescue analgesia (p value =0.0005). The median diclofenac consumption was 75 mg and 150 mg among RSB and CA group respectively. The median diclofenac requirement was statistically significant between the groups (p value = <0.0001)

Conclusion: Rectus sheath catheter block provides good postoperative analgesia with out any complications like tachycardia, postoperative nausea and vomiting and very rare requirement of rescue analgesia.

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ABBREVIATIONS

Abbreviation	Explanation
RSB	Rectus Sheath Block
CA	Conventional Analgesia
VAS	Visual Analogue Scale
NRS	Numeric Rating Scale
ANVP	Adult Non Verbal Pain Score
PONV	Postoperative Nausea and Vomiting
ASA	American Society of Anaesthesiologists
BMI	Body Mass Index
TEA	Thoracic Epidural Analgesia
TAPB	Transversus Abdominis Plane Block
LA	Local Anaesthesia
RS	Rectus Sheath
USG	Ultrasonography
PACU	Pediatric Anaesthesia Care Unit
GA	General Anaesthesia

EIA	Epidural Infusion Analgesia
MIL	Mid Line Incision Laparotomy
DEM	Demand of Analgesia
BPI	Brief Pain Inventory
MDA	MalonildiAldehyde
POP /POD	Post Operative Period/ Day
TID	Three times in a day
Inj.	Injection
IM	Intramuscular
IV	Intravenous

INTRODUCTION

INTRODUCTION

Pain is defined as "An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage" by the International Association for the Study of Pain[1]. Midline incision-requiring laparotomies frequently resulted in postoperative pain, which was usually linked to the neuroendocrine stress response[1,2]. In addition to improving early mobilization, postoperative analgesia lowers the risk of deep vein thrombosis and postoperative pneumonia[3,4].

Extreme pain following surgery was increased by 86% as a result of midline abdominal operations, which are extremely painful procedures[5]. For these patients, postoperative pain management is essential since severe pain is linked to atelectasis, reduced movement, and trouble sleeping[6,7].

Due to delayed hospital discharge, decreased patient satisfaction, postoperative mobilization that takes longer than expected, and increased chronic postoperative pain, these factors will increase health care costs[8].

For patients undergoing midline abdominal procedures, analgesic treatments such as thoracic epidural analgesia (TEA), abdominal field blocks, and parenteral analgesics are currently gaining popularity[9]. TEA is the gold standard choice for analgesia after major abdominal surgeries, but, cannot be used for all cases because of individual patient contraindications, lack of expert anesthesiologist, risk of hypotension, the need for more anaesthetic personnel, time constraints in the operating room, and 6–8% technical difficulties[10].Following abdominal procedures, the TAP block has become more common; nevertheless, this block does not ensure an incision that extends above the umbilicus[11,12].

Incisional pain is the focus of recent multimodal techniques rather than visceral pain, which is what causes abdominal field block[13]. Numerous surgical procedures have been reported to benefit from the use of RSBs, such as midline laparotomies, open gynaecological procedures, major open urological pelvic surgeries, and repairs of umbilical and epigastric hernias[14,15].

RSB is displayed in four locations. On either side of the umbilicus, there are 5 cm of caudad-5 cm lateral and 5 cm of cephalad, 5 cm lateral, with 0.25% of 10-15 ml at each location[16]. Yarwood et al. suggested 0.25% of 30–40 ml bupivacaine for RSB in adults as an efficient and secure dosage[17].For RSB in pediatric patients ,Johnson et al. established a dose of 0.2–0.3 ml/kg of 0.25% bupivacaine, 2–3 cm from the midline, and this was repeated on the opposite side[18]. The medication is applied at space between the posterior rectus sheath and the rectus muscles[18,19].

RSB are less likely to experience hemodynamic alterations, avoid uncomfortable epidural catheterization, and mobilize sooner[20,21]. Several studies confirmed the effectiveness of RSB when carried out using the land mark approach following laparoscopic surgery with umbilical and paraumbilical incisions[18,22]. Additionally, patients whose abdominal wall discomfort was treated with RSB reported considerable increases in their quality of life and level of pain[23,24]. However, the landmark technique—which may include injecting the local anaesthetic drug too precisely in relation to prospective spaces—can affect the block's efficacy and distribution. An ultrasound-based RSB could increase the block's assurance and security. If BMI is greater than 35 kg/m2, obesity has a significant impact on the RSB success rate[25].

After midline laparotomy, systemic analgesics and RSB are used to relieve postoperative pain. However, opioids are associated with many unfavourable effects, epidural

analgesia requires expertise, is a difficult technique, not available widely, inappropriate and cannot be used for hemodynamically unstable patients[26,27]. In light of these, a study comparing the efficacy of RSB with traditional analgesics for post-operative pain management in midline laparotomy was carried out.

OBJECTIVES

OBJECTIVES

- To compare the efficacy of Rectus sheath block with conventional analgesia in post operative pain control

- To assess the safety of Rectus sheath catheter block analgesia

REVIEW OF LITERATURE

REVIEW OF LITERATURE

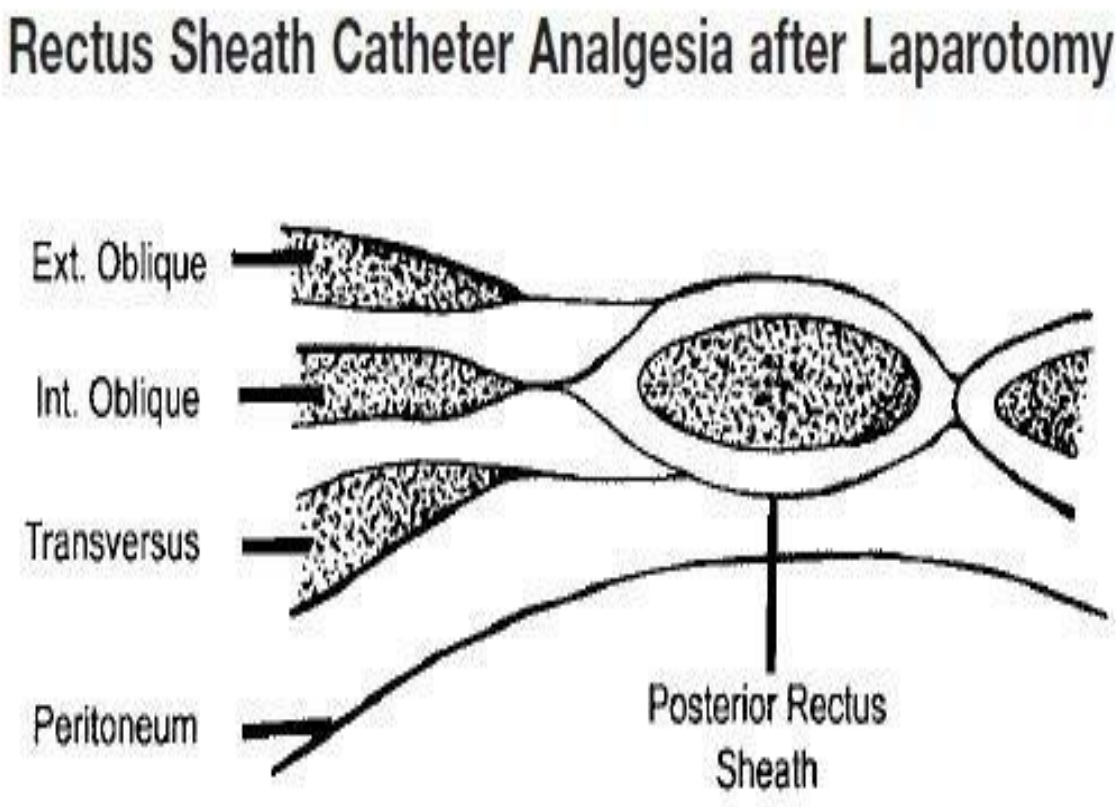
A variety of elective and urgent operations still need midline laparotomy, even with increase minimally invasive techniques for abdominal surgeries. In order to minimize the related perioperative problems, the optimal analgesia after laparotomy should make the patient comfortable both at rest and during movement. It should also facilitate early patient ambulation, allow deep breathing ability which aids in clearance of pulmonary secretions. It is best to limit analgesia-related side effects that could impede healing, such as hypotension, nausea, vomiting, ileus. The advent of and an increased importance to multimodal opioid-sparing strategies, such as abdominal trunk local anaesthetic (LA) blocks, post-laparotomy pain treatment is changing.

Abdominal trunk blocks, such as RSB and TAP blocks, can effectively relieve pain during and after laparotomy with elimination of some of the negative effects related to opioid and thoracic epidural procedures, despite the paucity of outcome data[28-30].

Anatomy

Rectus sheath and muscles

Main anatomical landmarks for Rectus sheath block are the paired rectus abdominis muscles and their respective anterior and posterior sheaths. Rectus abdominismuscles insertion is into the 5th, 6th and 7thcostal cartilages as well as xiphoid process. Origin of rectus abdominis is from the symphysis pubis and pubic tubercle[31]. Anterior aponeurosis of internal oblique muscle and aponeurosis of external oblique muscle forms the anterior sheath. The aponeuroses of transverses abdominis muscle and posterior aponeurosis of internal oblique muscle make up the posterior sheath[32].



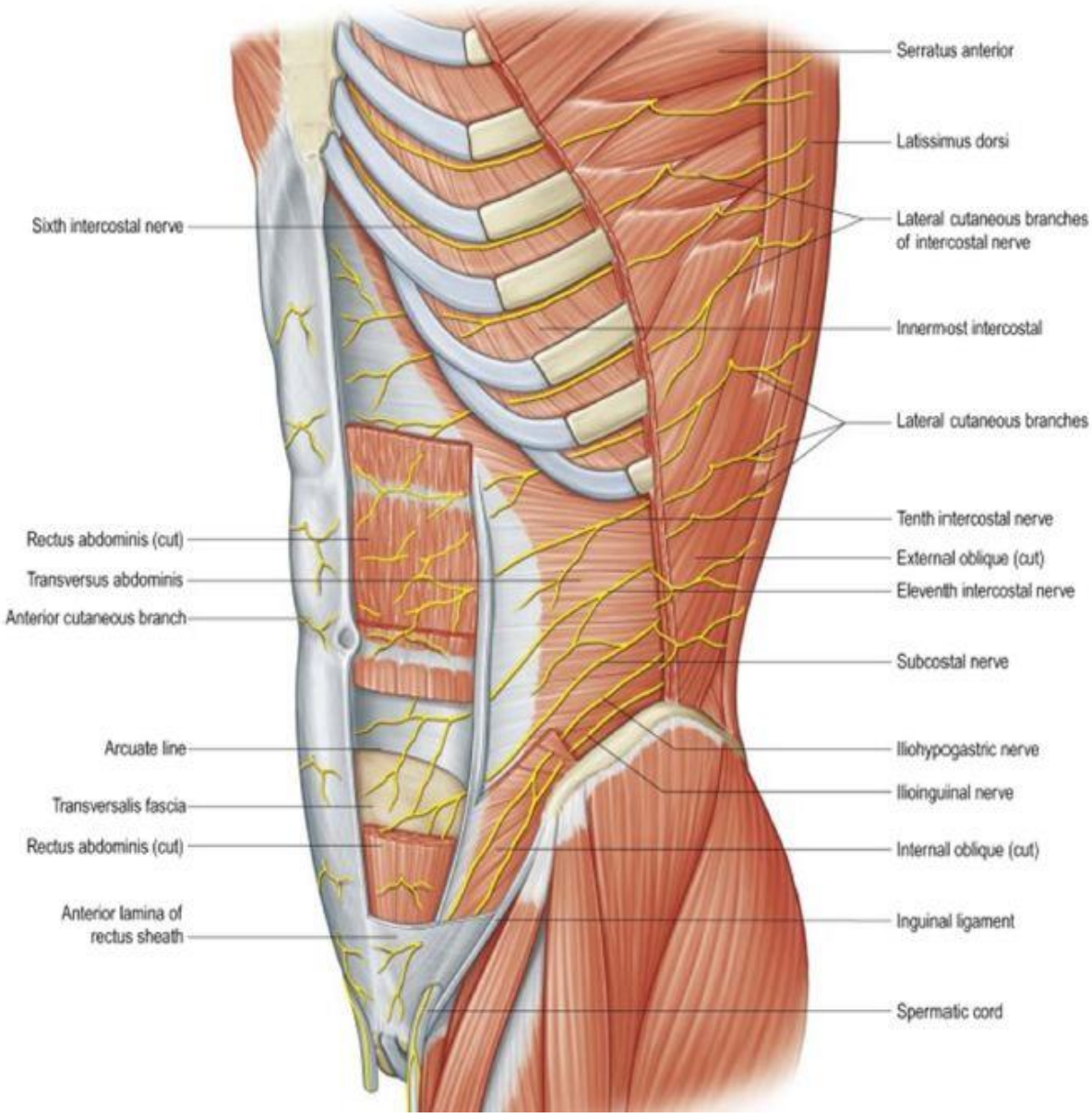
Picture 1 :Anterior Abdominal wall – Digrammatic representation

Anterior abdominal wall nerve supply and innervation

The ventral rami of T6–T12 nerves and the first lumbar nerve supply innervation to the anterior abdominal wall (Fig. 2). These segmental nerves create cutaneous branches which nourish the skin throughout the anterolateral abdominal wall as they migrate anteriorly in the neurovascular plane across the internal oblique and transverses abdominis. They also exhibit extensive interconnectivity[32].

Following their journey, the thoracic nerves pierce the rectus sheath at its lateral boundary and proceed posterior to rectus abdominis muscle. After passing through anterior rectus sheath and the rectus abdominis, the nerves terminate as cutaneous branches which innervate the anterior abdominal wall's skin from midline to mid clavicular line.

According to a study done by injecting dye in cadavers, nerves feeding the upper abdominal wall may enter the rectus abdominis close to costal border, which might not be affected by LA instilled in posterior rectus sheath[33].



Picture 2: Anterior abdominal wall innervation

Anterior abdominal wall blood supply

The rectus abdominis muscles receive blood supply from inferior and superior epigastric arteries. A branch of external iliac artery, inferior epigastric artery ascends between posterior RS and the rectus abdominis muscle, entering rectus sheath at the level of the arcuate line.

A terminal branch of internal thoracic artery, superior epigastric artery passes caudad between posterior RS and the rectus abdominis muscle before entering the upper portion of sheath from behind seventh costal cartilage.

Around the level of T10, both arteries produce large anastomoses, and their branches pass through rectus abdominis before piercing anterior rectus sheath to give blood toskin over the abdomen. On ultrasonography (US), five blood vessels located in the posterior rectus sheath are visible.

Clinical applications

Somatic discomfort is caused by cutaneous nerves that are blocked by LA located in the posterior rectus sheath. For the purpose of managing visceral pain following abdominal surgery, alternative analgesic methods are consequently necessary in contrast to epidural analgesia. RSB analgesia is primarily used in patients undergoing abdominal operation that necessitates a midline or para-median incision. For minor abdominal wall incisions (such as umbilical hernia repairs), where postoperative pain is anticipated to be transient, RSBs might not be required. At the time of surgery, these individuals might benefit from a single-injection RS block, nevertheless[34,35].

Rectus sheath block - Technique

By blocking terminal branches of intercostals nerves 9, 10, and 11, which pass between the transverses abdominis and internal oblique muscle ,then pierce the posterior wall of rectus abdominis muscle to supply the skin of the umbilical area, the technique aims to achieve its desired result.

The RSB will be inserted bilaterally at the end of surgery using Feeding tube no. 8.Rectus sheath layers are separated and the feeding tube catheter is placed between two layers of rectus sheath under vision bilaterally. The catheter is secured, silk suture will be used to secure catheter.15 ml of 0.125% bupivacaine is injected each side at desired time intervals .

It is challenging to forecast depth of rectus sheath because there is a weak link between posterior sheath depth and the patient's age, weight, or height[36]. While the needle is inserted under direct vision, non-invasive instantaneous imaging of the rectus sheath is made possible by the use of ultrasound.

Apart from the inappropriate local anaesthetic placement, anatomical variances can also lead to incomplete block. In approximately 30% population, anterior cutaneous branching of the nerves forms prior to rectus sheath and do not pierce the posterior wall of sheath[37].

Contraindications and cautions

There are just a few total contraindications to RSB procedures, such as allergy to LA and patient refusal. Impaired coagulation and sepsis are relative contraindications;

nonetheless, the risk of RSB insertion injury in individuals with these situations is probably lower than that of neuraxial methods.

Patients having a midline laparotomy for the purpose of fixing a big incisional hernia may not be good candidates for RSBs due to the possibility of severely deformed abdominal wall structure. Such patients may have reduced RS integrity, which could result in insufficient LA distribution and erratic abdominal wall analgesia.

Complications of RSB analgesia

The implantation of RSBs and the subsequent administration of LAs carry a number of possible hazards. Complication reports are uncommon, nevertheless.

Systemic toxicity of Local Anesthetics

For RS blocks, higher amounts of local anesthetic agentis typically needed, and systemic toxicity of LA is a possible side effect. Inadvertent vascular administration related to intravascular RSB placement, systemic absorption of LA appropriately implanted in posterior RS, or unintentional injection of LA into an intravenous line during future dosage can all result in toxicity. Both TAP and RS blocks can result in systemic concentrations of LA that are higher than recognized thresholds of LA systemic toxicity, according to a recent comprehensive analysis of systemic concentrations of LA following both blocks[38].

Only 1% of individuals, however, reported experiencing mild poisoning symptoms, all of which happened after TAP rather than RS blocks. Since rectus sheath is a less vascular fascial plane than transverse abdominis plane, maximal serum concentration (Cmax) is lower and the time to Cmax (Tmax) is of greater duration in RSB group compared with the TAP group. However, the authors recognised that heterogeneous nature of study and a few number of RS block studies restricted strength of these findings. Peak plasma

concentrations were dose-dependent in a study of USG guided RS blocks with 20 ml of ropivacaine at 0.25%, 0.5%, and 1% concentrations; the mean Tmax was found to be 49.6, 48.5, and 38.1 min, respectively[39].

Other complications

There have been reports of rectus sheath catheter trapping by the surgical suture applied for abdominal closure[40] and injecting chlorhexidine (instead of LA) accidentally in a single-injection RS block for the correction of divarication of the recti[41]. RSB placement may result in intestinal damage as well as the hepatic haemorrhage and peritoneal placement that are reported consequences of TAP blocks[42].

Another possible side effect of RS block caused by vascular damage sustained during the insertion of a needle or catheter is RS haemorrhage. As far as we are aware, though, no cases of RS haemorrhage linked to RSB analgesia have been reported.

Recent Literatures:

Randall M et al[43] (2011) described a patient who had a laparotomy and significant adhesionlysis who was treated with multimodal adjuncts and continuous bilateral RSB catheters after surgery. They were able to avoid using postoperative opioids and epidural analgesia by employing a unique, multimodal strategy. After a brief hospital stay, the patient was quite satisfied, complained of little discomfort, was able to walk around early, swiftly advanced her diet, and was sent home. They came to the conclusion that their study might be the first to detail an efficacious multimodal postop therapeutic regimen that excluded epidural analgesia and inpatient postop opioid use in favour of continuous bilateral RSBs after a MIL.

Hotta A et al[44] (2013) described a case of Leriche's syndrome that was managed by continuous infusion along with abdominal wall block for safe and efficient analgesia following laparotomy. A 61-year-old man with an abdominal aortic aneurysm had Y-graft replacement surgery after receiving a diagnosis of Leriche's syndrome. Numerous collateral artery networks were visible on preoperative enhanced and three-dimensional CT scans, particularly in the right abdominal wall. The left internal iliac artery had significant stenosis, and it was indicated that the right had been totally occluded. They identified collateral arteries on preoperative CT scans and in an ultrasound image following the induction of general anaesthesia. To avoid hurting them, they reduced the pulse repetition rate more than usual. Rop00ivacaine was injected both as an RSB and as a TAP block . After the incision was closed, 18-gauge Tuohy needle was positioned above the fascia at supraumbilical location to insert a catheter. Following the procedure, the catheter was used to continuously infuse ropivacaine. After surgery, they may give the patient a reliable analgesic.

Amir M S et al[45] (2013) shown that a safe and effective method for achieving acceptable quality postop analgesia in patients undergoing extended midline abdominal incision for BRSB was to add morphine to local bupivacaine.

Ghada MNB et al[46] (2014) compared to general anaesthesia alone, investigated the effectiveness of a preventive single-injection RSB in delivering improved early postoperative pain scores. In all five of the PACU's time points, the RSB group's median VAS score was substantially lower than the GA group's. Additionally, RSB group patients used less PACU morphine than GA group patients. Moreover, fewer morphine was used in the first two days following surgery. They asserted that learning USG-RSB is a simple process. When combined with general anaesthesia, this method will reduce pain scores and opioid use more effectively than when used alone.

Edward T et al[47] (2015) compared the average pain scores, time to mobilization, and duration of stay between RBS and epidural infusion analgesia (EIA). They said that 95 patients in all had been located. Records included indications for surgery, the operation, and any problems. Patients with RSBs had a considerably shorter wait time for mobilization than patients with EIAs. The duration of stay or the postoperative pain scores did not change. They came to the conclusion that RSBs avoid the known possible problems of EIA and offer analgesia comparable to that of EIA. Since they are linked to a faster mobilization time, their application ought to be expanded.

Alaa ED et al[48] (2016) examined how RSB affected individuals with mesenteric vascular occlusion's postoperative analgesia. They found that, on comparision with control group, patients of RB group used statistically significant less opioids during surgery or thereafter. At 2, 4, and 6 hours post-stroke, the RB group's mean pain scores were significantly lower than those of control group. On comparision with control group, the RB Group experienced a statistically significant decrease in sedation score as well as a frequency of nausea and vomiting. RB Group had higher patient satisfaction. On comparision with general anaesthesia alone, they found that USG-RSB led to a reduction in postoperative pain scores and narcotic intake. Additionally, RSB was linked to reduced nausea and vomiting along with increased patient satisfaction.

Hany MY et al[49] (2017) examined the safety and effectiveness of rectus sheath analgesia (RSA) and thoracic epidural analgesia (TEA). According to their findings, analgesia was needed by 54.8% of the patients in TEA group, 86.2% of patients in the RSA group. The TEA group consumed 33 mg (median) of cumulative morphine within the first 72 hours postoperatively, while the RSB group consumed 51 mg. In the TEA group, the first morphine request took 256 minutes, while in the RSA group, it took 208.82 minutes. At

every assessment point, the two groups' VASs for cough and rest were similar. Compared to TEA group, RSA group's time to patient ambulation was noticeably less. Only at 12 and 24 hours post surgically did the RSA group's sedation scores considerably outperform those of the TEA group. Both groups' rates of additional morphine-related adverse effects, flatus passage duration, and patient satisfaction ratings were similar. They stated that whereas intermittent RSA with catheters implanted under USG had equivalent safety views and early ambulation, continuous TEA is associated with much greater opioid sparing in the first 72 hours of postoperative period. When TEA is not an option for patients having laparotomies with a prolonged midline incision, RSA may be a useful substitute, particularly in the aftermath of the first postop day.

Rahiri J et al[50] (2017) sought to improve knowledge about systemic absorption of LA vand potential hazards of systemic toxicity by synthesising research assessing systemic LA concentrations following TAP and RSB in perioperative period. Fifteen studies were found to have satisfied the inclusion criteria. In every study, rapid systemic LA absorption was noted. Mean peak level concentration of LA surpassed hazardous levels in 33 out of 381 participants; three of these patients experienced mild ill effects. The systemic absorption of LA was decreased by the addition of epinephrine. There were no reports of seizures or irregular heartbeats. They came to the conclusion that systemic LA concentration in TAPB and RSB can be detectable and beyond established limits of systemic toxicity in LA. They claimed that in terms of systemic toxicity caused by LA, these approaches are comparatively safe.

Esma K et al[51] (2018) sought to look into the effectiveness of the USG-RSB approach in the past. They found that patients with RSB had decreased postop VAS values, DEM values, and total morphine use. Additionally, nausea and vomiting were less common

in RSB patients. Thirty individuals without RSB and eight patients with RSB experienced constipation in the first twenty-four hours following surgery. They asserted that USG-RSB is a useful technique for managing pain following surgery.

Martin P et al[52] (2018) examined the safety and analgesic effectiveness of three distinct RSB techniques for managing pain following surgery. They reported that repeated-dosing and continuous drug infusion groups consumed less oxycodone in first 12 hours, and also the repeated-doses group consumed less oxycodone in numerical values up to 48 hours. The levels of oxycodone in plasma were comparable across all four groups. When coughing during the first four hours, at rest on first postop morning, and at 24 hours, the pain scores were lower compared with the repeated-doses group. Levobupivacaine at all plasma concentrations was safe. In comparison to the control group, the patients in repeated doses group reported higher levels of satisfaction. There were no unanticipated or significant negative events noted. They came to the conclusion that repeated-dose RSB analgesia appears to be effective in sparing opioids and may improve pain management and patient satisfaction following MIL.

Viivi K et al[53] (2019) investigated the possibility that RSB analgesia could improve patients' satisfaction after MIL in both cancer and benign illness patients. According to their findings, RSB analgesia considerably raised the research groups' SFS24 scores. individuals with cancer had considerably lower median plasma NT levels after surgery than individuals with benign diseases. They asserted that after MIL, RSB analgesia could greatly improve patient satisfaction. There is a substantial correlation between patient satisfaction after surgery and plasma NT concentrations in both cancer and benign diseases.

Viivi K et al[54] (2019) conducted a study with the idea that, after MIL, RSB may improve patient satisfaction and reduce discomfort. They claimed that the repeated

dosage group had a larger rise in Brief Pain Inventory (BPI) severity score, lower interference score value, and a significant time effect in a linear mixed model for the BPI interference score.

Vishal U et al[55] (2019) intended to study the anatomy pertinent to TAP block and RSB ultrasound procedures. They talked about how effective they were as a single dose injectionfor analgesia compared with an ongoing infusion technique through catheters for a range of surgical operations. They observed that RSB had opioid-sparing effects for laparoscopic, laparotomy, and umbilical surgical procedures, also that it offers better analgesia than local infiltration. A high-quality study contrasting RSB and epidural analgesia does not yet exist. For extended pain relief, intermittent drug bolus administered via catheter provide more beneficial than continuous LA infusion. Similar to this, in cases where long-acting opioids via neuraxial technique are not utilized or are contraindicated, USG-guided TAP block offers good analgesia postoperatively for laparotomy, laparoscopy, and caesarean section. Adjuvants like dexamethasone and dexmedetomidine are added to local anaesthetics to increase their efficacy and prolong duration of TAP block and RSB. They asserted that TAP block and RSB are highly dependable when ultrasonography guiding is used. For less involved surgical procedures, single shot infiltration is helpful, and where thoracic epidural analgesia is not appropriate, catheters are a helpful substitute.

Debas Y M et al[56] (2020) examined the claim that, following emergency midline laparotomy, RSB lowers pain scores, lowers overall analgesic drug intake, and delays time until first analgesic request is made. At rest and during movement, the RSB group's VAS was considerably lower at 1, 2, 4, 6 and 8 hours, but not at the 10, 12, or 24 hour points. In comparison to the control group, RSB group's patients required less tramadol during the course of a day. The RSB group's 24-hour diclofenac intake was noticeably less than that of

the control group. The RSB group had considerably long mean time to first request for analgesic drug than the control group. They came to the conclusion that the RSB group experienced lower pain scores, used fewer analgesics overall, and took longer to request their first dose. As a result, they suggested using RSB in conjunction with multimodal analgesia following emergency midline laparotomy.

Mengesha DA et al[57] (2020) evaluated the dual RSB's analgesic efficacy following MIL using a numerical rating scale and the landmark technique. They observed that the groups differed statistically significantly in terms of postoperative pain score as determined by a numerical rating scale during the initial eight hours and total analgesic usage throughout the next twenty-four hours. They observed statistically significant difference in first, second, fourth, sixth, and eighth postoperative hour NRS between RSB and control groups. For the RSB group and control group, median 24 hour post-prandial tramadol requirement was 175 mg and 256 mg, respectively. They stated that a good postoperative analgesic for MIL is to do bilateral RSB with 0.25% bupivacaine at the conclusion of the procedure. They suggested using bilateral RSB for patients undergoing midline abdominal incisions based on these.

Arti K et al[58] (2020) investigated RSB's effectiveness in treating acute postoperative pain after MIL. They claimed that isobaric ropivacaine or bupivacaine used in bilateral single shot RSB is a safe and efficient way to give postoperative analgesia to patients having midline abdominal operations. When compared to bupivacaine, ropivacaine is a great option for the RSB due to its lower cardiac toxicity profile and excellent persistent postoperative analgesia.

Maiju R et al[59] (2020) evaluated patients satisfaction, pain scores while rest state and pressure on wound in patients of laparotomy with RSB technique for analgesia, and

MDA (malonildialdehyde) against CAT (catalase)/NT (nitrotyrosine) plasma concentrations. They claimed that using RSB analgesia improved patient contentment. After surgery, plasma MDA (POP1) fell, and observed statistically significant postop decrease in the MDA marker between the preop and POP1 readings. Additionally, there was a substantial temporal effect on the plasma NT biomarker for both the single group and the benign group. Individuals with cancer had considerably lower median plasma levels of MDA after surgery than individuals with benign diseases. They came to the conclusion that all patients' plasma MDA dramatically dropped following surgery, and that patients with cancer had significantly lower levels of MDA than patients with benign diseases.

Nandita G et al[60] (2020) examined the impact of continuous thoracic epidural infusion (TEA) and bilateral continuous RSB on postop analgesia in patients undergoing MIL. They reported that they didn't observe any statistically significant difference in opioid intake over first 2 post-operative days between the two groups. With the exception of POD 0 and POD 2, when the CRSB Group showed lower pain scores, the groups' pain scores were constant throughout. They came to the conclusion that CRSB provides a dependable, secure, and efficient substitute for TEA as part of multimodal pain relief approach.

Diriba T et al[61] (2021) carried out a study to evaluate the level of pain among MIL cases in the RSB and regular analgesics groups. They stated that an RSB group's numerical rating scale score during recovery was much lower. Among the RSB group, postoperative NRS at the third, sixth, twelve, and twenty-four hours time point were found to be statistically substantially lower. Patients receiving RSB consumed considerably less tramadol in the 24 hours following surgery. They suggested that a bilateral RSB added at the conclusion of the procedure could be a useful postoperative analgesic for MIL.

Akshay L et al[62] (2022) compared the USG-RSB bilateral RSB with LA infiltration's analgesic effectiveness. When RSB was used throughout the postop period, VAS scores were considerably lower than those of LA. At one hour, four hours, eight hours, and twelve hours of rest, as well as at one hour, four hours, and eight hours during coughing, there were significant variations in the VAS scores. With RSB, median morphine intake was lower. In patients receiving RSB, time required for first administer rescue analgesia was extended. In patients receiving RSB, the frequency of PONV also reduced. When compared to LA infiltration, they asserted that bilateral USG-RSB offers patients having emergency laparotomy procedures prolonged postop analgesia at rest and cough. With RSB, there was a notable decrease in the amount of morphine used, a higher frequency of PONV, and a longer duration until the first rescue analgesia.

Shamsul K H et al[63] (2023) examined the safety and analgesic effectiveness of ketamine used in conjunction with bupivacaine as an adjuvant for major abdominal or gynaecological surgery that involved a midline incision in USG-RSB patients. They found that, on comparision with control group, the ketamine group's mean NRS pain scores on mobility were consistently considerably low. On comparison to control group, the ketamine group's total 24-hour postoperative morphine use was considerably lower. In both groups, no negative effects of psychomimetic were noted. They came to the conclusion that by lowering postop pain scores on movement for individuals who had MIL, ketamine addition to bupivacaine in RSB produced efficient postoperative analgesia. Without causing any severe adverse effects, this combination also decreased the amount of morphine needed after surgery.

Mayuko N et al[64] (2023) examined the best time to provide RSB to patients having laparoscopic surgery. They found that the pre-RSB group of patients having

laparoscopic surgery tended to respond more slowly to the initial request for analgesics. Compared to patients in the post-RSB group, individuals in pre-RSB group had a decreased chance of receiving an analgesic drug within period of 24 hours. Therefore, it could be better to carry out RSB prior to surgery.

MostafaM et al[65] (2023) evaluated the safety and efficacy of bilateral USG-RSB in paediatric patients having elective midline abdominal surgery. They observed that both groups' hemodynamic and demographic characteristics were comparable. When comparing the RBS group (Group R) to the traditional analgesic group (Group C), the total intraop fentanyl need was considerably reduced among Group R. On comparisionwithgroup C, group RBS showed noticeably low pain ratings for up to 24 hours after the procedure. In comparison to group C, group R's mean time to get first postop analgesia for rescue was noticeably longer. Compared to group C, group R required a much less rescue analgesic dosages. They asserted that in paediatric patients undergoing planned midline abdominal surgeries, bilateral RSB performed under ultrasound guidance results in more stable hemodynamics as well as successful intraop and postop analgesia.

MATERIALS & METHODS

MATERIALS AND METHODS

Study Design:

This prospective observational study was performed to compare the efficacy of Rectus sheath catheter block with conventional analgesia in post op pain control among cases undergoing midline laparotomy.

Study Area:

Department of General Surgery in RL Jalappa Hospital and Research Centre, Tamaka, Kolar attached to Sri Devraj URS Medical College.

Study population:

Patients underwent midline laparotomy

Study period:

September 2022 to June 2024

Inclusion criteria:

Patients

- Posted for midline laparotomy
- ASA 1 and 2 physical status
- Both genders
- Age >18 yrs

Exclusion criteria:

Patients with

- Patient refusal
- Known hypersensitivity to local anesthetics
- Severe systemic illness
- Coagulation abnormalities
- Local skin infection at site of needle entry

Sample size:

A total of sixty cases those who underwent midline laparotomy during the study period were included in the study with thirty cases in rectus sheath block group (Group RSB) and the rest thirty cases in the conventional analgesic group (Group CA).

Ethical committee approval:

Institutional Human Ethics committee approved the study and sanctioned approval for conducting this study .

Data Collection:

Written and informed consent was obtained from study participants prior to the interview. After taking the written informed consent, participants were assessed for demographic and clinical presentation by the principal investigator using a pre structured proforma.

Following which the principal investigator assessed the detailed medical history of the participants and clinical examination of the patients was done. Based on computer generated random numbers the participants were subjected to either RSB group or CA group.

Data analysis

Data was entered into excel sheet and analyzed using the Statistical Package for Social Sciences (SPSS) - Version 19. Descriptive statistics with mean, standard deviation and proportions (%) were calculated for quantitative variables. To test the hypothesis Chi Square test, and Independent sample t test were used. pvalueof<0.05 was considered as statistically significant.

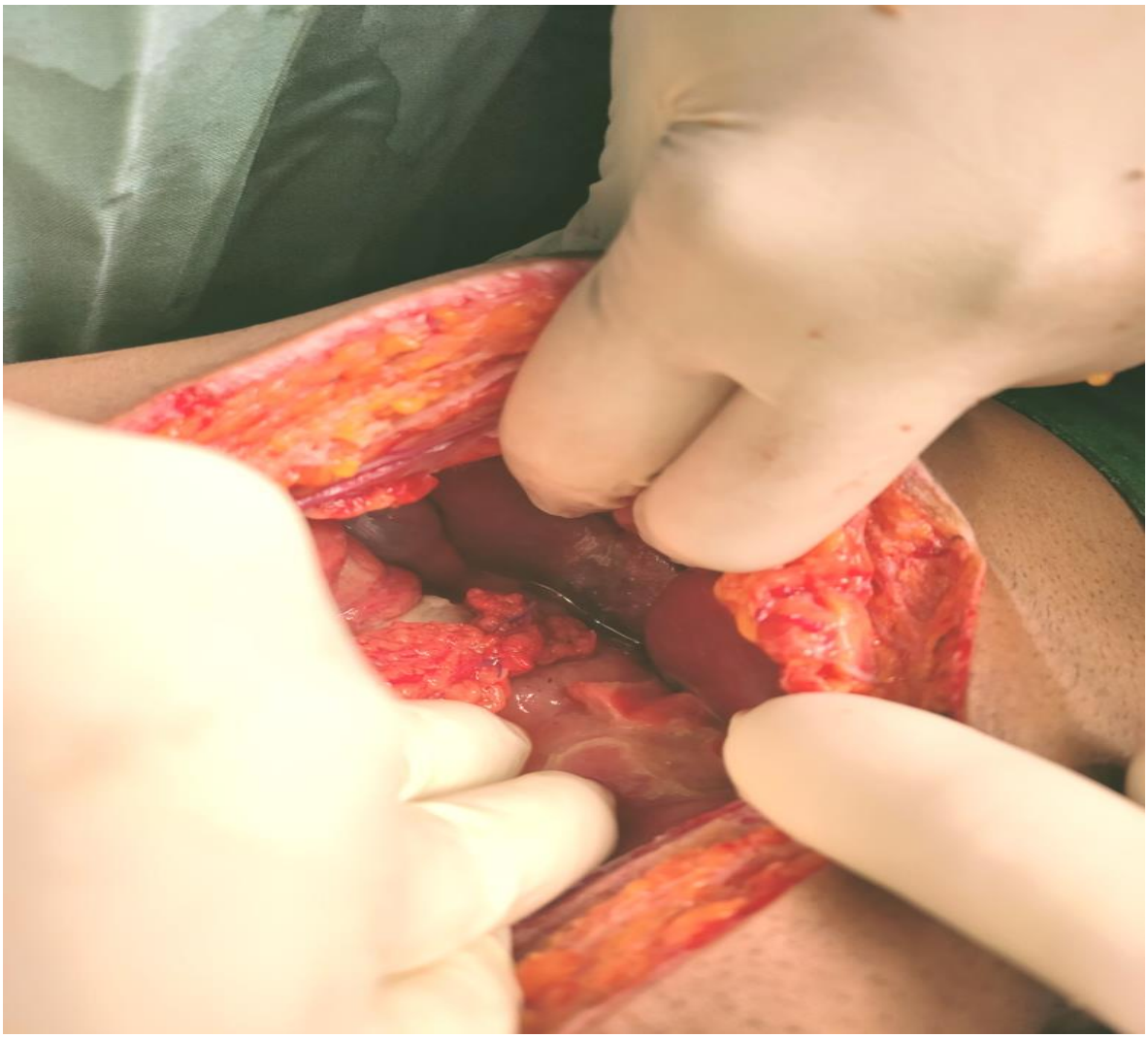
RSB GROUP(Rectus Sheath Catheter Block)

The RSB will be inserted bilaterally at the end of surgery using Feeding tube 8. Rectus sheath layers are separated and the feeding tube catheter is placed between two layers of rectus sheath under vision bilaterally. The catheter is secured, silk suture will be used to secure catheter. Once secured, catheter will be flushed with normal salineto prevent occlusionduring closure of abdomen. 15 ml of 0.125% bupivacaine will be injected into rectus sheath catheters on bothsides .

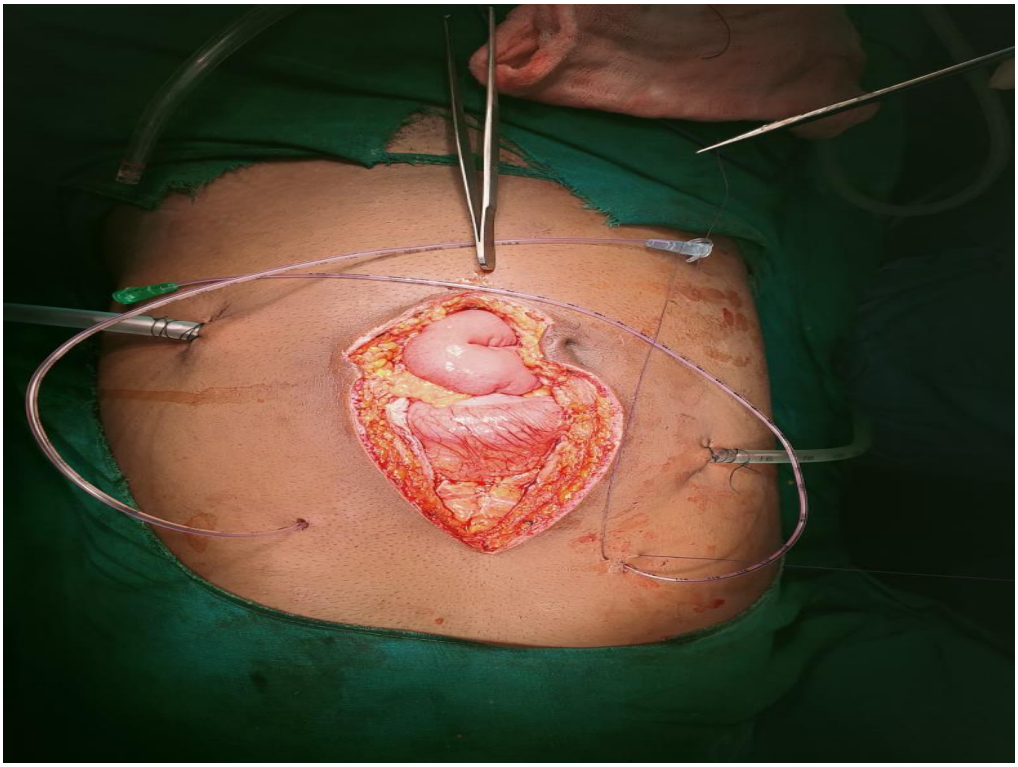
CA GROUP(CONVENTIONAL ANALGESIA)

Patients without Rectus sheath catheters are given INJ. Tramadol by INTRAVENOUS/ INTRAMUSCULAR route in a TID dosing.

Breakthrough pain in both groups will be treated by INJ. Diclofenac IM and inj. Paracetamol iv



Picture 3 : Catheter placed in between two layers of rectus sheath



Picture 4 : Catheters secured before closure of abdominal wall

RESULTS

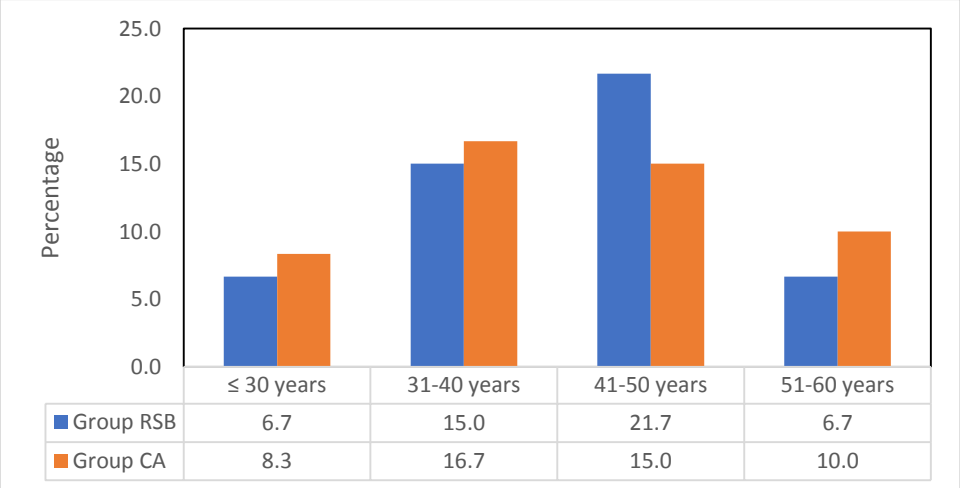
RESULTS

In this study among RSB group 6.7% of the participants found to be below 30 years age, 15% of the participants were between 31-40 years age while 21.7% and 6.7% of the cases were found to be between 41-50 years and 51-60 years age group respectively. In CA group 15% of the participants were below 30 years age, 16.7% of the cases belonged to age group 31-40 years while 15% and 10% of the cases belonged to the age range of 41-50 years and 51-60 years respectively. No significant association was recorded between RSB group and CA group patients for age.

Table 1: Distribution of participants based on Age

Age group (years)	Group RSB	Group CA	Total	p value
≤ 30	4 (6.7)	5 (8.3)	9 (15)	0.731
31-40	9 (15)	10 (16.7)	19 (31.7)	
41-50	13 (21.7)	9 (15)	22 (36.7)	
51-60	4 (6.7)	6 (10)	10 (16.7)	
Total	30 (50)	30 (50)	60 (100)	

Figure 1: Distribution of participants based on Age

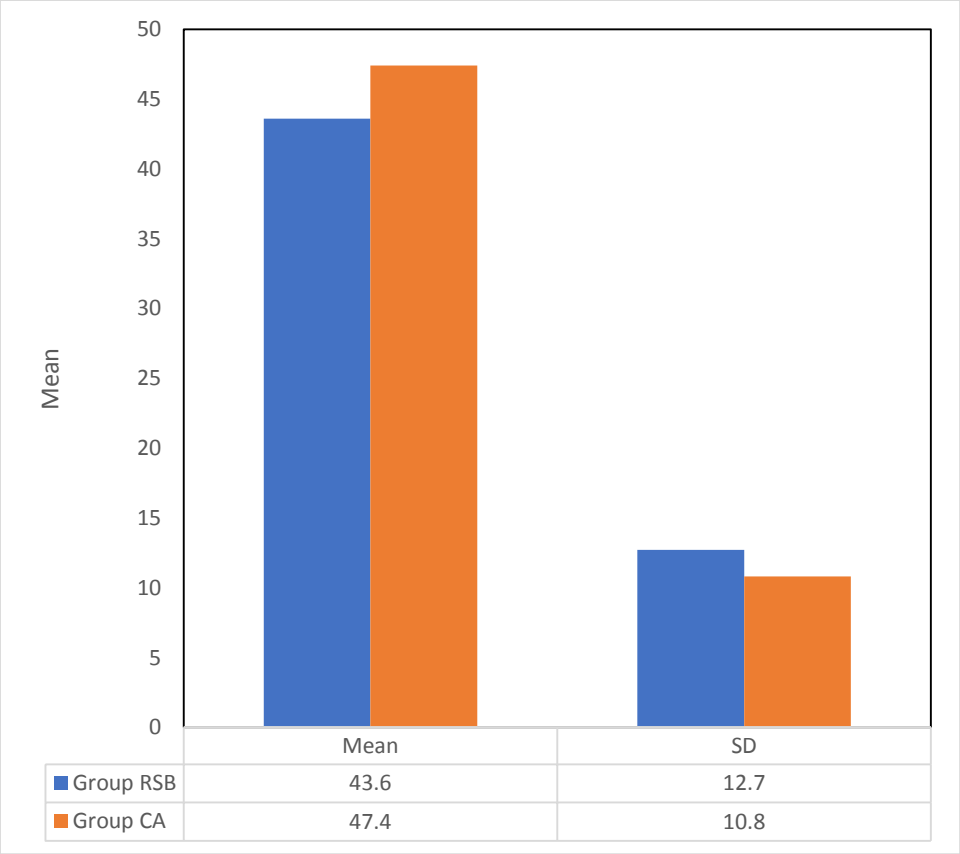


The mean age among RSB group cases was 43.6±12.7 years while in CA group cases was 47.4±10.8 years. Difference in the mean age between two groups was insignificant statistically (p value =0.216).

Table 2: Mean age vs RSB group and CA group

Parameter	Group RSB	Group CA	p value
Mean age (in years)	43.6±12.7	47.4±10.8	0.216

Figure2: Mean age vs RSB group and CA group

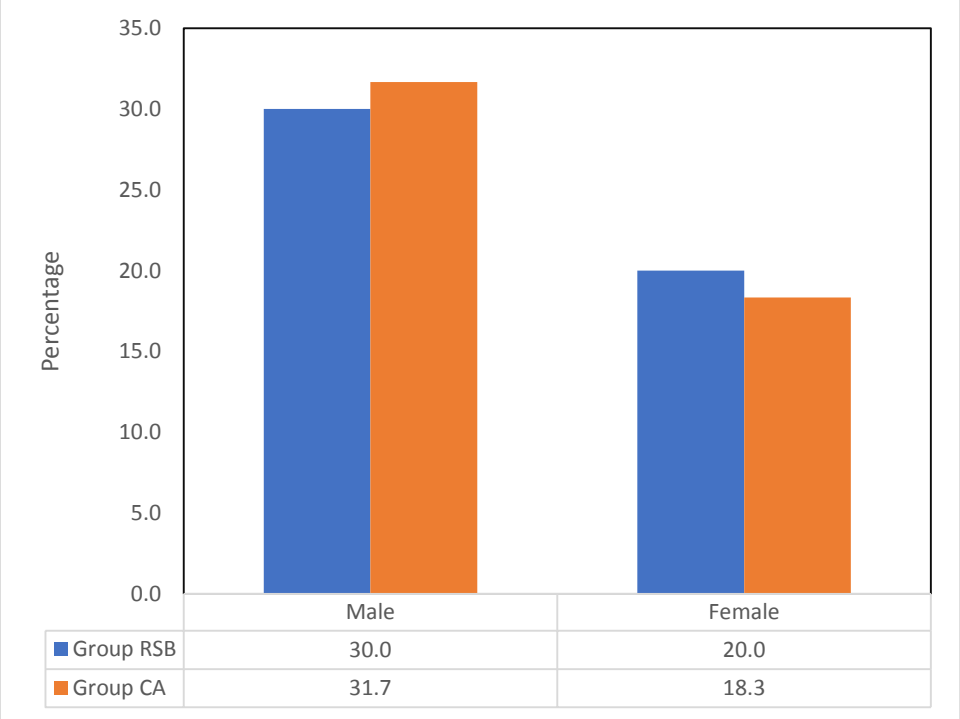


Male patients were 30% and 31.7% in RSB and CA group respectively while female patients were found to be 20% and 18.3% among the RSB and CA group respectively. The association between RSB and CA group patients was noted to be insignificant (p value =0.790).

Table 3: Gender vs RSB group and CA group

Gender	Group RSB	Group CA	Total	p value
Male	18 (30)	19 (31.7)	37 (61.7)	0.790
Female	12 (20)	11 (18.3)	23 (38.3)	
Total	30 (50)	30 (50)	60 (100)	

Figure3: Gender vs RSB group and CA group

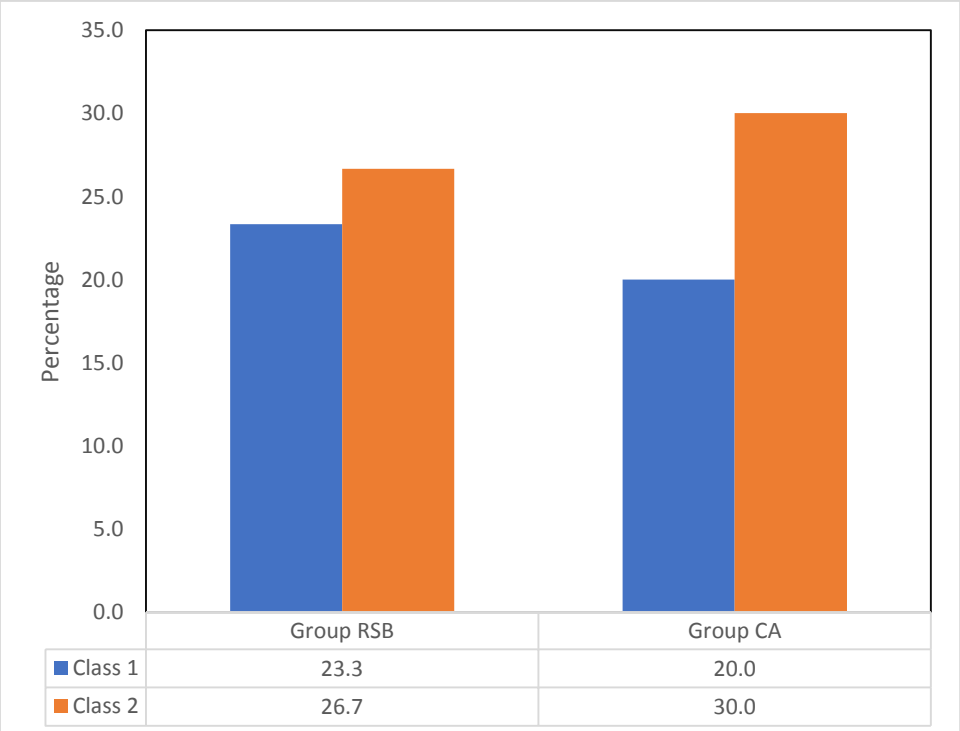


Based on ASA classification 23.3% and 26.7% of the cases belonged to class 1 and class2 in RSB group respectively while in CA group 20% and 30% of the cases belonged to ASA class 1 and 2 respectively. No statistical association noted for ASA classification between RSB and CA group in our study (p value =0.602).

Table 4: ASA classification vs RSB group and CA group participants

ASA class	Group RSB	Group CA	Total	p value
Class 1	14 (23.3)	12 (20)	26 (43.3)	0.602
Class 2	16 (26.7)	18 (30)	34 (56.7)	
Total	30 (50)	30 (50)	60 (100)	

Figure4: ASA classification vs RSB group and CA group participants

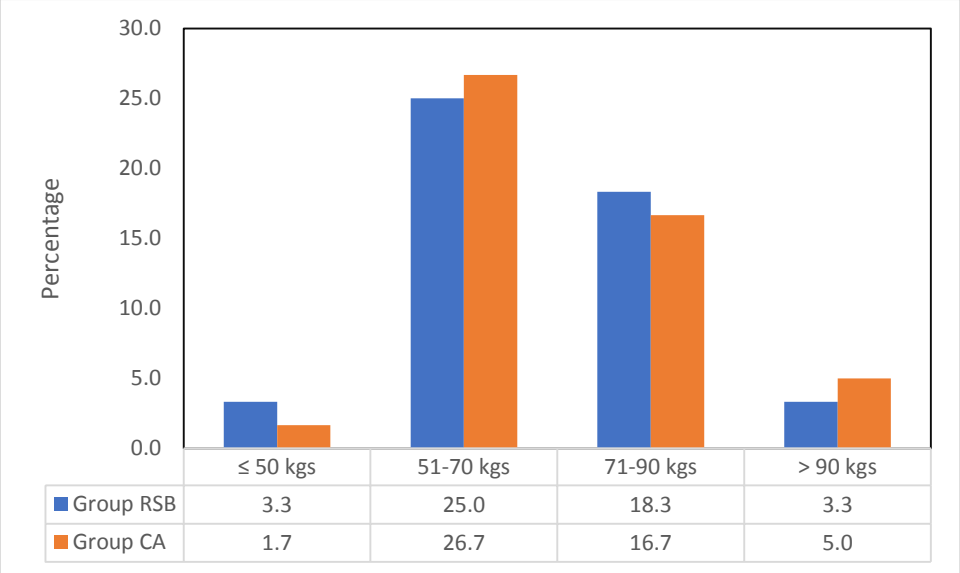


On assessing the body weight of the patients 3.3%, 25%, 18.3% and 3.3% of the patients weighed ≤ 50 kg, 51-70 kg, 71-90 kg and > 90 kg in RSB group respectively whereas among CA group 1.7%, 26.7%, 16.7% and 5% of the patients were in the weight range of ≤ 50 kg, 51-70 kg, 71-90 kg and>90 kg respectively. No significant association was found for weight between the two groups (p value =0.893).

Table 5: Proportion of participants based on weight in RSB and CA group

Weight	Group RSB	Group CA	Total	p value
≤ 50 kgs	2 (3.3)	1 (1.7)	3 (5)	0.893
51-70 kgs	15 (25)	16 (26.7)	31 (51.7)	
71-90 kgs	11 (18.3)	10 (16.7)	21 (35)	
> 90 kgs	2 (3.3)	3 (5)	5 (8.3)	
Total	30 (50)	30 (50)	60 (100)	

Figure5: Proportion of participants based on weight in RSB and CA group

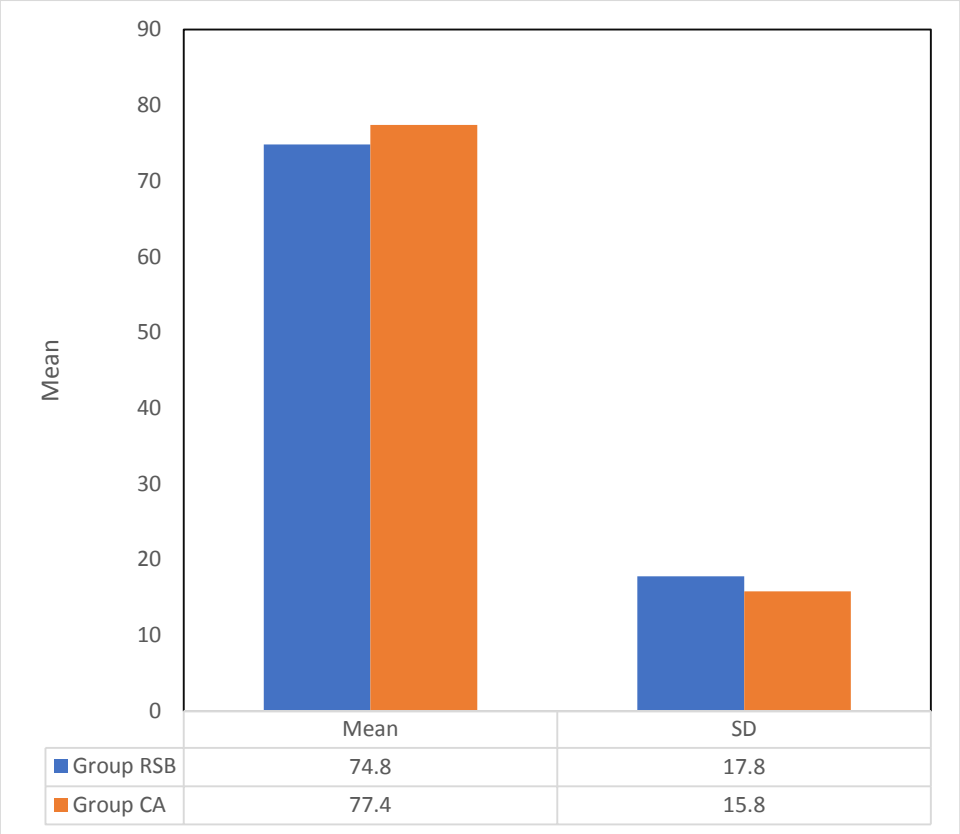


Mean weight of patients in RSB group was 74.8±17.8 kgs and in CA group was 77.4±15.8 kgs with no difference in mean weight between two groups (p value =0.551).

Table 6: Mean weight of study participants

Parameter	Group RSB	Group CA	p value
Mean weight (in kgs)	74.8±17.8	77.4±15.8	0.551

Figure6: Mean weight of the study participants

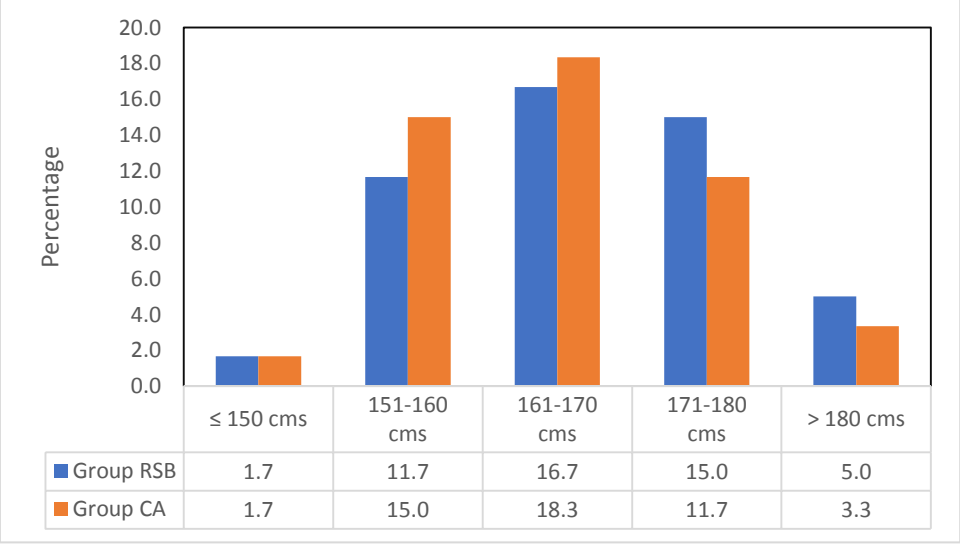


On assessing the height of the study subjects 1.7% of the cases were below 150 cms, 11.7% of the cases were between 151-160 cms,16.7% of the cases were in 161-170 cms while 15% of the cases were between 171-180 cms and 5% of the cases were above 180 cms while 1.7%, 15%, 18.3%, 11.7% and 3.3% of the cases were in the height range of ≤ 150 cms, 151-160 cms, 161-170 cms, 171-180 cms and > 180 cms respectively. The p value was noted to be insignificant which shows there was no association for height between both the groups.

Table 7: Height vs RSB group and CA group

Height	Group RSB	Group CA	Total	p value
≤ 150 cms	1 (1.7)	1 (1.7)	2 (3.3)	0.945
151-160 cms	7 (11.7)	9 (15)	16 (26.7)	
161-170 cms	10 (16.7)	11 (18.3)	21 (35)	
171-180 cms	9 (15)	7 (11.7)	16 (26.7)	
> 180 cms	3 (5)	2 (3.3)	5 (8.3)	
Total	30 (50)	30 (50)	60 (100)	

Figure7: Height vs RSB group and CA group

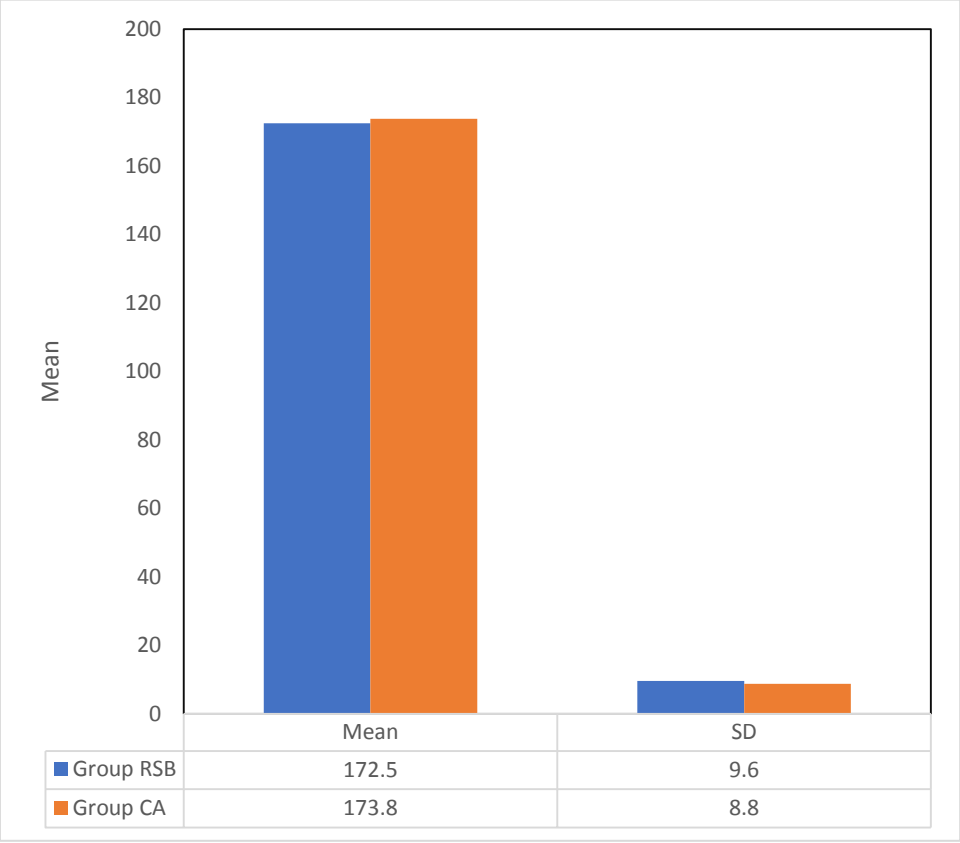


The mean height of RSB group cases was 172.5±9.6 cms whereas the mean height of CA group cases was 173.8±8.8 cms, with no statistical difference between both the groups (p value =0.586).

Table 8: Mean height among study participants

Parameter	Group RSB	Group CA	p value
Mean height (in cms)	172.5±9.6	173.8±8.8	0.586

Figure8: Mean height among the study participants

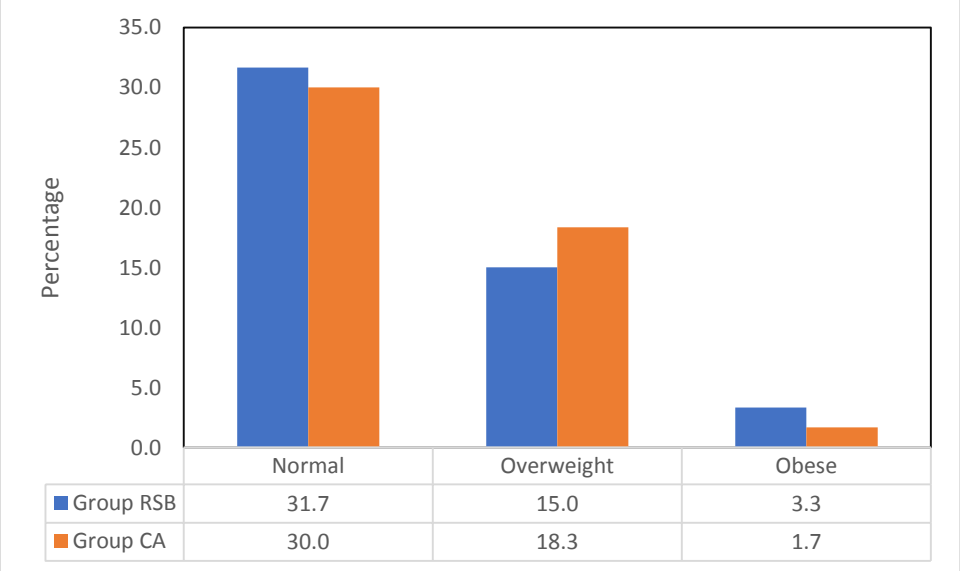


Regarding BMI 31.7%, 15% and 3.3% of the participants were found to have normal BMI, overweight and obese respectively while 30%, 18.3% and 1.7% of the participants were found to have normal BMI, overweight and obese respectively. Association between RSB group and CA group based on BMI was insignificant in this present study (p value =0.755).

Table 9: BMI vs RSB group and CA group participants

BMI	Group RSB	Group CA	Total	p value
Normal	19 (31.7)	18 (30)	37 (61.7)	0.755
Overweight	9 (15)	11 (18.3)	20 (33.3)	
Obese	2 (3.3)	1 (1.7)	3 (5)	
Total	30 (50)	30 (50)	60 (100)	

Figure9: BMI vs RSB group and CA group participants

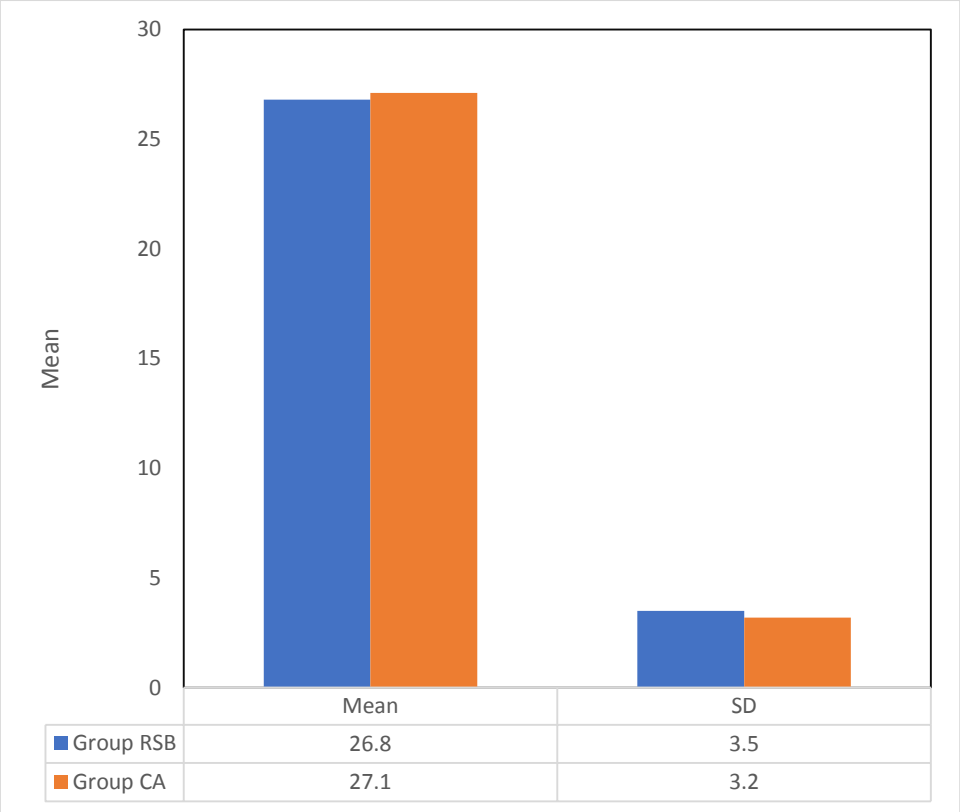


The mean BMI among RSB group was 26.8±3.5 and in CA group was 27.1±3.2. The difference in mean BMI was insignificant with p value of 0.730.

Table 10: Proportion of cases based on mean BMI

Parameter	Group RSB	Group CA	p value
Mean BMI	26.8±3.5	27.1±3.2	0.730

Figure10: Proportion of cases based on mean BMI

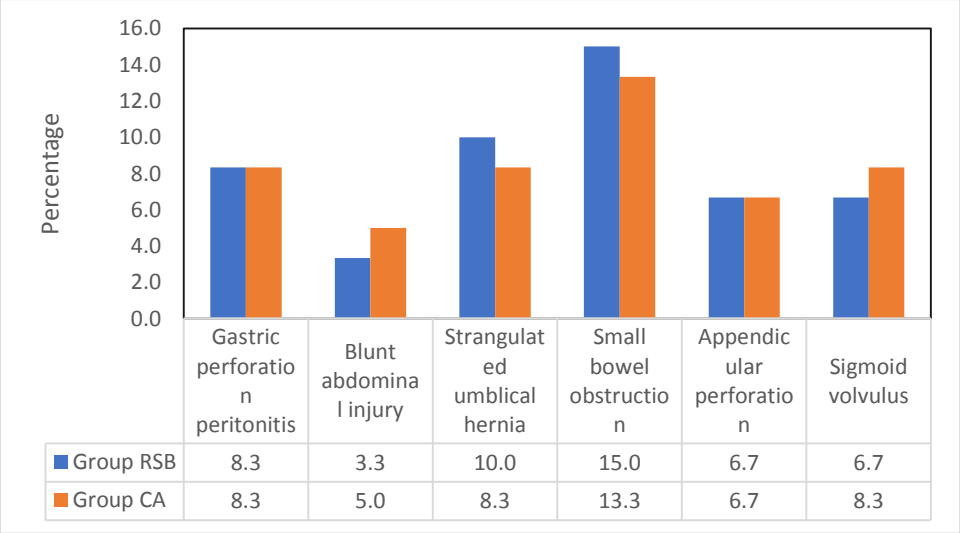


Gastric perforation peritonitis, blunt abdominal injury, strangulated umbilical hernia, small bowel obstruction, appendicular perforation and sigmoid volvulus was diagnosed among 8.3%, 3.3%, 10% 15% and 6.7% of the participants in RSB group and 8.3%, 5%, 8.3%, 13.3% and 6.7% of the participants respectively. The association between the groups based po diagnosis was insignificant.

Table 11: Proportion of cases based on diagnosis

Diagnosis	Group RSB	Group CA	Total	p value
Gastric perforation peritonitis	5 (8.3)	5 (8.3)	10 (16.7)	0.993
Blunt abdominal injury	2 (3.3)	3 (5)	5 (8.3)	
Strangulated umbilical hernia	6 (10)	5 (8.3)	11 (18.3)	
Small bowel obstruction	9 (15)	8 (13.3)	17 (28.3)	
Appendicular perforation	4 (6.7)	4 (6.7)	8 (13.3)	
Sigmoid volvulus	4 (6.7)	5 (8.3)	9 (15)	
Total	30 (50)	30 (50)	60 (100)	

Figure11: Proportion of cases based on diagnosis

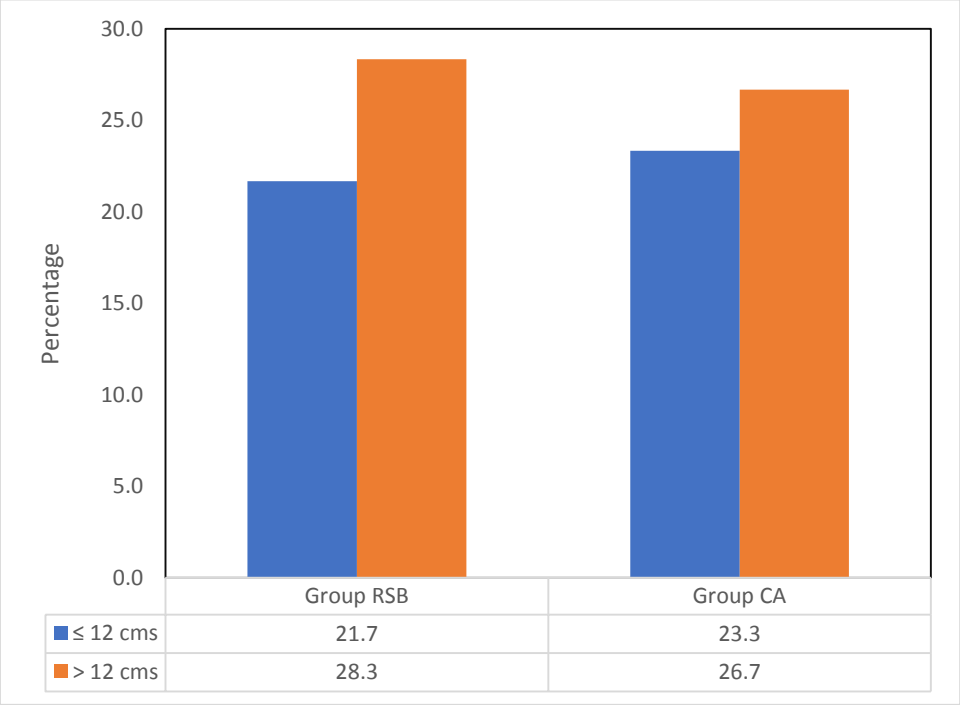


The length of laparoscopic incision among RSB group patients was ≤ 12 cms among 21.7% of the cases and >12 cms among 28.3% of the cases while in CA group 23.3% of the cases had incision of about ≤ 12 cms length and >12 cms among 26.7% of the cases. There was no significant association recorded between CA group patients and RSB group patients with p value of 0.795.

Table 12: Distribution of cases based on length of incision

Length of incision	Group RSB	Group CA	Total	p value
≤ 12 cms	13 (21.7)	14 (23.3)	27 (45)	0.795
> 12 cms	17 (28.3)	16 (26.7)	33 (55)	
Total	30 (50)	30 (50)	60 (100)	

Figure12: Distribution of cases based on length of incision

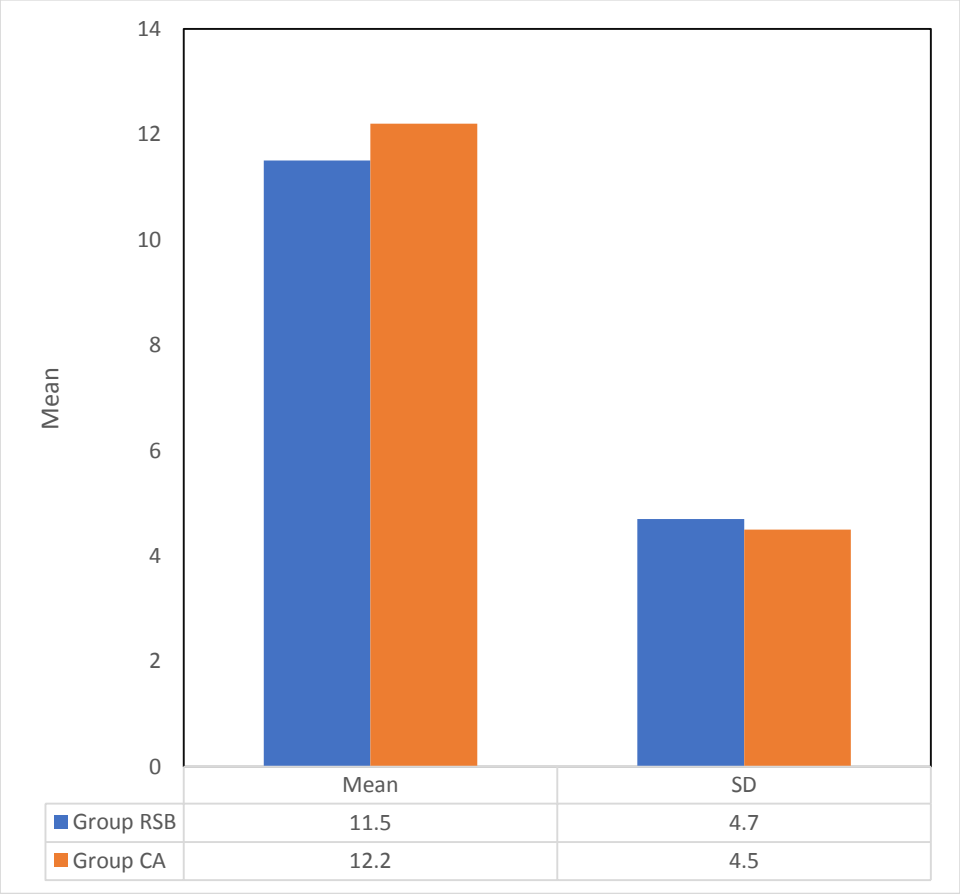


The mean length of incision in RSB group was 11.5±4.7 cms while in CA group the mean length of incision was 12.2±4.5 cms, with no significant difference between RSB group and CA group (p value =0.558).

Table 13: Mean length of incision among RSB group and CA group patients

Parameter	Group RSB	Group CA	p value
Mean length of incision (in cms)	11.5±4.7	12.2±4.5	0.558

Figure13: Mean length of incision among RSB group and CA group patients

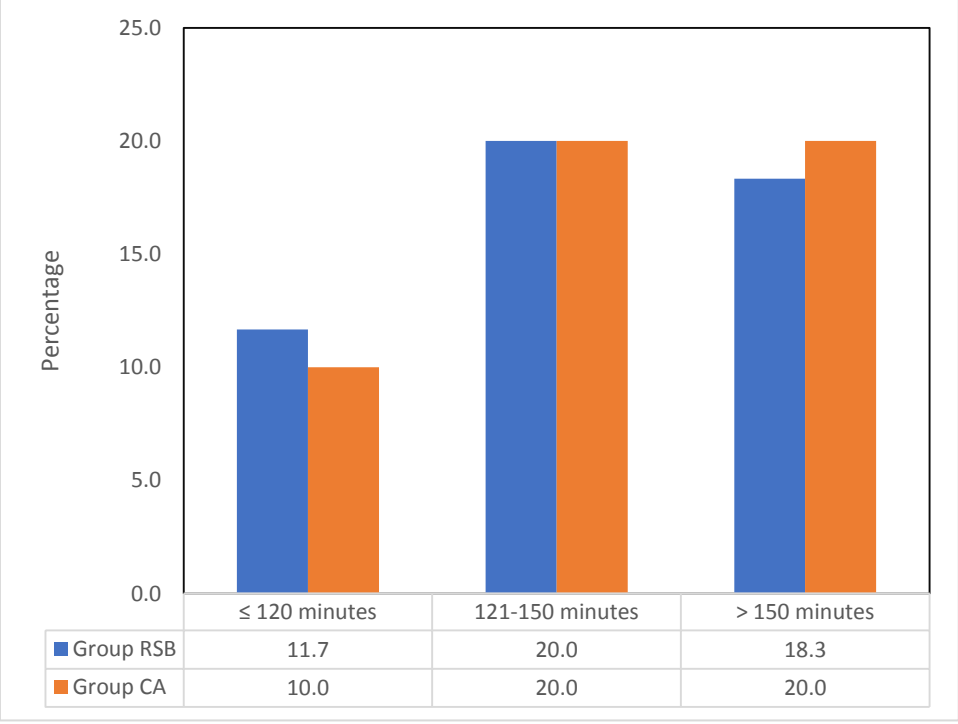


The time duration for surgery was recorded to be ≤ 120 minutes, 121-150 minutes and > 150 minutes among 11.7%, 20% and 18.3% of the cases in RSB group and 10%, 20% and 20% of the patients in CA group respectively.

Table 14: Duration of surgery vs RSB group and CA group

Duration of surgery	Group RSB	Group CA	Total	p value
≤ 120 minutes	7 (11.7)	6 (10)	13 (21.7)	0.941
121-150 minutes	12 (20)	12 (20)	24 (40)	
> 150 minutes	11 (18.3)	12 (20)	23 (38.3)	
Total	30	30	60	

Figure14: Duration of surgery vs RSB group and CA group

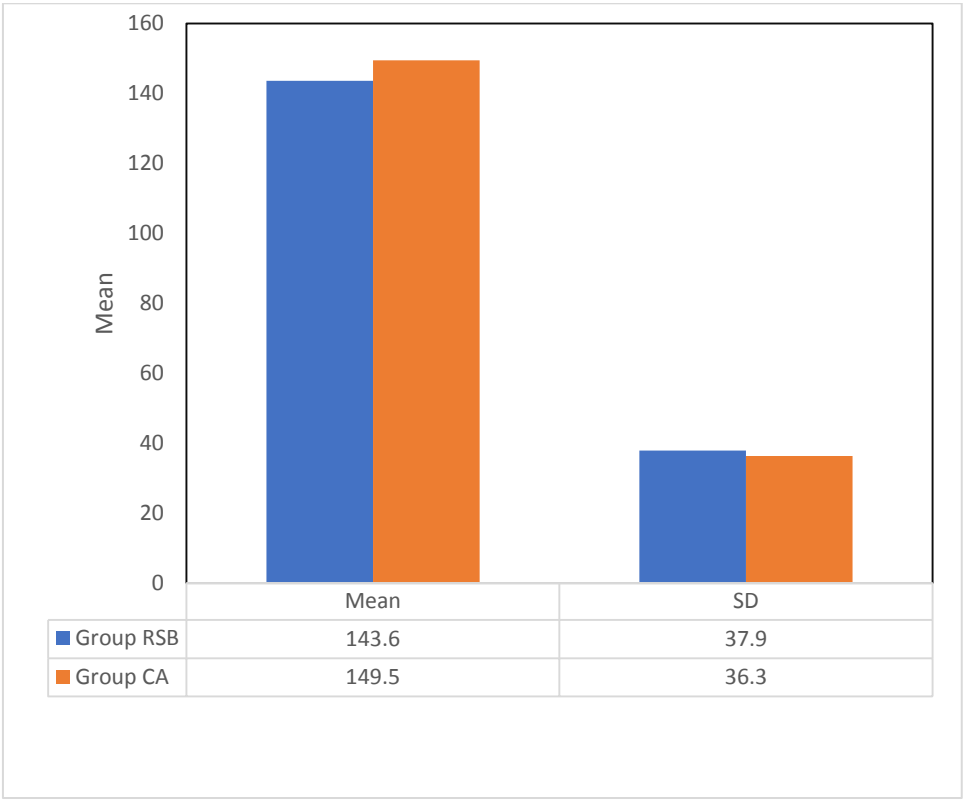


Mean duration of surgery was 143.6±37.9 mins in RSB group and 149.5±36.3 mins in CA group participants with no significant difference noted for mean duration of surgery between the two groups (p value =0.540).

Table 15: Mean duration of surgery among the study participants

Parameter	Group RSB	Group CA	p value
Mean duration of surgery (in minutes)	143.6±37.9	149.5±36.3	0.540

Figure15: Mean duration of surgery among the study participants



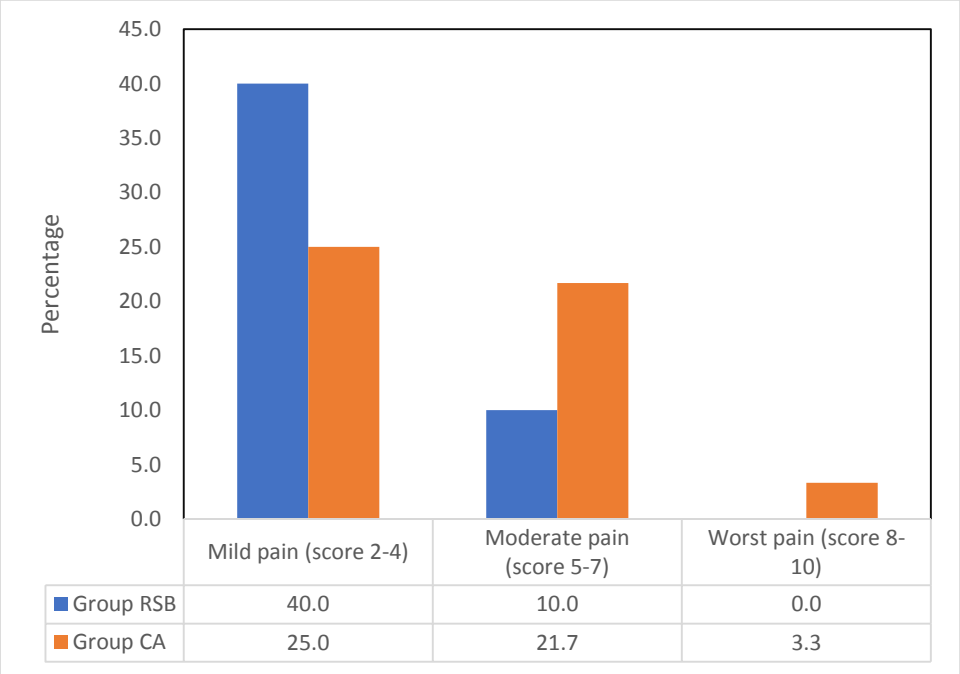
Based on VAS score 40% of the patients had mild pain, 10% of the patients had moderate pain in RSB group however 25% of the cases had mild pain, 21.7% of the patients had moderate pain and 3.3% of the patients had worst pain in CA group respectively. There was significant association noted between RSB group and CA group for pain in our study (p value =0.035).

Table 16: VAS in RSB and CA group

VAS	Group RSB	Group CA	Total	p value
Mild pain (score 2-4)	24 (40)	15 (25)	39 (65)	0.035*
Moderate pain (score 5-7)	6 (10)	13 (21.7)	19 (31.7)	
Worst pain (score 8-10)	0 (0)	2 (3.3)	2 3.3)	
Total	30 (50)	30 (50)	60 100)	

*Significant

Figure16: VAS in RSB and CA group



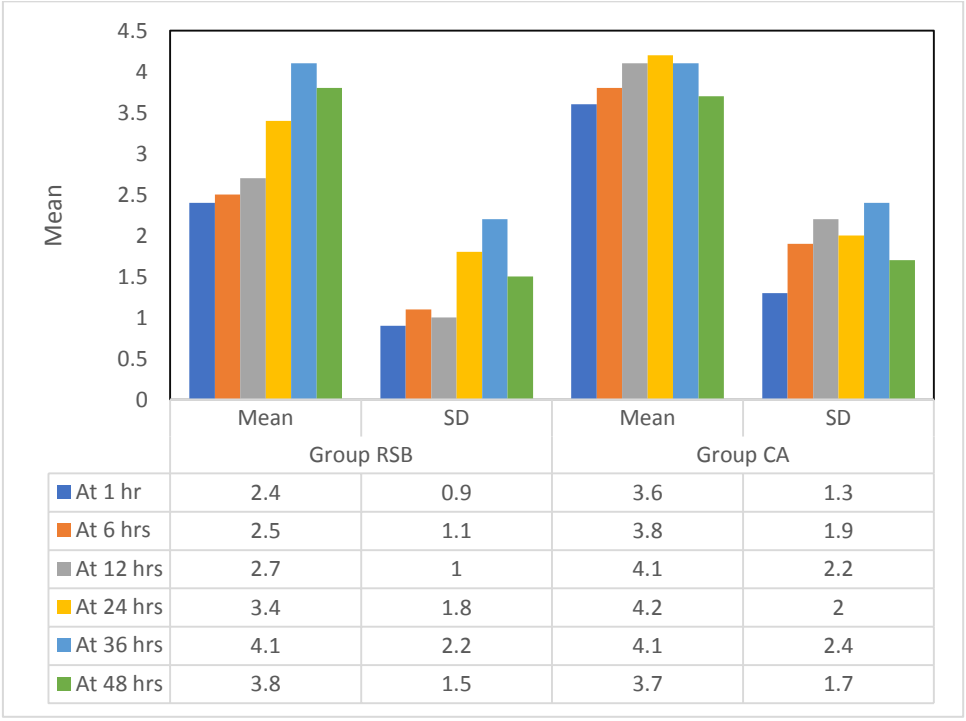
In this present study the difference in VAS score between RSB group and CA group was found to be significant at 1 hour, 6 hours and 12 hours with p value0.0001, 0.002 and 0.002 respectively.

Table 17: Difference in VAS at various time period

VAS	Group RSB	Group CA	p value
At 1 hr	2.4±0.9	3.6±1.3	0.0001*
At 6 hrs	2.5±1.1	3.8±1.9	0.002*
At 12 hrs	2.7±1.0	4.1±2.2	0.002*
At 24 hrs	3.4±1.8	4.2±2.0	0.108
At 36 hrs	4.1±2.2	4.1±2.4	1.000
At 48 hrs	3.8±1.5	3.7±1.7	0.809

*Significant

Figure17: Difference in VAS at various time period

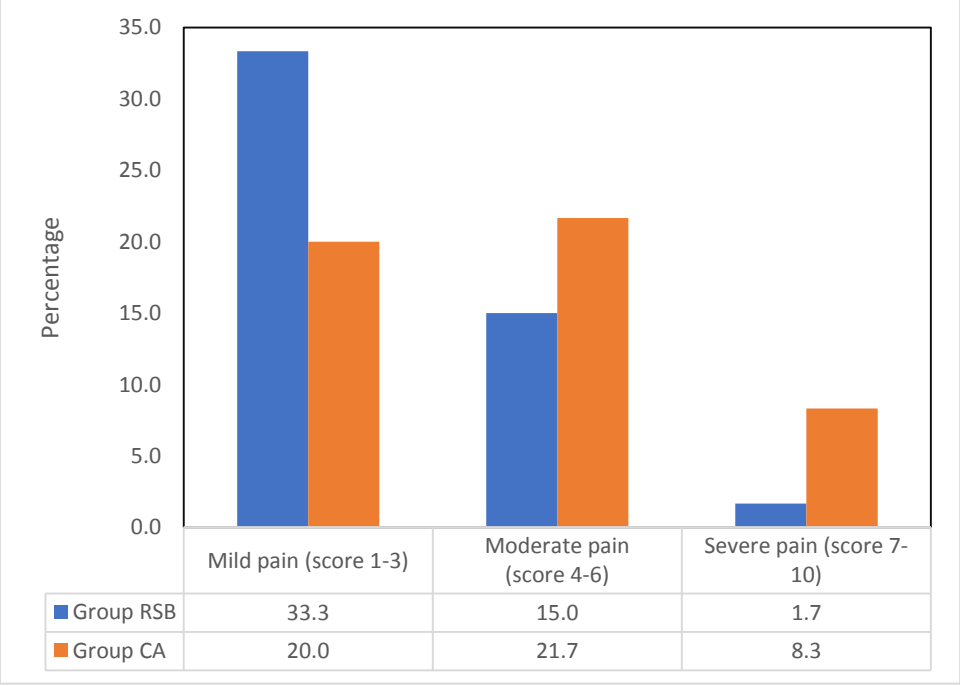


On assessing the pain based on NRS 33.3%, 15% and 1.7% of patients had mild, moderate and severe pain in RSB group respectively while 20%, 21.7% and 8.3% of the cases had mild, moderate and severe pain among CA group respectively. The association between RSB group and CA group cases based on VAS for pain was significant (p value =0.037).

Table 18: NRS vs RSB group and CA group cases

NRS	Group RSB	Group CA	Total	p value
Mild pain (score 1-3)	20 (33.3)	12(20)	32 (53.3)	0.037
Moderate pain (score 4-6)	9 (15)	13 (21.7)	22 (36.7)	
Severe pain (score 7-10)	1 (1.7)	5 (8.3)	6 (10)	
Total	30 (50)	30 (50)	60 (100)	

Figure18: NRS vs RSB group and CA group cases

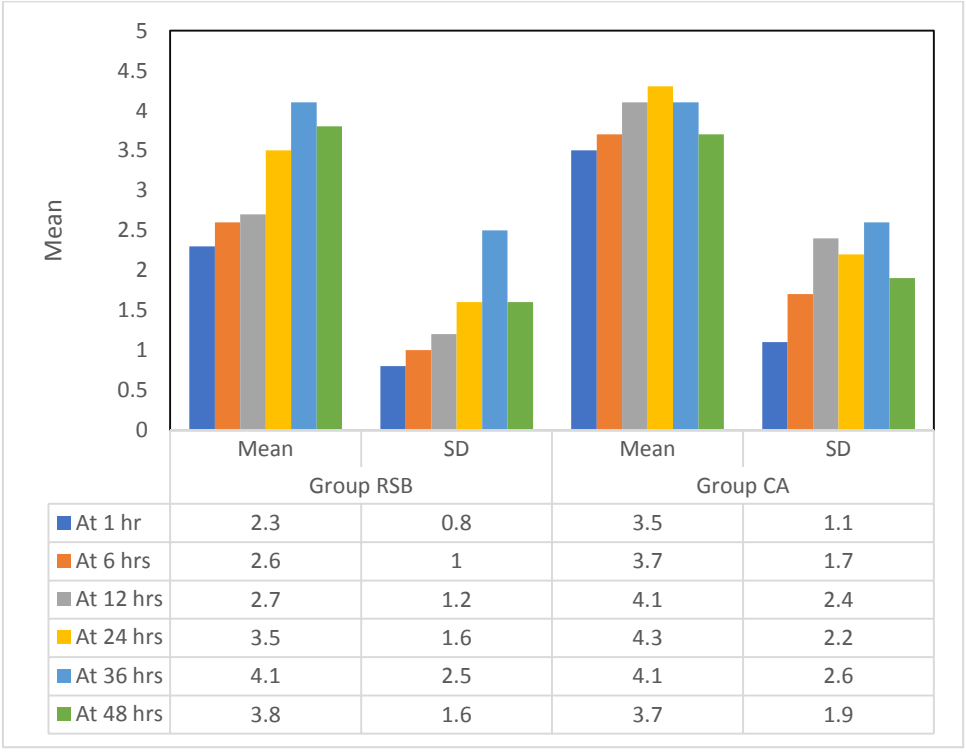


In this current study the difference in NRS score between RSB group and CA group was found to be significant at 1 hour, 6 hours and 12 hours with p value0.0003, 0.001 and 0.005 respectively.

Table 19: Difference in NRS at various time period

NRS	Group RSB	Group CA	p value
At 1 hr	2.3±0.8	3.5±1.1	0.0003
At 6 hrs	2.6±1.0	3.7±1.7	0.001
At 12 hrs	2.7±1.2	4.1±2.4	0.005
At 24 hrs	3.5±1.6	4.3±2.2	0.112
At 36 hrs	4.1±2.5	4.1±2.6	1.000
At 48 hrs	3.8±1.6	3.7±1.9	0.826

Figure19: Difference in NRS at various time period

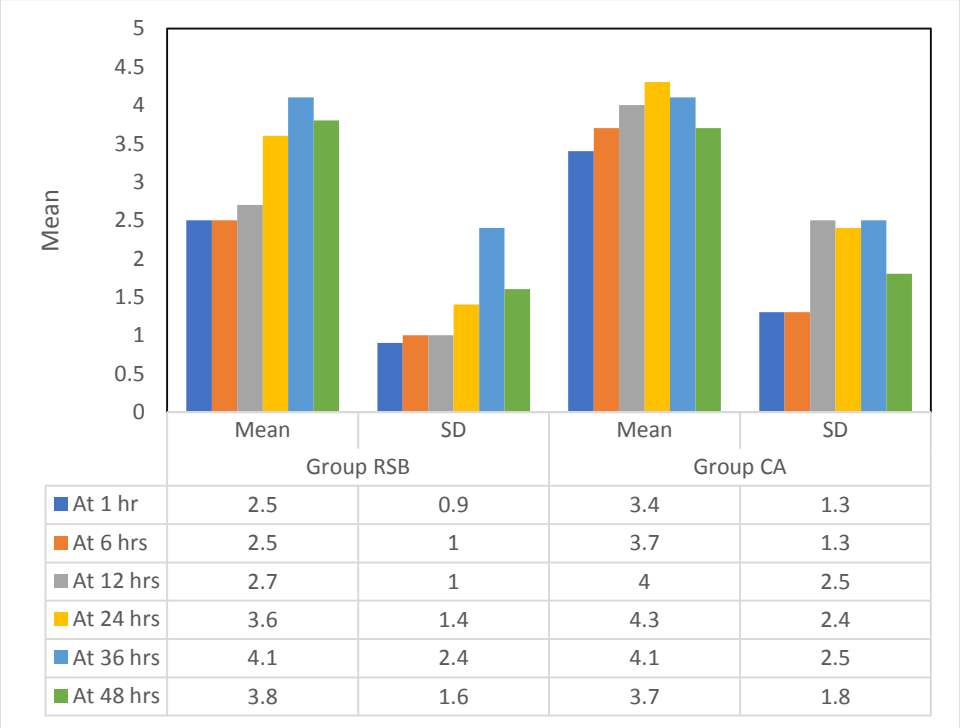


Based on ANVP scale significant difference was noted between the groups at 1 hour, 6 hours and 12 hours with p values 0.002, 0.0002 and 0.010 respectively. However, difference in ANVP score at 24 hours to 48 hours was noted as insignificant.

Table 20: ANVP vs RSB group and CA group

ANVP	Group RSB	Group CA	p value
At 1 hr	2.5±0.9	3.4±1.3	0.002
At 6 hrs	2.5±1.0	3.7±1.3	0.0002
At 12 hrs	2.7±1.0	4.0±2.5	0.010
At 24 hrs	3.6±1.4	4.3±2.4	0.172
At 36 hrs	4.1±2.4	4.1±2.5	1.000
At 48 hrs	3.8±1.6	3.7±1.8	0.820

Figure20: ANVP vs RSB group and CA group

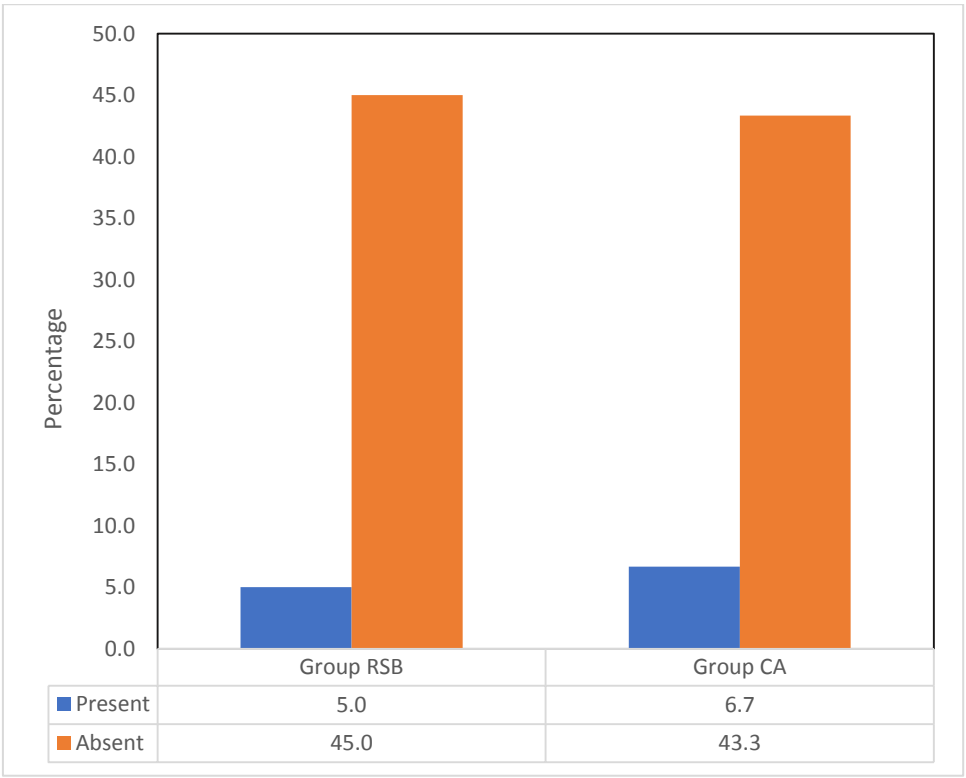


Adverse events were present among 5% and 6.7% of the cases in RSB group and CA group participants respectively with no association between the groups based on adverse events, the p value was recorded as 0.687.

Table 21: Adverse events among the study subjects

Adverse events	Group RSB	Group CA	Total	p value
Present	3 (5)	4 (6.7)	7 (11.7)	0.687
Absent	27 (45)	26 (43.3)	53 (88.3)	
Total	30 (50)	30 (50)	60 (100)	

Figure21: Adverse events among the study subjects

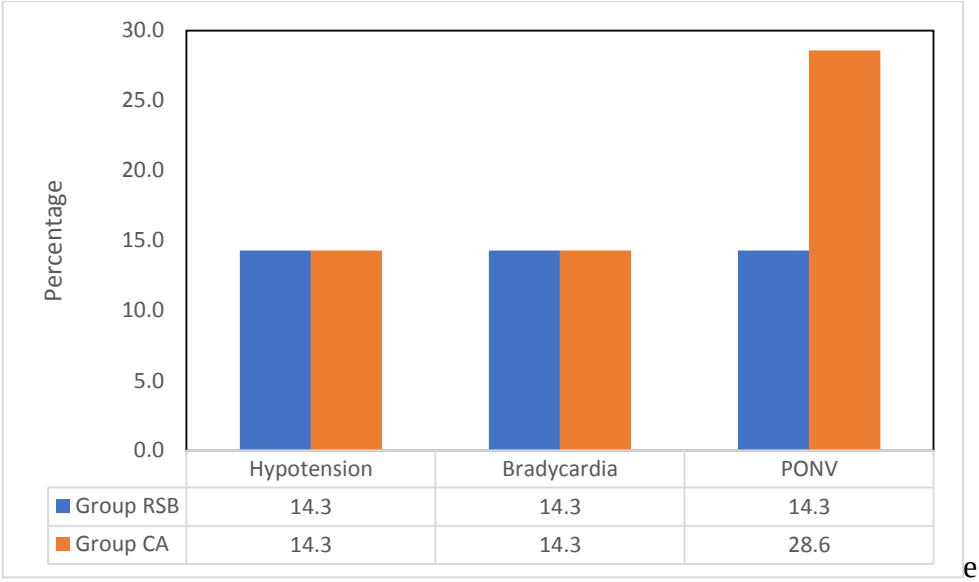


Specific adverse events like Hypotension, Bradycardia and PONV was seen among 14.3% of the cases in RSB group each while in CA group 14.3%, 14.3% and 28.6% of the cases had Hypotension, Bradycardia and PONV respectively. No significant association recorded between both groups based on specific adverse events.

Table 22: Proportion of cases based on Specific adverse events

Specific adverse event	Group RSB	Group CA	Total	p value
Hypotension	1 (14.3)	1 (14.3)	2 (28.6)	0.907
Bradycardia	1 (14.3)	1 (14.3)	2 (28.6)	
PONV	1 (14.3)	2 (28.6)	3 (42.9)	
Total	3 (42.9)	4 (57.1)	7 (100)	

Figure22: Proportion of cases based on Specific adverse events



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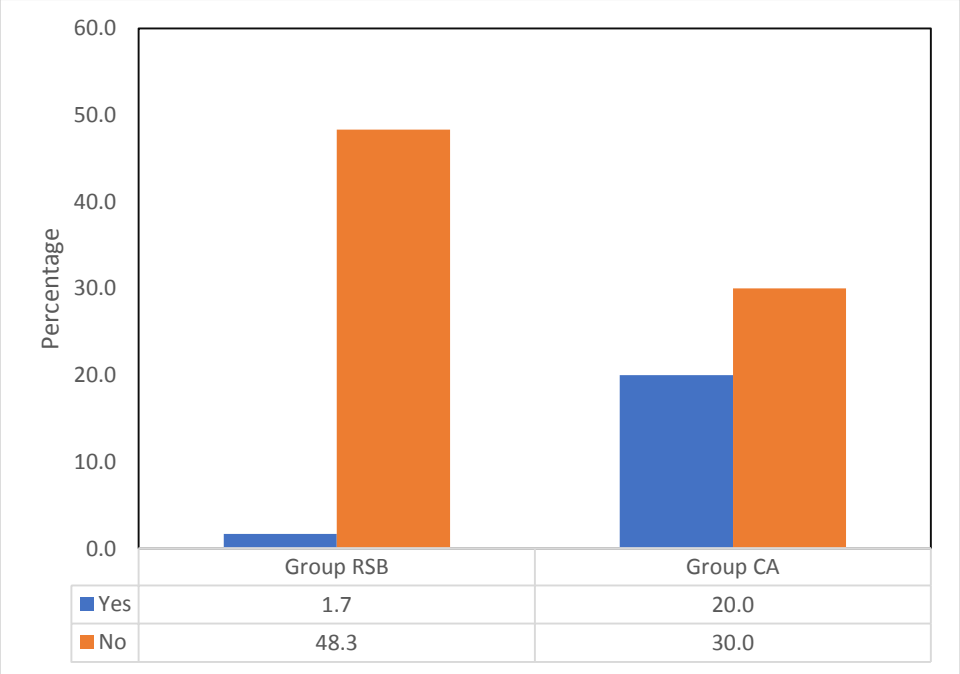
Rescue analgesia within 24 hrs were required among 1.7% of the patients in RSB group and 20% cases in CA group. There was highly significant statistical association noted for rescue analgesia between the groups with CA group cases requiring more rescue analgesia (p value =0.0005).

Table 23: Requirement of rescue analgesia within 24 hrs among study participants

Requirement of rescue analgesia within 24 hrs	Group RSB	Group CA	Total	p value
Yes	1 (1.7)	12 (20)	13 (21.7)	0.0005
No	29 (48.3)	18 (30)	47 (78.3)	
Total	30 (50)	30 (50)	60 (100)	

Figure23: Requirement of rescue analgesia within 24 hrs among study participants

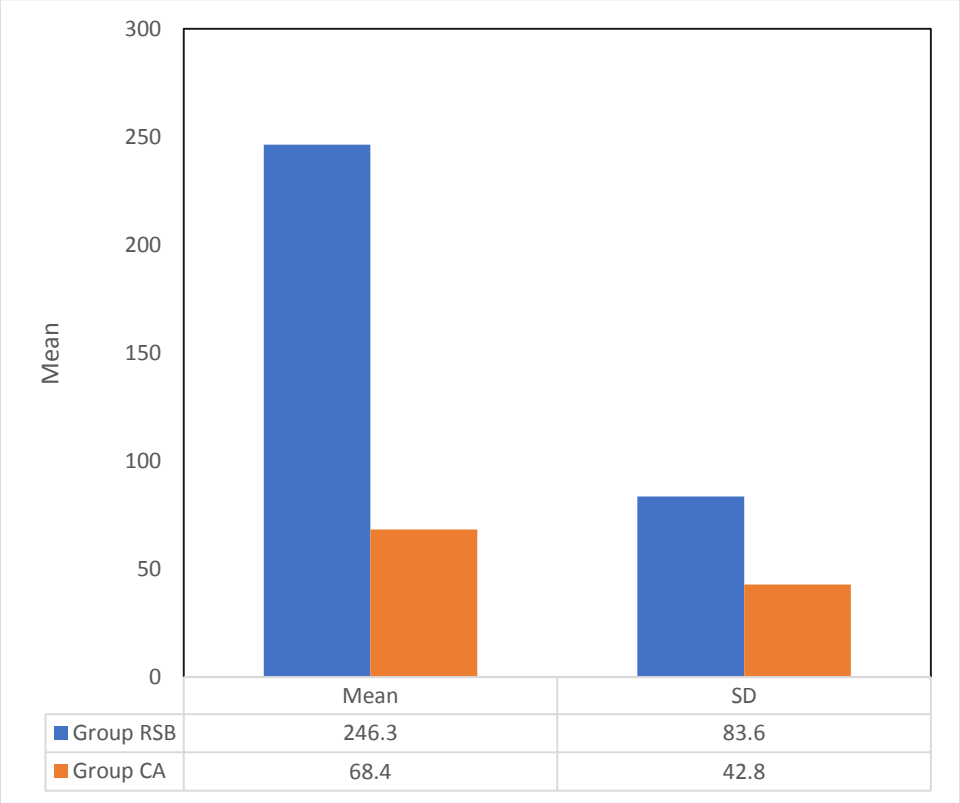


The mean first analgesia request time was 246.3±83.6 minutes among RSB group and in CA group it was 68.4±42.8 minutes, the difference in mean first analgesic time was significant in pour study with p value of <0.0001.

Table 24: Mean first analgesic request time

Parameter	Group RSB	Group CA	p value
First analgesic request time (in minutes)	246.3±83.6	68.4±42.8	<0.0001*

Figure24: Mean first analgesic request time

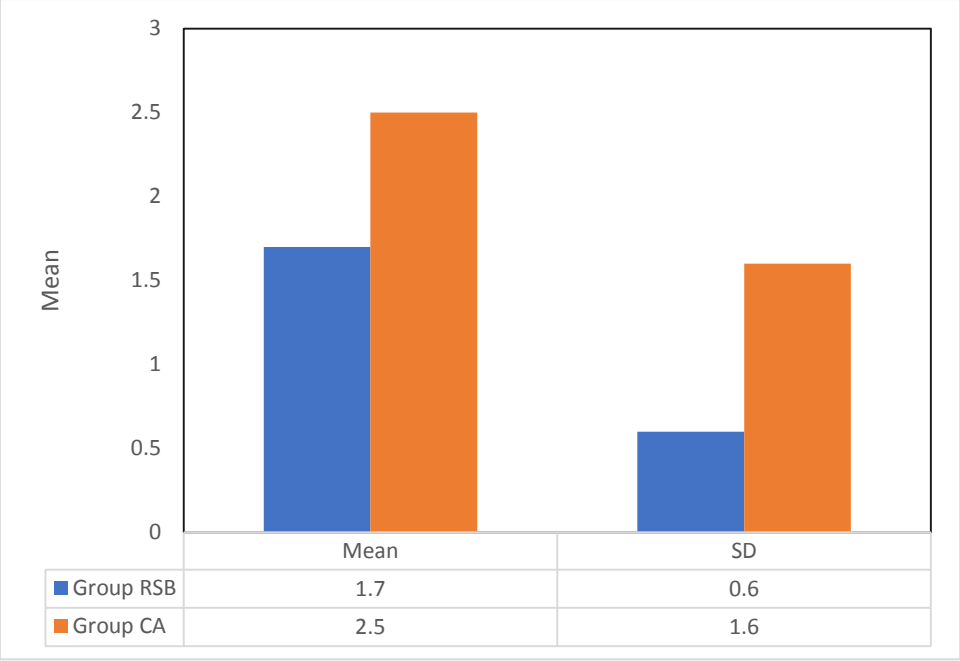


In this current study mean paracetamol consumption among RSB and CA group was 1.7±0.6gms and 2.5±1.6gms respectively with highly significant difference in mean paracetamol consumption between the groups(p value <0.0001). However, the median diclofenac consumption was 75 mg and 150 mg among RSB group and CA group respectively. The median diclofenac consumption was statistically significant between two groups (p value <0.0001).

Table 25: Mean paracetamol consumption & Median diclofenac consumption among participants

Parameter	Group RSB	Group CA	p value
Mean paracetamol consumption (g)	1.7±0.6	2.5±1.6	<0.0001*
Median diclofenac consumption (mg)	75 (75-125)	150 (75-150)	<0.0001*

Figure25: Mean paracetamol consumption & Median diclofenac consumption among participants

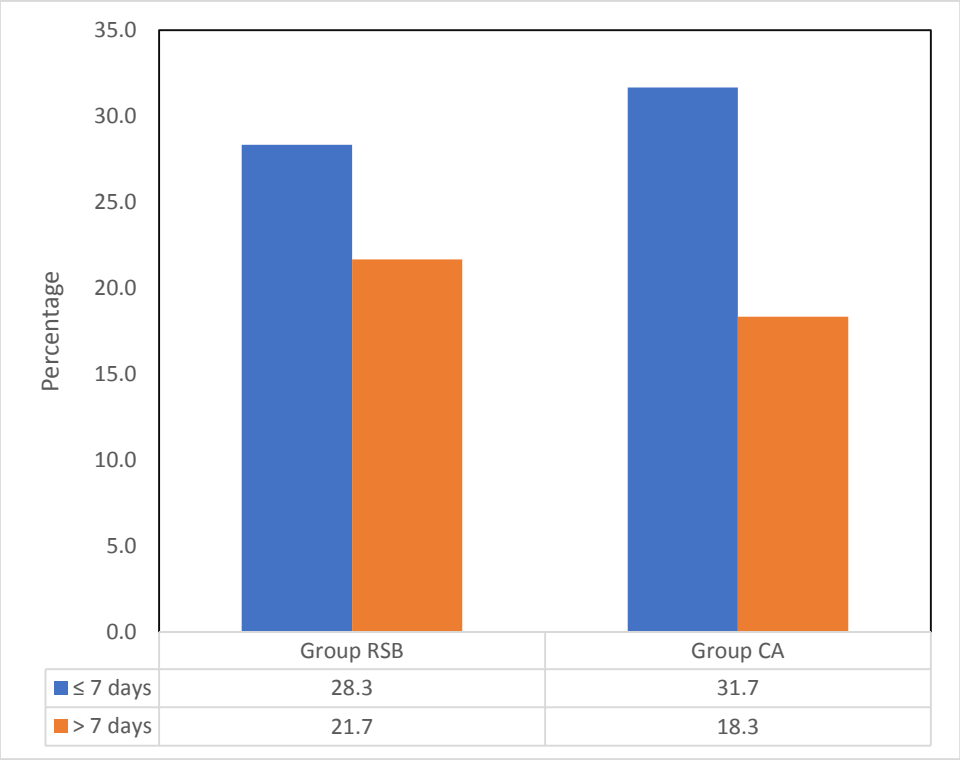


Duration of hospital stay was ≤ 7 days for 28.3% of the cases in RSB group and 31.7% of the cases in CA group while the hospital stay was > 7 days for 21.7% and 18.3% of the cases in RSB and CA group respectively. There was no significant association recorded between the groups based on duration of hospital stay (p value = 0.598).

Table 26: Duration of hospital stay

Duration of hospital stay	Group RSB	Group CA	Total	p value
≤ 7 days	17 (28.3)	19 (31.7)	36 (60)	0.598
> 7 days	13 (21.7)	11 (18.3)	24 (40)	
Total	30 (50)	30 (50)	60 (100)	

Figure26: Duration of hospital stay

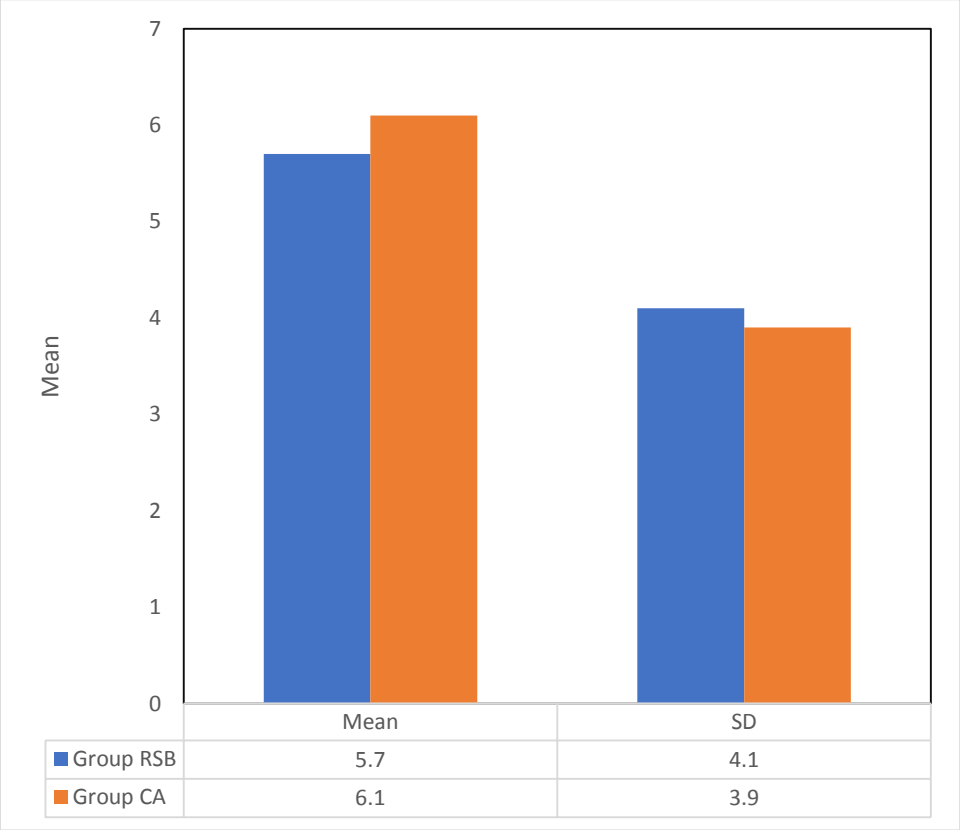


The mean duration of hospital stay was 5.7±4.1 days and 6.1±3.9 days in RSB and CA group cases with insignificant p value which shows no difference between the groups regarding to mean duration of hospital stay (p value = 0.7001).

Table 27: Mean duration of hospital stay

Parameter	Group RSB	Group CA	p value
Mean duration of hospital stay (in days)	5.7±4.1	6.1±3.9	0.7001

Figure27: Mean duration of hospital stay

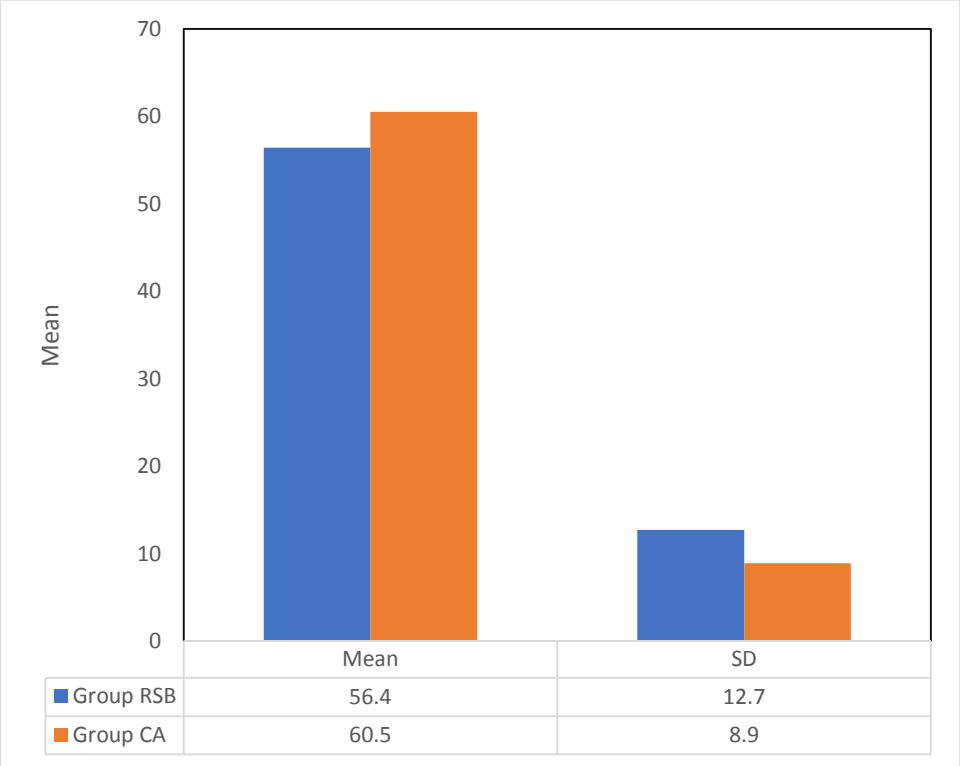


In this study the mean time to pass flatus among the participants was 56.4±12.7 hours and 60.5±8.9 hours among RSB group and CA group with no difference statistically (p value = 0.153).

Table 28: Proportion of cases based on mean time to pass flatus

Parameter	Group RSB	Group CA	p value
Mean time to pass flatus (in hrs)	56.4±12.7	60.5±8.9	0.153

Figure28: Proportion of cases based on mean time to pass flatus

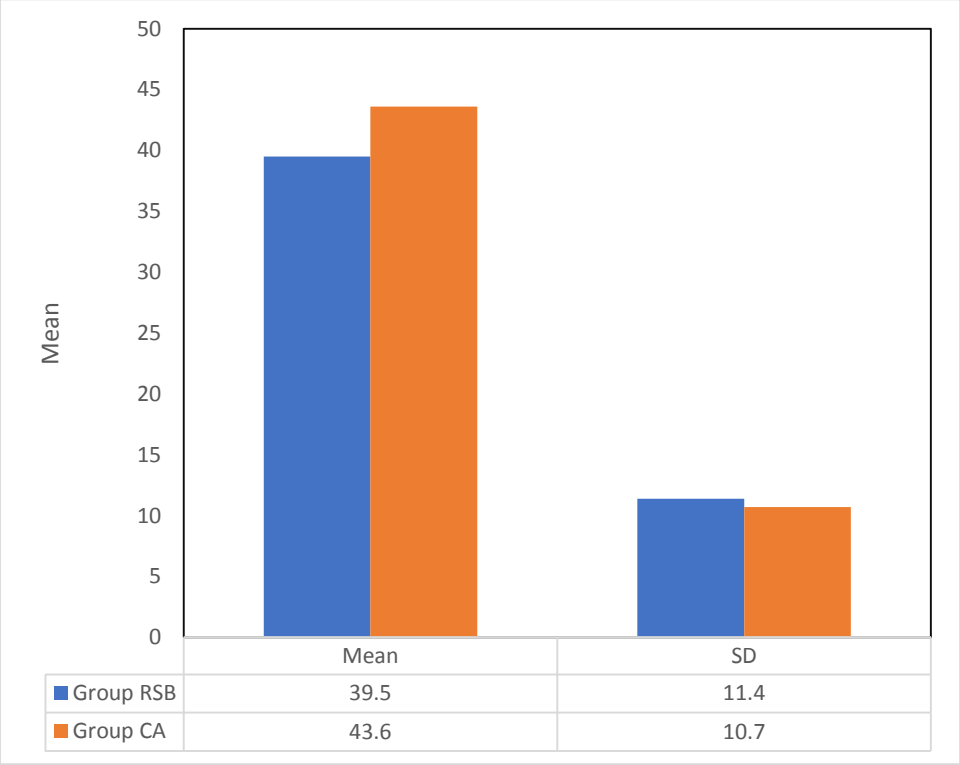


Similarly, the mean time for ambulation was 39.5±11.4 hours in RSB group patients and 43.6±10.7 hours among CA group patients, but difference between two groups was insignificant (p value =0.156).

Table 29: Proportion of study subjects based on mean time to ambulation

Parameter	Group RSB	Group CA	p value
Mean time to ambulation (in hrs)	39.5±11.4	43.6±10.7	0.156

Figure29: Proportion of study subjects based on mean time to ambulation

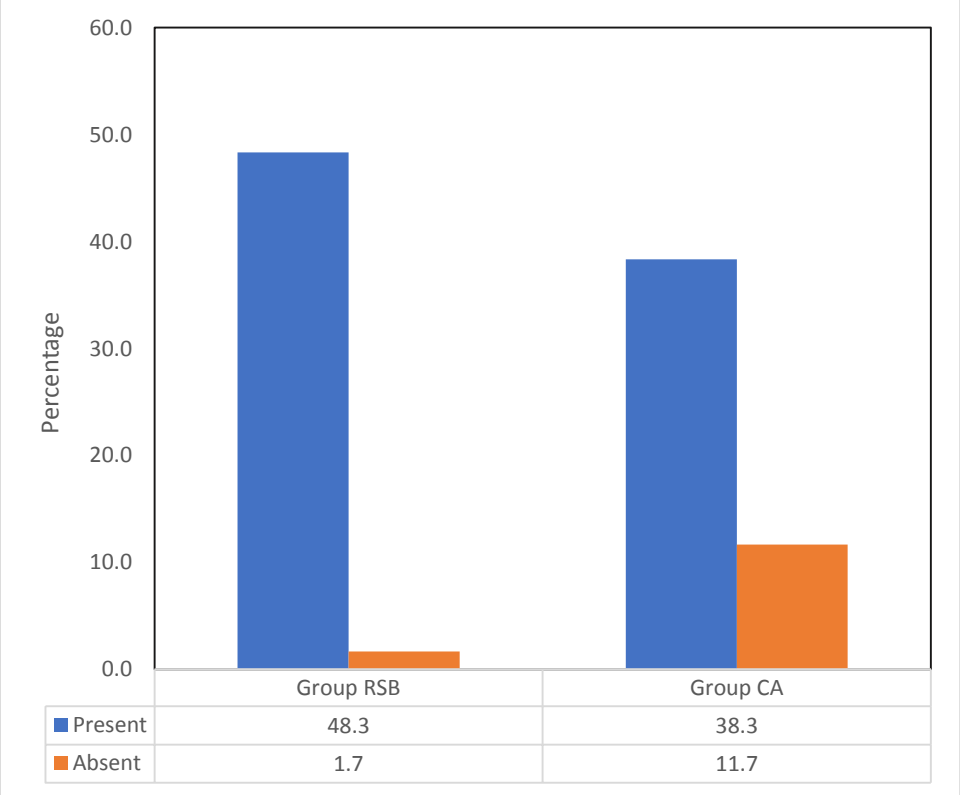


Patient's satisfaction regarding surgery was found among 48.3% of cases in RSB group and 38.3% of the cases in CA group, with no significant difference between the groups (p value =0.226).

Table 30: Distribution of cases based on patients' satisfaction

Patient's satisfaction	Group RSB	Group CA	Total	p value
Present	29 (48.3)	23 (38.3)	52 (86.7)	0.226
Absent	1 (1.7)	7 (11.7)	8 (13.3)	
Total	30 (50)	30 (50)	60 (100)	

Figure30: Distribution of cases based on patients' satisfaction



DISCUSSION

DISCUSSION

In this study among RSB group 6.7% participants were below 30 years age, 15% participants were between 31-40 years age group while 21.7% and 6.7% cases were found to be between of 41-50 years and 51-60 years age respectively. In CA group 15% participants were below 30 years age, 16.7% cases were in age group of 31-40 years while 15% and 10% cases were in age range 41-50 years and 51-60 years respectively. There was no significant association recorded between RSB group and CA group patients for age. The mean age among RSB group cases was 43.6±12.7 years while in CA group cases was 47.4±10.8 years. The difference in mean age between the groups was insignificant statistically. Male patients were 30% and 31.7% in RSB and CA group respectively while female patients were found to be 20% and 18.3% among the RSB and CA group respectively. The association between RSB and CA group patients was noted to be insignificant. Based on ASA classification 23.3% and 26.7% of the cases belonged to class 1 and class2 in RSB group respectively while in CA group 20% and 30% of the cases belonged to ASA class 1 and 2 respectively. No statistical association noted for ASA classification between RSB and CA group in our study.

On assessing the body weight of the patients 3.3%, 25%, 18.3% and 3.3% of the patients weighed ≤ 50 kg, 51-70 kg, 71-90 kg and > 90 kg in RSB group respectively whereas among CA group 1.7%, 26.7%, 16.7% and 5% of the patients were in the weight range of ≤ 50 kg, 51-70 kg, 71-90 kg and > 90 kg respectively. No significant association was found for weight between two groups.Mean weight in RSB group was 74.8±17.8 kgs and in CA group was 77.4±15.8 kgs with no difference in mean weight between the groups.

On assessing the height of the study subjects 1.7% of the cases were below 150 cms, 11.7% of the cases were between 151-160 cms,16.7% of the cases were in 161-170

cms while 15% of the cases were between 171-180 cms and 5% of the cases were above 180 cms while 1.7%, 15%, 18.3%, 11.7% and 3.3% of the cases were in the height range of ≤ 150 cms, 151-160 cms, 161-170 cms, 171-180 cms and > 180 cms respectively. The p value was noted to be insignificant which shows there was no association for height between both the groups. The mean height of RSB group cases was 172.5±9.6 cms whereas the mean height of CA group cases was 173.8±8.8 cms, with no statistical difference between both the groups.

Regarding BMI 31.7%, 15% and 3.3% of the participants were found to have normal BMI, overweight and obese respectively while 30%, 18.3% and 1.7% of the participants were found to have normal BMI, overweight and obese respectively. Association between RSB group and CA group based on BMI was insignificant in this present study. The mean BMI among RSB group was 26.8±3.5 and in CA group was 27.1±3.2. The difference in mean BMI was insignificant.

Gastric perforation peritonitis, blunt abdominal injury, strangulated umbilical hernia, small bowel obstruction, appendicular perforation andsigmoid volvulus was diagnosed among 8.3%, 3.3%, 10% 15% and 6.7% of the participants in RSB group and 8.3%, 5%, 8.3%, 13.3% and 6.7% of the participants respectively. The association between the groups based po diagnosis was insignificant.The length of laparoscopic incision among RSB group patients was ≤ 12 cms among 21.7% of the cases and >12 cms among 28.3% of the cases while in CA group 23.3% of the cases had incision of about ≤ 12 cms length and >12 cms among 26.7% of the cases. There was no significant association recorded between CA group patients and RSB group patients.

The mean length of incision in RSB group was 11.5±4.7 cms while in CA group the mean length of incision was 12.2±4.5 cms, with no significant difference between RSB group and CA group.Time duration of surgery was recorded to be ≤ 120 minutes, 121-

150 minutes and > 150 minutes among 11.7%, 20% and 18.3% of the cases in RSB group and 10%, 20% and 20% of the patients in CA group respectively. Mean duration of surgery was 143.6±37.9 mins in RSB group and 149.5±36.3 mins in CA group participants with no significant difference noted for mean duration of surgery between two groups.

Based on VAS score 40% cases showed mild pain, 10% cases showed moderate pain in RSB group however 25% of the cases had mild pain, 21.7% of the cases had moderate pain and 3.3% cases experienced worst pain among CA group respectively. There was significant association noted between RSB group and CA group for pain in our study. In this present study the difference in VAS score between RSB group and CA group was found to be significant at time point of 1 hour, 6 hours and 12 hours.

On assessing pain based on NRS 33.3%, 15% and 1.7% patients experienced mild, moderate and severe pain in RSB group respectively while 20%, 21.7% and 8.3% of the cases had mild, moderate and severe pain among CA group respectively. The association between RSB group and CA group cases based on VAS for pain was significant. In this current study the difference in NRS score between RSB group and CA group was found to be significant at 1 hour, 6 hours and 12 hours.Based on ANVP scale significant difference was noted between the groups at time point of 1 hour, 6 hours and 12 hours. However, difference in ANVP score at 24 hours to 48 hours was noted as insignificant.

Adverse events were present among 5% and 6.7% of the cases in RSB group and CA group participants respectively with no association between the groups based on adverse events. Specific adverse events like Hypotension, Bradycardia and PONV was seen among 14.3% of the cases in RSB group each while in CA group 14.3%, 14.3% and 28.6% of the cases had Hypotension, Bradycardia and PONV respectively. There was no significant association recorded between two groups based on specific adverse events.

Rescue analgesia within 24 hrswere required among 1.7% patients of RSB group where as 20% cases in CA group. There was highly significant statistical association noted for rescue analgesia between the groups with CA group cases requiring more rescue analgesia.The mean first analgesia request time was 246.3±83.6 minutes among RSB group and in CA group it was 68.4±42.8 minutes, the difference in mean first analgesic time was significant in our study.In this current study mean paracetamol consumption among RSB and CA group was 1.7±0.6gms and 2.5±1.6gms respectively with highly significant difference in mean paracetamol consumption between the groups. However, the median diclofenac consumption was 75 mg and 150 mg among RSB group and CA group respectively. The median diclofenac consumption was statistically significant between the groups.

Duration of hospital stay was ≤ 7 days for 28.3% patients in RSB group where as for 31.7% patients in CA group while the hospital stay was > 7 days for 21.7% and 18.3% of the cases in RSB and CA groups respectively. No significant association was recorded between the groups regarding the duration of hospital stay.Mean hospital stay duration was 5.7±4.1 days and 6.1±3.9 days in RSB and CA group cases with insignificant p value which shows no difference between two groups based on mean duration of hospital stay.In this study the mean time to pass flatus among the participants was 56.4±12.7 hours and 60.5±8.9 hours among RSB group and CA group with no difference statistically.

Similarly, the mean time for ambulation was 39.5±11.4 hours in RSB group patients and 43.6±10.7 hours among CA group patients, but difference between two groups was not significant. Patient's satisfaction regarding surgery was found among 48.3% of patients in RSB group where as 38.3% of patients in CA group, with no significant difference between the groups.

Our study findings were comparable with findings of the following studies. Amir M S et al[45]shown that a safe and effective method for achieving acceptable quality postop analgesia in patients undergoing extended midline abdominal incision for BRSB was to add morphine to local bupivacaine. Ghada MNB et al[46]compared to general anaesthesia alone, investigated the effectiveness of a preventive single-injection RSB in delivering improved early postoperative pain scores. In all five of the PACU's time points, the RSB group's median VAS score was substantially lower than the GA group's. Additionally, RSB group patients used less PACU morphine than GA group patients. Moreover, fewer morphine was used in the first two days following surgery. They asserted that learning USG-RSB is a simple process. When combined with general anaesthesia, this method will reduce pain scores and opioid use more effectively than when used alone.

Similarly, Edward T et al[47]said that 95 patients in all had been located. Records included indications for surgery, the operation, and any problems. Patients with RSBs had a considerably shorter wait time for mobilization than patients with EIAs. The duration of stay or the postoperative pain scores did not change. They came to the conclusion that RSBs avoid the known possible problems of EIA and offer analgesia comparable to that of EIA. Since they are linked to a faster mobilization time, their application ought to be expanded. Alaa ED et al[48]found that, on comparision with control group, patients in RSB Group used statistically significant less opioids during surgery or thereafter. At 2, 4, and 6 hours post-stroke, the RSB Group's mean pain scores were found to be significantly low than those of control group. When compared with control group, the RSB Group experienced a statistically significant decrease in sedation score as well as a frequency of nausea and vomiting. In RSB Group, higher patient satisfaction was recorded. On comparison to general anaesthesia alone, they found that USG-RSB led to a reduction in postoperative pain scores

and narcotic intake. Additionally, RSB was linked to reduced nausea and vomiting along with increased patient satisfaction.

Also, Hany MY et al[49]examined the safety and effectiveness of rectus sheath analgesia (RSA) and thoracic epidural analgesia (TEA). According to their findings, analgesia was needed by 54.8% patients in TEA group and 86.2% patients in RSA group. TEA group consumed 33 mg (median) of cumulative morphine within the first 72 hours postoperatively, while the RSB group consumed 51 mg. In the TEA group, the first morphine request took 256 minutes, while in the RSA group, it took 208.82 minutes. At every assessment point, the two groups' VASs for cough and rest were similar. Compared to TEA group, RSA group's time required for patient ambulation was noticeably shorter. Only at 12 and 24 hours post surgically did the RSA group's sedation scores considerably outperform those of the TEA group. Both groups' rates of additional morphine-related adverse effects, flatus passage duration, and patient satisfaction ratings were similar. They stated that whereas intermittent RSA with catheters implanted under USG had equivalent safety views and early ambulation, continuous TEA showed much greater opioid sparing effects during the first 72 hours postoperatively. When TEA is not an option for patients having laparotomies with a prolonged midline incision, RSA may be a useful substitute, particularly in the aftermath of the first postop day.

In another study, Rahiri J et al[50]sought to improve knowledge of systemic LA absorption and potential hazards of systemic toxic effects by synthesising research assessing systemic concentration of LA following TAP and RSB in perioperative period. Fifteen studies were found to have satisfied the inclusion criteria. In every study, rapid systemic LA absorption was noted. Mean peak level concentration of LA surpassed hazardous levels in 33 out of 381 participants; three of these patients experienced mild ill effects. The systemic

absorption of LA was decreased by the addition of epinephrine. There were no reports of seizures or irregular heartbeats. They came to the conclusion that systemic concentration of LA in TAP block and RSB can be detectable and beyond established limits of systemic toxicity in LA. They claimed that in terms of systemic toxicity caused by LA, these approaches are comparatively safe. Esma K et al[51]found that patients with RSB had decreased postop VAS values, DEM values, and total morphine use. Additionally, nausea and vomiting were less common in RSB patients. Thirty individuals without RSB and eight patients with RSB experienced constipation in the first twenty-four hours following surgery. They asserted that USG-RSB is a useful technique for managing pain following surgery.

Additionally, Viivi K et al[53]investigated the possibility that RSB analgesia could improve patients' satisfaction after MIL in both cancer and benign illness patients. According to their findings, RSB analgesia considerably raised the research groups' SFS24 scores. individuals with cancer had considerably lower median plasma NT levels after surgery than individuals with benign diseases. They asserted that after MIL, RSB analgesia could greatly improve patient satisfaction. There is a substantial correlation between patient satisfaction after surgery and plasma NT concentrations in both cancer and benign diseases.

However, Viivi K et al[54]claimed that the repeated dosage group had a larger rise in Brief Pain Inventory (BPI) severity score, lower interference score value, and a significant time effect in linear mixed model for the BPI interference score. Vishal U et al[55]observed that RSB provides opioid-sparing effect in laparoscopic, laparotomy, and umbilical surgical procedures, and that it offers better analgesia than local infiltration. A high-quality study contrasting RSB and epidural analgesia does not yet exist. For extended pain relief, intermittent drug bolus administered via catheter seems to be more beneficial than infusion continuously. Similar to this, in cases where long-durationneuraxial opioids are not

utilized or are contraindicated, USG guided TAP block offers good analgesia in post operative period benefit in laparotomy, laparoscopy, and caesarean section. Adjuvants like dexamethasone and dexmedetomidine are added to local anaesthetics to increase their efficacy and lengthen the duration of TAP block and RSB. They asserted that the RSB and TAP block are highly dependable when ultrasonography guiding is used. For less involved surgical procedures, single shot infiltration is helpful, and where thoracic epidural analgesia is not appropriate, catheters are a helpful substitute.

In consistent with this study, Debas Y M et al[56]examined the claim that, following emergency midline laparotomy, RSB lowers pain scores, lowers overall analgesic intake, and delays time until the call for first analgesic request is made. At rest and during movement, the RSB group's VAS scores were considerably lower at 1, 2, 4, 6, and 8 hours, but not at the 10, 12, or 24 hour points. In comparison to the control group, the RSB group patients required less tramadol during the course of a day. The RSB group's 24-hour diclofenac intake was noticeably less than that of the control group. The RSB group had a considerably longer mean time to first analgesic request than the non-exposed group. They came to the conclusion that the RSB group experienced lower pain scores, used fewer analgesics overall, and took longer to request their first dose. As a result, they suggested using RSB in conjunction with multimodal analgesia following emergency midline laparotomy. Mengesha DA et al[57]observed that the groups differed statistically significantly in terms of postoperative pain score as determined by a numerical rating scale during 1steight hours and total analgesic usage throughout next twenty-four hours. They observed statistically significant difference in first, second, fourth, sixth, and eighth postoperative hour NRS among two groups. For the RSB group and control group, median 24-hour post-prandial tramadol consumption was 175 mg and 256 mg, respectively. They stated that a good postoperative analgesic for MIL is to do bilateral RSB with 0.25% bupivacaine at the

conclusion of the procedure. They suggested using bilateral RSB for patients undergoing midline abdominal incisions based on these.

Similarly, Diriba T et al[61]stated that an RSB group's numerical rating scale during recovery recorded much lower. Among RSB group, postoperative NRS at the third, sixth, twelve, and twenty-four hours time point were observed to be statistically substantially low. RSB group consumed considerably less tramadol in the 24 hours following surgery. They suggested that a bilateral RSB added at the conclusion of the procedure could be a useful postoperative analgesic for MIL. Akshay L et al[62]compared the USG-RSB bilateral RSB with LA infiltration's analgesic effectiveness. When RSB was used throughout the postop period, VAS scores were considerably lower than those of LA. At one hour, four hours, eight hours, and twelve hours of rest, as well as at one hour, four hours, and eight hours during coughing, there were significant variations in the VAS scores. With application of RSB, morphine intake was lower. With application of RSB, time of call to first administer rescue analgesia has been observed to be extended. With application of RSB,frequency of PONV also has been very much reduced. When compared to LA infiltration, they asserted that bilateral USG-RSB offers patients having emergency laparotomy procedures prolonged postop analgesia at rest and cough. With RSB, there was a notable decrease in the amount of morphine used, a higher frequency of PONV, and a longer duration until the first rescue analgesia.

Also, Mayuko N et al[64]found that the pre-RSB group of patients having laparoscopic surgery tended to respond more slowly to the initial request for analgesics. Compared to patients in the post-RSB group, individuals in the pre-RSB group showed a decreased chance of receiving an analgesia drug during 24 hours. Therefore, it could be better to carry out RSB prior to surgery. MostafaM et al[65]observed that both groups' hemodynamic

and demographic characteristics were comparable. When comparing the RBS group (Group R) to the traditional analgesic group (Group C), the total intraop fentanyl need was considerably reduced in Group RBS. When compared to group C, group Rshowed a noticeably low pain ratings for up to 24 hours after the procedure. In comparison to group C, group R's mean time to get first postop analgesia for rescue was noticeably longer. Compared to group C, group R required a much less rescue analgesic dosages. They asserted that in paediatric patients undergoing planned midline abdominal surgeries, bilateral RSB performed under ultrasound guidance results in more stable hemodynamics as well as successful intraop and postop analgesia.

LIMITATIONS

Limitations of our study includes small sample size, study being conducted in a single hospital setting and different pain tolerance levels in patients. A larger sample size and a large scale study is needed for validation of efficacy of Rectus sheath catheter block for postoperative pain control in patients undergoing midline laparotomy in comparision with conventional analgesic techniques

CONCLUSION

CONCLUSION

In the present study, cases in both RSB and CA groups were similar in terms of age, gender, ASA class, BMI, diagnosis, length of midline incision and duration of surgery.

Notably, based on all three scales, VAS, NRS and NAVP, the pain during the post op period was remarkably high in conventional analgesic group till first 12 hours after surgery was done compared to rectus sheath block group. However after 12 hours, pain among two groups was similar between both the groups.

Analgesic requirement in rectus sheath block group was lesser than conventional analgesia group. However, the adverse events, duration of hospital stay, time taken to pass flatus, time taken for ambulation and patient's satisfaction were similar in both the groups.

We infer that rectus sheath block is the preferred choice of analgesia compared to conventional analgesia with lesser requirement of analgesic doses during post op period among the cases underwent midline laparotomy.

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ANNEXURE

ANNEXURE—I

PROFORMA

"PROSPECTIVE STUDY OF ANALGESIC EFFICACY OF RECTUS SHEATH BLOCK IN PATIENTS UNDERGOING LAPAROTOMY FOR POSTOPERATIVE PAIN CONTROL IN COMPARISION WITH CONVENTIONAL ANALGESIC TECHNIQUES "

Investigator: DR. KAVITHA.G

Name:

Weight:

Age/sex: Male/Female

Date:

IP No:

UHID:

ASA status:

Presenting complaints:

H/O present illness

Pain duration

Nausea

Vomiting

Anorexia

Past history:

Family history:

Menstrual history:

Obstetric history:

GENERAL PHYSICAL EXAMINATION:

General condition:

- Build and nutrition:

- Pallor/Cyanosis/Icterus/Clubbing/edema/Generalized lymphadenopathy
- Body weight:

VITAL DATA:

- Pulse:
- Temperature:
- BP:
- Respiration rate:

SYSTEMIC EXAMINATION :

- Per abdomen:
  - Swelling/ lump
  - Guarding
  - Rebound tenderness
  - Distension
  - Rigidity
- Respiratory system:
- Cardio vascular system:
- Central nervous system:
-

- **Clinical diagnosis**

- **Investigations**
- CBP
- BT
- CT
- Urine routine and microscopy
- RBS
- RFT
- Chest X-Ray PA view
- ECG
- Abdominal USG
- Abdomen X RAY/ CT

COMORBID CONDITIONS:

Procedure:

Group Allocated: RSB/ CA

POST OPERATIVE MONITORING

INTERMITTENT BOLUS (6 hourly) INJ.BUPIVACAINE

	1	2	3	4	5	6	7	8
RSB								

POSTOP MONITORING

TIME	VAS	PR	SBP	DBP	NRS	ANVP	SPO2
15 min							
30 min							
2 hr							
4 hr							
8 hr							
16 hr							
24 hr							
30 hr							
36 hr							
48 hr							

SECONDARY OUTCOMES

PONV	0	1	2	3
Rescue analgesia	YES	NO		
Patient satisfaction	1 POOR	2 FAIR	3 GOOD	4 EXCELLENT
Technical/ Therapeutic failure	YES	NO		

COMPLICATIONS

HYPOTENSION	YES	NO
BRADYCARDIA	YES	NO
RESP.DEPRESSION	YES	NO
OTHERS (if any)		

ANNEXURE – II

PATIENT INFORMATION SHEET

Study title :
"PROSPECTIVE STUDY OF ANALGESIC EFFICACY OF RECTUS SHEATH BLOCK IN PATIENTS UNDERGOING MIDLINE LAPAROTOMY FOR POSTOPERATIVE PAIN CONTROL COMPARING WITH CONVENTIONAL ANALGESIC TECHNIQUES"

STUDY CONDUCTED BY DR.KAVITHA.G
Study location: R L Jalappa Hospital and Research Centre attached to
Sri DevarajUrs Medical College, Tamaka, Kolar.
The purpose of the study is explained in detail to us and all informationcollected is for study purpose only. The data collected is submitted to the department of surgery, SDUMC, Kolar and confidentiality ensured .The merits and demerits explained briefly to us.
All Patients posted for laparotomy will be included in this study. Patients in this study will undergo routine investigations, cbc ,rft, lft, coagulation Parameters.
Please read the following information and discuss with your family members. You can ask any question regarding the study. If you agree to participate in the study, we will collect information (as per proforma) from you or a person responsible for you or both. Relevant history will be taken. This information collected will be used only for dissertation and publication.
All information collected from you will be kept confidential and will not be disclosed to any outsider. Your identity will not be revealed. This study has been reviewed by the Institutional Ethics Committee and you are free to contact the member of the Institutional Ethics Committee.
There is no compulsion to agree to this study. The care you will get will
not change if you don't wish to participate. You are required to sign/ provide thumb impression only if you voluntarily agree to participate in this study.
The investigator is responsible for all the costs of study.

For further information contact:
Dr.KAVITHA.G [post graduate]
Phone no.:8985614945
Email:kavithagondesi28@gmail.com
Department of General Surgery
SDUMC, Kolar

left thumb impression/signature of the patient

left thumb impression/signature of the witness.

ANNEXURE – III

INFORMED CONSENT

Title: "PROSPECTIVE STUDY OF ANALGESIC EFFICACY OF RECTUS SHEATH BLOCK IN PATIENTS UNDERGOING MIDLINE LAPAROTOMY FOR POSTOPERATIVE PAIN CONTROL COMPARING WITH CONVENTIONAL ANALGESIC TECHNIQUES"

Principal investigator: Dr.Kavitha.G

I, Mr/Ms/Mrs. …….. have been explained in my own understandable language, that I will be included in a study which "PROSPECTIVE STUDY OF ANALGESIC EFFICACY OF RECTUS SHEATH BLOCK IN PATIENTS UNDERGOING MIDLINE LAPAROTOMY FOR POSTOPERATIVE PAIN CONTROL COMPARING WITH CONVENTIONAL ANALGESIC TECHNIQUES"**.** I have been explained that my clinical findings, investigations, preoperative and post-operative findings will be assessed and documented for study purpose.

I have been explained my participation in this study is entirely voluntary and I can withdraw from the study any time and this will not affect my relation with my doctor or treatment for my ailment.

I understand that the medical information produced by this study will become part of institutional records and will be kept confidential by above said institute.

I agree not to restrict the use of any data or result that arise from this study provided such a use is only for scientific purpose(s).

I have principal investigator mobile number for enquiries.

I have been informed that standard of care will be maintained throughout the treatment period.

I in my sound mind give full consent to be added in the part of this study.

Investigator: Dr.Kavitha.G

Participant's signature/ thumb impression
Name:

Signature/thumb impression of the witness: Date:
Name:
Relation to patient:

ರೋಗಿಯಮಾಹಿತಿಹಾಳೆ

ಅಧ್ಯಯನದಶೀರ್ಷಿಕೆ:

"ರೆಕ್ಟಸ್‌ನನೋವುನಿವಾರಕಪರಿಣಾಮಕಾರಿತ್ವದಪ್ರಾಸ್ಪೆಕ್ಟಿವ್ಸ್ ಡಿ

ಸಾಂಪ್ರದಾಯಿಕನೋವುನಿವಾರಕತಂತ್ರಗಳೊಂದಿಗೆಹೋಲಿಸಿದರೆಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯನಂತರದನೋವಿನನಿಯಂತ್ರಣಕ್ಕಾಗಿಮಿಡ್

ಲೈನ್ಸ್ಯಾಪರೊಟಮಿಗೆಒಳಗಾಗುವರೋಗಿಗಳಲ್ಲಿಶೀತ್ಬಾಕ್

ಡಾ.ಕವಿತಾ.ಜಿನಡೆಸಿದಅಧ್ಯಯನ

ಅಧ್ಯಯನಸ್ಥಳ: ಆರ್ಯಲ್ಲಾಲಪ್ಪಆಸ್ಪತ್ರೆಮತ್ತುಸಂಶೋಧನಾಕೇಂದ್ರವನ್ನುಲಗತ್ತಿಸಲಾಗಿದೆ

ಶ್ರೀದೇವರಾಜಅರಸುವೈದ್ಯಕೀಯಕಾಲೇಜು, ಟಮಕ, ಕೋಲಾರ.

ಅಧ್ಯಯನದಉದ್ದೇಶವನ್ನುನಮಗೆವಿವರವಾಗಿವಿವರಿಸಲಾಗಿದೆಮತ್ತುಸಂಗ್ರಹಿಸಲಾದಎಲ್ಲಾಮಾಹಿತಿಯುಅಧ್ಯಯನಉದ್ದೇಶಕ್ಕಾಗಿಮಾತ್ರ.

ಸಂಗ್ರಹಿಸಿದಡೇಟಾವನ್ನುಶಸ್ತ್ರಚಿಕಿತ್ಸಾಇಲಾಖೆ, ಖಿಆಗಒಅ, ಕೋಲಾರಕ್ಕೆಸಲ್ಲಿಸಲಾಗಿದೆಮತ್ತುಗೌಪ್ಯತೆಯನ್ನುಖಾತ್ರಿಪಡಿಸಲಾಗಿದೆ

.ಮೆರಿಟ್ಮತ್ತುಡಿಮೆರಿಟ್‌ಗಳನ್ನುನಮಗೆಸಂಪ್ಷಿಪ್ತವಾಗಿವಿವರಿಸಲಾಗಿದೆ.

ಲ್ಯಾಪರೊಟಮಿಗಾಗಿಪೋಸ್ಟ್ಡಲಾದಎಲ್ಲಾರೋಗಿಗಳನ್ನುಈಅಧ್ಯಯನದಲ್ಲಿಸೇರಿಸಲಾಗುತ್ತದೆ.ಈಅಧ್ಯಯನದಲ್ಲಿರೋಗಿಗಳುವಾಡಿಕೆಯತ

ನಿಖೆಗಳಿಗೆಒಳಗಾಗುತ್ತಾರೆ, ಛಿಛಛಿ ,ಡಿಜಿಣ, ಟಜಿಣ, ಹೆಪ್ಪುಗಟ್ಟುವಿಕೆನಿಯತಾಂಕಗಳು.

ದಯವಿಟ್ಟುಕೆಳಗಿನಮಾಹಿತಿಯನ್ನುಓದಿಮತ್ತುನಿಮ್ಮಕುಟುಂಬದಸದಸ್ಯರೊಂದಿಗೆಚರ್ಚಿಸಿ.ಅಧ್ಯಯನಕ್ಕೆಸಂಬಂಧಿಸಿದಂತೆನೀವುಯಾವುದೇ

ಪ್ರಶ್ನೆಯನ್ನುಕೇಳಬಹುದು.ನೀವುಅಧ್ಯಯನದಲ್ಲಿಭಾಗವಹಿಸಲುಒಪ್ಪಿದರೆ,

ನಾವುನಿಮ್ಮಿಂದಅಥವಾನಿಮ್ಮಿಂದಅಥವಾಇಬ್ಬರಿಗೂಜವಾಬ್ದಾರರಾಗಿರುವವ್ಯಕ್ತಿಯಿಂದಮಾಹಿತಿಯನ್ನು (ಪ್ರೊಫಾರ್ಮಾಪ್ರಕಾರ)

ಸಂಗ್ರಹಿಸುತ್ತೇವೆ.ಸಂಬಂಧಿತಇತಿಹಾಸವನ್ನುತೆಗೆದುಕೊಳ್ಳಲಾಗುವುದು.ಸಂಗ್ರಹಿಸಿದಈಮಾಹಿತಿಯನ್ನುಪ್ರಬಂಧಮತ್ತುಪ್ರಕಟಣೆಗೆಮಾತ್ರ

ಬಳಸಲಾಗುತ್ತದೆ.

ನಿಮ್ಮಿಂದಸಂಗ್ರಹಿಸಲಾದಎಲ್ಲಾಮಾಹಿತಿಯನ್ನುಗೌಪ್ಯವಾಗಿಇರಿಸಲಾಗುತ್ತದೆಮತ್ತುಯಾವುದೇಹೊರಗಿನವರಿಗೆಬಹಿರಂಗಪಡಿಸಲಾಗುವುದಿ

ಲ್ಲ. ನಿಮ್ಮಗುರುತನ್ನುಬಹಿರಂಗಪಡಿಸಲಾಗುವುದಿಲ್ಲ.

ಈಅಧ್ಯಯನವನ್ನುಸಾಂಸ್ಥಿಕನೀತಿಶಾಸ್ತ್ರಸಮಿತಿಯುಪರಿಶೀಲಿಸಿದೆಮತ್ತುನೀವುಸಾಂಸ್ಥಿಕನೀತಿಶಾಸ್ತ್ರಸಮಿತಿಯಸದಸ್ಯರನ್ನುಸಂಪರ್ಕಿಸಲು

ಮುಕ್ತರಾಗಿದ್ದೀರಿ.

ಈಅಧ್ಯಯನವನ್ನುಒಪ್ಪಿಕೊಳ್ಳಲುಯಾವುದೇಒತ್ತಾಯವಿಲ್ಲ. ನಿಮಗೆಸಿಗುವಕಾಳಜಿಇರುತ್ತದೆ

ನೀವುಭಾಗವಹಿಸಲುಬಯಸದಿದ್ದರೆಬದಲಾಗುವುದಿಲ್ಲ.

ಈಅಧ್ಯಯನದಲ್ಲಿಭಾಗವಹಿಸಲುನೀವುಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದಸಮ್ಮತಿಸಿದರೆಮಾತ್ರನೀವುಸಹಿ/ಹೆಬ್ಬೆರಳಿನಗುರುತನ್ನುಒದಗಿಸಬೇಕಾಗು

ತ್ತದೆ.

ಅಧ್ಯಯನದಎಲ್ಲಾವೆಚ್ಚಗಳಿಗೆತನಿಖಾಧಿಕಾರಿಜವಾಬ್ದಾರನಾಗಿರುತ್ತಾನೆ.

ಹೆಚ್ಚಿನಮಾಹಿತಿಗಾಗಿಸಂಪರ್ಕಿಸಿ:

ಡಾ.ಕವಿತಾ.ಜಿ [ಸ್ನಾತಕೋತ್ತರ]

ದೂರವಾಣಿಸಂಖ್ಯೆ:8985614945

ಇಮೇಲ್:ಞಚಿತುಣಚಿರಠಟಿಜಛು28@ರಟಚಬಟ.ಛಿಠಟ

ಜನರಲ್ಸರ್ಜರಿವಿಭಾಗವುರೋಗಿಯಎಡಹೆಬ್ಬೆರಳಿನಗುರುತು/ಸಹಿ

ಖಿಆಗಒಅ, ಕೋಲಾರ

ಎಡಹೆಬ್ಬೆರಳಿನಗುರುತು/ಸಾಕ್ಷಿಯಸಹಿ.

ಮಾಹಿತಿನೀಡಿದಒಪ್ಪಿಗೆ

ಶೀರ್ಷಿಕೆ: "ರೆಕ್ಟಸ್‌ನನೋವುನಿವಾರಕಪರಿಣಾಮಕಾರಿತ್ವದಪ್ರಾಸ್ಪೆಕ್ಟಿವ್ಸ್ ಡಿ

ಸಾಂಪ್ರದಾಯಿಕನೋವುನಿವಾರಕತಂತ್ರಗಳಿಗೆಹೋಲಿಸಿದರೆಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯನಂತರದನೋವಿನನಿಯಂತ್ರಣಕ್ಕಾಗಿಮಿಡ್‌ಲೈನ್ಲ್ಯಾಪರೊಟಮಿ ಗೆಒಳಗಾಗುವರೋಗಿಗಳಲ್ಲಿಶೀತ್ಬ್ಲಾಕ್

ಪ್ರಧಾನತನಿಖಾಧಿಕಾರಿ: ಡಾ.ಕವಿತಾ.ಜಿ

ನಾನು, ಶ್ರೀ/ಶ್ರೀಮತಿ/ಶ್ರೀಮತಿ. .. ನನ್ನಸ್ವಂತಅರ್ಥವಾಗುವಭಾಷೆಯಲ್ಲಿವಿವರಿಸಲಾಗಿದೆ, ನಾನುಅಧ್ಯಯನದಲ್ಲಿಸೇರಿಸಿಕೊಳ್ಳುತ್ತೇನೆ "ರೆಕ್ಟಸ್ಯೀತ್ಬ್ಲಾಕ್ನನೋವುನಿವಾರಕಪರಿಣಾಮಕಾರಿತ್ವದಪ್ರಾಸ್ಪೆಕ್ಟಿವ್ಸ್ ಡಿರೋಗಿಗಳಲ್ಲಿಮಿಡ್ಲೈನ್ ಲ್ಯಾಪರೊಟಮಿಗೆಒಳಗಾಗುವರೋಗಿಗಳಲ್ಲಿನಂತರದಸಂಯೋಜಿತಪ್ರಕ್ರಿಯೆಗಾಗಿ ". ನನ್ನಕ್ಲಿನಿಕಲ್ಸಂಶೋಧನೆಗಳು, ತನಿಖೆಗಳು, ಪೂರ್ವಭಾವಿಮತ್ತುಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯನಂತರದಸಂಶೋಧನೆಗಳನ್ನುಮೌಲ್ಯಮಾಪನಮಾಡಲಾಗುತ್ತದೆಮತ್ತುಅಧ್ಯಯನಉದ್ದೇಶಕ್ಕಾಗಿದಾಖ ಲಿಸಲಾಗುತ್ತದೆಎಂದುನನಗೆವಿವರಿಸಲಾಗಿದೆ.

ಈಅಧ್ಯಯನದಲ್ಲಿನನ್ನಭಾಗವಹಿಸುವಿಕೆಯುಸಂಪೂರ್ಣವಾಗಿಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆಮತ್ತುನಾನುಯಾವುದೇಸಮಯದಲ್ಲಿಅಧ್ಯಯನದಿಂದ ಹಿಂದೆಸರಿಯಬಹುದುಮತ್ತುಇದುನನ್ನವೈದ್ಯರೊಂದಿಗಿನನನ್ನಸಂಬಂಧಅಥವಾನನ್ನಕಾಯಿಲೆಯಚಿಕಿತ್ಸೆಯಮೇಲೆಪರಿಣಾಮಬೀರುವುದಿಲ್ಲ ಎಂದುನನಗೆವಿವರಿಸಲಾಗಿದೆ.

ಈಅಧ್ಯಯನದಿಂದಉತ್ಪತ್ತಿಯಾಗುವವೈದ್ಯಕೀಯಮಾಹಿತಿಯುಸಾಂಸ್ಥಿಕದಾಖಲೆಗಳಭಾಗವಾಗುತ್ತದೆಮತ್ತುಮೇಲೆತಿಳಿಸಿದಸಂಸ್ಥೆಯುಗೌಪ್ಯ ವಾಗಿಡುತ್ತದೆಎಂದುನಾನುಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ಈಅಧ್ಯಯನದಿಂದಉಂಟಾಗುವಯಾವುದೇಡೇಟಾಅಥವಾಫಲಿತಾಂಶದಬಳಕೆಯನ್ನುನಿರ್ಬಂಧಿಸದಿರಲುನಾನುಸಮ್ಮತಿಸುತ್ತೇನೆ, ಅಂತಹಬಳಕೆಯನ್ನುಕೇವಲವೈಜ್ಞಾನಿಕಉದ್ದೇಶ(ಗಳಿಗೆ)

ವಿಚಾರಣೆಗಾಗಿನಾನುಪ್ರಧಾನತನಿಖಾಧಿಕಾರಿಯಮೊಬೈಲ್ಸಂಖ್ಯೆಯನ್ನುಹೊಂದಿದ್ದೇನೆ.

ಚಿಕಿತ್ಸೆಯಅವಧಿಯುದ್ದಕ್ಕೂಆರೈಕೆಯಗುಣಮಟ್ಟವನ್ನುನಿರ್ವಹಿಸಲಾಗುವುದುಎಂದುನನಗೆತಿಳಿಸಲಾಗಿದೆ.

ಈಅಧ್ಯಯನದಭಾಗದಲ್ಲಿಸೇರಿಸಲುನನ್ನಉತ್ತಮಮನಸ್ಸಿನಲ್ಲಿನಾನುಸಂಪೂರ್ಣಒಪ್ಪಿಗೆಯನ್ನುನೀಡುತ್ತೇನೆ.

ತನಿಖಾಧಿಕಾರಿ: ಡಾ.ಕವಿತಾ.ಜಿ

ಭಾಗವಹಿಸುವವರಸಹಿ/ಹೆಬ್ಬೆರಳಿನಗುರುತು ಹೆಸರು:

ಸಾಕ್ಷಿಯಸಹಿ/ಹೆಬ್ಬೆರಳಿನಗುರುತು: ದಿನಾಂಕ: ಹೆಸರು:
ರೋಗಿಗೆಸಂಬಂಧ:

MASTER CHART

MASTER CHART

Sl no	Ag e	end er		AS A class	Weight	Height	BMI	Diagnosis	Length of incision	Duration of surgery	VAS	NRS	Ave rse event s	Require ment of rescue analgesia within24 hrs	Duration of hospitalstay	Patient's satisfaction
		1- Male -37		Class1 -26	1-≤ 150 cms- 2	1-≤ 150 cms -2	1- Normal- 37	1-Gastric perforation peritonitis -10	1-≤ 12 cms- 27	1-≤ 120 minute s -13	1- Mild pain (score 2-4) - 39	1-Mild pain (score 1-3) - 32	1- Present- 7	1-Yes- 13	1 -≤7 days- 36	1- Present- 52
		2- femal e-23		Class 2- 34	2- 51- 70 kgs- 31	2- 151- 160 cms -16	2- Overweight -20	2 - Blunt abdominalinjury- 5	2-> 12 cms- 33	2- 121- 150 minute s - 24	2- Moderate pain (score 5-7)- 19	2- Moderate pain (score 4-6) - 22	2- Absent- 53	2 -No -47	2 ->7 days- 24	2- Absent- 8
					3-71- 90 kgs- 21	3- 161- 170 Cms-21	3- Obese- 3	3- Strangulated umbilical hernia- 11		3-> 150 minute s - 23	3- Worst pain (score 8-10) - 2	3- Severe pain (score 7-10)- 6				
					4-> 90 kgs- 5	4- 171- 180 cms -16		4- Small bowel obstruction -17								

						5-> 180 cms -5		5- Appendicular perforation-8								
								6- Sigmoid volvulus- 9								
1	38	1	136226	2	87	151	1	3	1	151	1	1	1	2	2	1
2	41	2	188656	2	61	171	1	6	2	121	2	2	1	2	1	1
3	48	1	885101	1	86	182	2	2	1	112	2	3	1	1	2	1
4	35	2	157050	2	51	173	1	4	2	132	1	2	1	2	2	1
5	51	1	258861	2	91	135	1	1	2	152	2	1	1	2	1	1
6	49	2	239269	2	52	161	1	5	1	111	1	2	1	1	1	2
7	37	1	186205	1	85	152	3	3	2	133	1	2	1	2	2	1
8	42	2	129471	2	60	183	1	6	1	153	2	2	2	2	2	1
9	50	2	173478	1	71	172	2	3	1	122	1	3	1	2	1	1
10	29	1	135249	2	62	162	1	4	2	113	1	1	1	2	1	1

11	31	1	246685	2	88	174	1	1	2	154	1	2	2	1	1	2
12	56	2	181431	2	52	165	1	6	1	134	2	1	1	2	2	1
13	43	2	157050	1	72	173	2	5	1	114	1	1	1	2	1	1
14	54	1	235465	2	51	153	1	3	2	123	2	3	1	1	1	1
15	41	2	244415	1	90	163	1	2	2	155	1	1	1	2	2	1

16	28	1	925656	2	61	136	1	4	1	135	1	2	1	2	1	1
17	32	1	221952	2	53	175	1	4	1	115	1	2	1	2	2	2
18	27	2	235305	1	89	151	1	6	1	156	2	1	1	1	1	1
19	44	1	267443	2	84	164	2	4	2	116	1	3	2	2	1	1
20	39	1	269635	2	63	154	1	5	1	124	1	2	1	1	1	1
21	58	1	268489	1	60	174	1	1	2	163	3	1	1	2	2	1
22	45	2	265608	2	54	184	2	4	2	117	1	2	1	2	2	1
23	34	1	266299	2	92	152	1	5	1	157	2	3	1	2	1	1
24	26	2	240193	1	53	170	2	3	1	136	2	1	1	2	1	1
25	36	1	264707	1	64	155	1	4	2	118	1	2	1	1	2	2
26	46	1	264874	2	73	165	2	2	1	125	1	1	1	1	2	1
27	42	1	261624	2	88	169	1	1	2	158	1	2	1	2	1	1
28	33	2	258146	1	55	156	3	6	2	119	2	1	1	2	1	1
29	43	1	2499	2	83	175	2	4	2	162	1	1	1	2	1	1

			15													
30	47	1	233569	2	70	153	1	3	1	137	2	1	2	2	2	1
31	31	2	239509	1	74	166	1	4	2	159	1	2	1	2	2	2
32	41	1	227700	2	65	157	2	5	1	161	1	2	1	1	2	1
33	25	2	221952	1	93	176	2	1	2	126	2	1	1	2	1	1
34	51	2	219600	2	59	168	1	6	1	138	1	1	1	2	1	1
35	42	1	233215	2	82	185	2	3	2	160	1	2	1	2	1	1
36	32	1	231199	1	56	154	1	1	1	127	1	1	1	2	2	1
37	52	2	235879	2	75	167	1	4	1	161	3	1	1	2	1	1

38	26	2	235908	1	58	177	2	4	1	170	1	2	1	1	2	1
39	43	1	208282	2	81	167	1	2	2	139	2	1	1	2	1	1
40	33	2	213135	2	66	158	1	5	1	162	1	1	1	2	2	2
41	53	1	215793	1	76	176	1	3	2	120	1	2	1	2	1	1
42	30	1	208737	2	94	178	2	1	2	128	1	1	2	2	1	1
43	34	2	220728	2	57	168	1	6	2	115	2	2	1	2	1	1
44	44	1	201513	1	45	155	2	4	1	140	1	1	1	1	1	1
45	40	1	31789	1	54	166	1	4	2	169	1	1	1	2	1	1
46	45	1	362395	2	95	165	1	1	2	163	1	3	1	2	2	1
47	35	2	366182	2	67	179	1	4	1	141	1	1	1	2	1	1
48	27	1	307254	2	46	186	2	4	1	116	1	1	1	2	1	2
49	49	2	293289	1	77	156	1	3	2	164	2	1	1	1	1	1
50	36	1	303511	2	57	169	1	6	1	168	1	2	1	1	1	1
51	54	1	3886	2	47	159	3	1	2	142	1	1	1	2	2	1

			48													
52	39	1	351120	2	58	180	1	4	2	165	1	2	1	2	1	1
53	48	2	343948	1	80	164	2	3	1	129	1	1	1	2	2	1
54	37	1	355290	2	55	171	2	4	2	117	2	1	2	2	1	1
55	46	1	352640	2	78	170	1	2	2	143	1	1	1	2	2	1
56	28	1	301757	1	68	161	1	5	2	166	2	2	1	1	1	1
57	55	1	344356	2	56	163	2	1	1	130	1	1	1	2	1	2
58	38	1	354656	2	79	172	2	6	2	167	2	1	1	2	2	1
59	47	2	342414	1	59	160	1	3	2	144	2	1	2	2	2	1
60	29	1	352040	2	69	162	2	5	2	131	1	2	1	2	1	1