ORIGINAL RESEARCH

Effect of preincisional ilioinguinal and iliohypogastric nerve block on post operative pain after hernia repair

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ABSTRACT
Objectives: The purpose of the study is to evaluate the effectiveness of ilioinguinal –iliohypogastric nerve block in post operative analgesia in patients undergoing inguinal herniorraphy **Methods:** Inguinal herniorraphy was carried out under spinal anaesthesia. Subsequently 60 patients belonging to ASA physical status I and II were randomized into 2 groups of 30 each. Group B received landmark based ilioinguinal / iliohypogastric nerve block using 0.75% ropivacaine 14 ml to the same half of the surgical side while Group C received the same volume of normal saline. **Results:** Excellent post operative pain relief was afforded in subjects receiving ilioinguinal /iliohygastric nerve block (Group B) for up to 4 hours post –operatively. The time to rescue analgesia was also prolonged in the study group as compared to the control group 9.5 hours versus 5.42 hours. The cumulative dose of analgesic consumed was also less in the study group as compared to control group 25 mg versus 72.5mg. **Conclusion:** Pre-incisional Ilioinguinal, Iliohypogastric nerve blocks with 14 ml (0.75%) ropivacaine along with spinal anesthesia is effective in managing pain following inguinal hernia repair. It is evident from our study that this technique significantly reduces postoperative pain perception and analgesic requirement.
Keywords: ilioinguinal nerve block, iliohypogastric nerve block, ropivacaine, inguinal herniorraphy.

INTRODUCTION

Necessity is the mother of invention" is a famous English proverb. Pain has always been the most unwanted sensation of human being and an attempt to alleviate it, has been an important field of medical science advancement.

The Taxonomy committee of International Association for the Study of Pain (IASP) defines pain as "An unpleasant sensory and emotional experience associated with actual/potential tissue damage or described in terms of such damage.[1]

Effective pain control is essential for optimal care of surgical patient. Providing postoperative analgesia to the patient gives subjective comfort, helps in restoring the altered physiology and immunological response. Postoperative pain is a self-limiting phenomenon, most severe during the 1st day following surgery, diminishing over the next 24 hours and minimal after 3rd and 4th day. This mechanism is not well understood but it has been hypothesized that once the oxygen supply and metabolic demands are fulfilled, the pain response is decreased.

Severe postoperative pain may have consequences increasing the stress response to surgery seen as a cascade of endocrine, metabolic and inflammatory events that ultimately may contribute to organ dysfunction, morbidity, increased hospital stay and mortality. The pain often causes the patient to remain immobile, thus becoming vulnerable to deep venous thrombosis, pulmonary atelectasis, muscle wasting and urinary retention. Besides restlessness caused by severe pain may contribute to postoperative hypoxemia.[2] Assessing postoperative pain is very important. The aim of assessment is to determine the intensity, quality and duration of pain, to decide the choice of therapy and to evaluate the relative effectiveness of different therapies. Approaches to the measurement and assessment of pain include verbal and numerical rating scales, visual analogue scale (VAS), behavioral observation scales and

psychological responses. Of these there are various ways to control postoperative pain: [2,3]

1. Pharmacological methods: systemic opioids, neuraxial analgesia, non opioids techniques like local infiltration and NSAIDs, analgesic adjuvant NMDA antagonists (Ketamine, dextromethorphan, Mg, adenosine), alpha-2 agonist (low dose clonidine given neuraxially), naloxone, steroids, gabapentine etc.
2. Non Pharmacological Methods: Complimentary and alternative medicine (CAM), herbal medicine, hypnosis, homeopathy, therapeutic touch, meditation, transcutaneous nerve stimulation (TENS) [4] applied with a relevant, strong, subnoxious intensity and adequate frequency in the wound area may reduce analgesic consumption in the postoperative period. Heat application, cryoanalgesia, acupuncture are other non-pharmacological means which may prove to be of value in acute pain management especially in the postoperative period.

Inguinal hernioplasty is one of the most common procedures performed in general surgery[5]. Effective pain management following surgery has a significant influence on postoperative recovery and hospital stay of the patients[6].

A wide variety of analgesics is available for postoperative pain management. Commonly used analgesics include NSAIDs, opioids etc. The use of these conventional analgesics is associated with their accompanying side effects and secondly their efficacy in relieving pain is also questionable[7].

To counter this aforementioned observation regional anesthesia has come into vogue. It has been claimed to be an effective alternativein postoperative pain management[8] and in fact is considered to be as good as caudal block[9]. Preemptive analgesic administration reduces post-operative pain intensity[10] and current evidence shows that it reduces hospital stay and overall costs[11, 12].

The objective of our study is to substantiate the effectiveness of ilioinguinal and Iliohypogastric blocks with ropivacaine in reducing the postoperative pain, time elapsed for first analgesic dose demand and hospital stay following inguinal hernioplasty.

AIM AND OBJECTIVES

AIM

- To find a novel post operative analgesic technique for patients undergoing inguinal hernia repair.

PRIMARY OBJECTIVE

- Analgesic duration due to Ilioinguinal and iliohypogastricnerve blocks in hernia surgery.

SECONDARY OBJECTIVE:

- Postoperative analgesic requirement.
- Associated side effects if any.

MATERIAL & METHODS

METHODOLOGY

Approval from institutional ethics committee and written inform consent taken.

1. TYPE OF STUDY:

Prospective, Randomized double blind comparative study.

2. STUDY CENTRE:

Study is conducted in the Department of Anesthesiology N.S.C.B. Medical College Jabalpur.

3. DURATION OF STUDY:

1st March 2016 to 31st August 2017

Sixty patients of either sex, age > 18 years were included and divided in two groups

Groups	Drugs Used	No. of Patients
Test	0.75% Ropivacaine	30
Control	Normal Saline	30

4. CRITERIA OF INCLUSION:

- Patients of age more than 18 years.
- ASA class I & II who have undergone elective surgery for hernia repair.

5. CRITERIA OF EXCLUSION:

- Patients allergic to NSAIDs.
- Patients allergic to local anesthetics.
- Patients using analgesics for some other reason.

6. PROCEDURE PLANNED:

- Careful pre anesthetic examination was performed and informed consent taken.

Under all aseptic precautions spinal block was given at L_3-L_4 inter vertebral space in lateral position using 25G Quincke spinal needle with the operative side down, using injection bupivacaine 0.5% (heavy).The dose of Bupivacaine used is constant i.e15mg.After obtaining sensory block due to spinal anesthesia, ilioinguinal and iliohypogastric block was performed as per the technique described in the NYSORA web site. Ropivacaine was injected with a blunt tipped needle at a point2 cm medial and 2 cm superior from anterior superior iliac spine. A total of 14 ml of the local anesthetic was injected indifferent planes of the skin and muscles. This method of block allows accurate placement of local anesthetic both between the transverses abdominis and internal oblique muscles as well as between the internal oblique and external oblique muscles. In test group, 14 ml of 0.75% ropivacaine and in control group 14 ml of normal saline was infiltrated which was unknown to observer.

Post-operative VAS was assessed at 2hrs, 4hrs, 6hr, 8hrs, 12hrs and 24 hrs.

Each patient received a scheduled dose of intravenous paracetamol 1 gm 6 hourly for up to 24 hours postoperatively.

Patients having breakthrough pain which is defined as VAS >4 received injection diclofenac sodium 75 mg i/m, which was to be repeated so as to keep VAS ≤ 4.

DATA COLLECTION

All the records were recorded by using structured schedule (Case Report Form) and entered in Microsoft Excel Sheet.

STATISTICAL ANALYSIS PLAN

All records were rechecked for their completeness and consistencies. Non numeric entries were coded numerically into nominal/ordinal distribution before analysis. Categorical variables were summarized in frequency and percent distribution and Chi-square or Fisher exact test performed as appropriate. Continuous variable was analyzed using mean ± sd or median with inter quartile range as appropriate. The p-value was determined using independent-samples T test and Mann-Whitney test (p value of <0.05 was aimed).

OBSERVATION & RESULTS

Table: 1 Patients characteristic & surgery time

	R-Group (30)	C-Group (30)
Mean Age (Years)	52.03±12.95	43.73±12.58
Mean Weight (Kg)	63.23±7.44	63.66±7.22
Sex (Male)	30	30
ASA I/II	18/12	20/10
Mean Surgical Time (mins)	59.76±10.49	61.2±13.53

- In both the groups, patients demographic variables were comparable (p>0.05).

Table: 2 Age distribution

Age (Years)	Group R	Group C	Total
21-30	3	5	8
31-40	2	9	11
41-50	4	5	9
51-60	10	8	18
61-70	11	3	14

Graph: 1 Age distribution

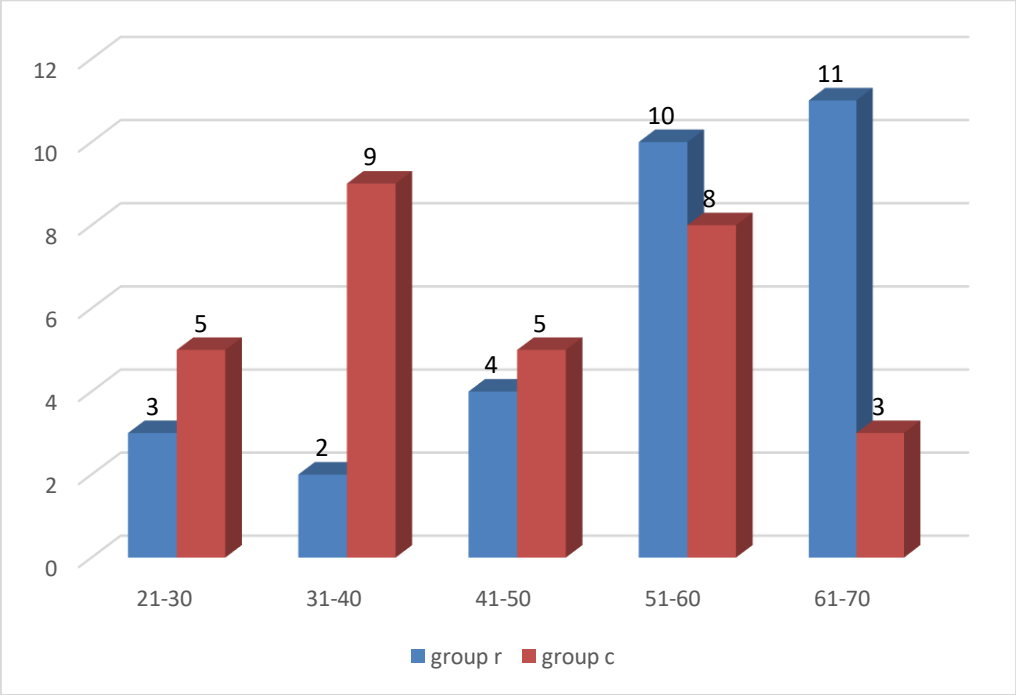


Table: 4 Weight wise distribution

Weight (Kg)	Group R	Group C	Total
Up to 60	11	9	20
61-70	14	14	28
71-80	5	7	12

Graph: 3 Weight wise distribution

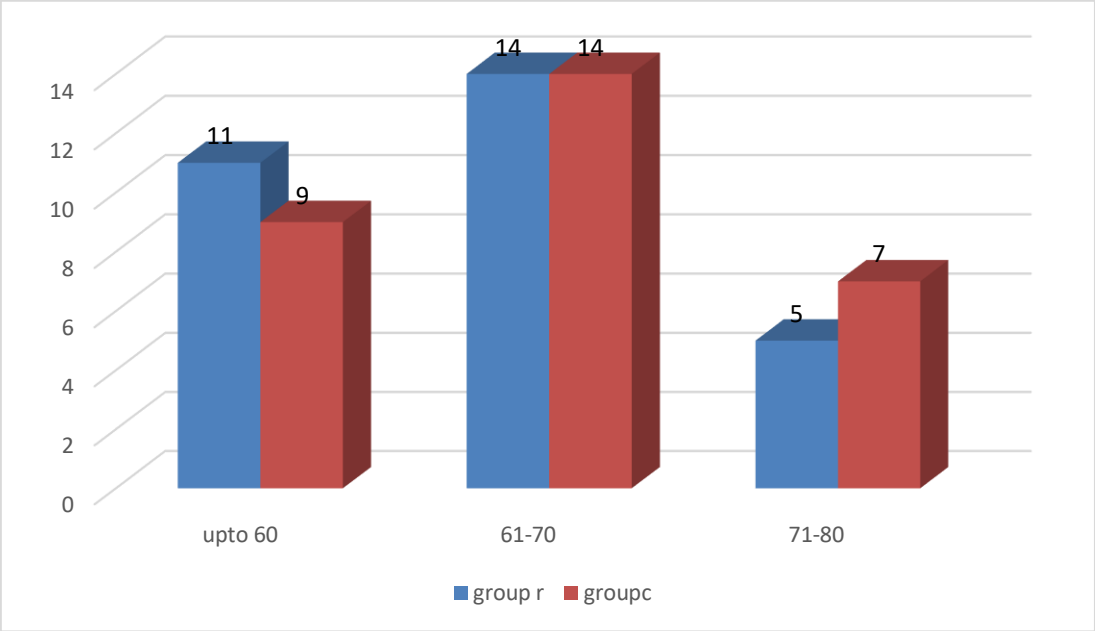


Table: 7 VAS comparisons

S.no	Time (hr)	C- Group (30) median VAS	R - group (30) median VAS	p value
1	2	2	1	0.015
2	4	4	2	0.0001
3	6	3	2	0.0002
4	8	4	3	0.0005
5	12	5	3	0.0239
6	24	3	3	0.2299

Graph: 6 VAS comparisons

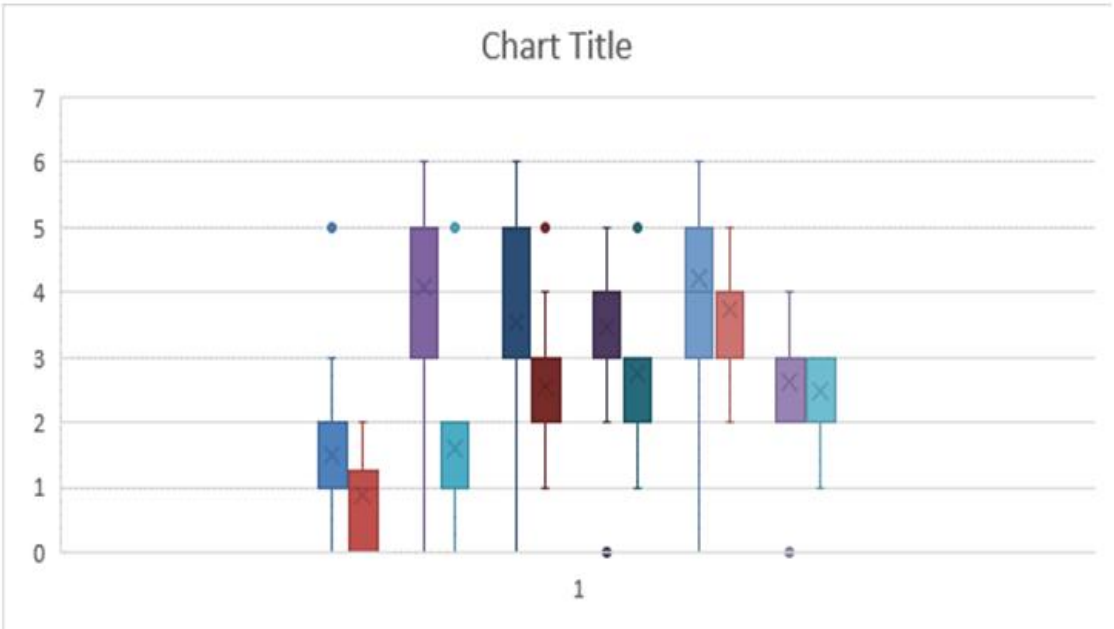


Table: 8 Time for first rescue analgesia

Group	Mean (Hrs)	Std. Deviation
R- Group	9.5	2.84
C-Group	5.42	2.39

p value<.0001

Graph: 7 Time for first rescue analgesia

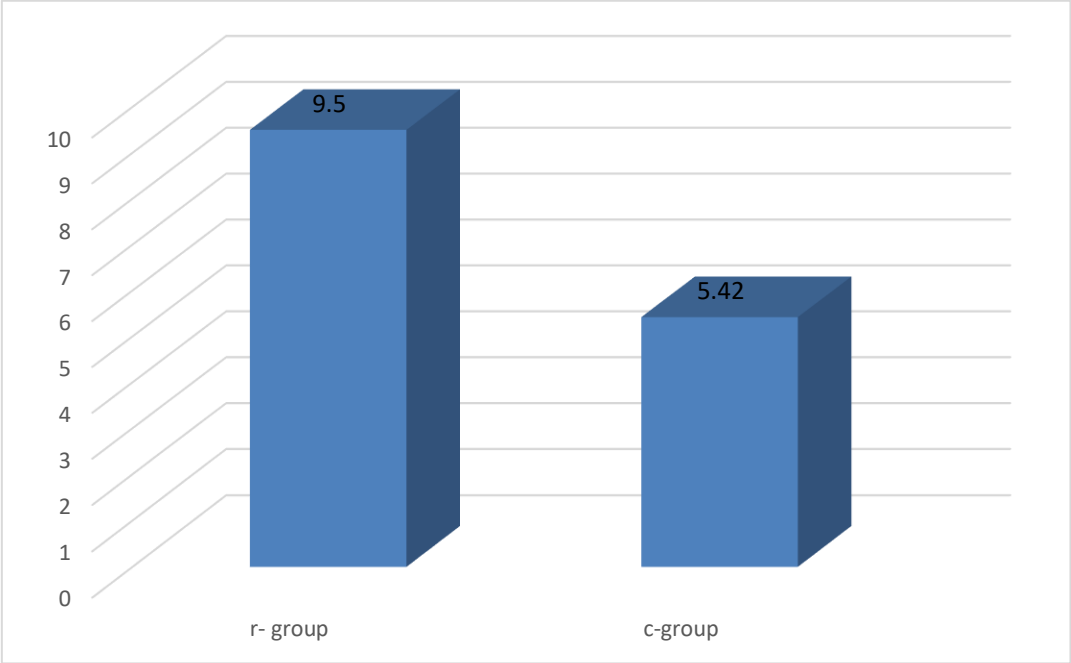


Table: 9 No. of patients receiving rescue analgesia

Column1	Column2
R-IINB	S-IINB
12(40%)	24(80%)

Graph: 8 No. of patients receiving rescue analgesia

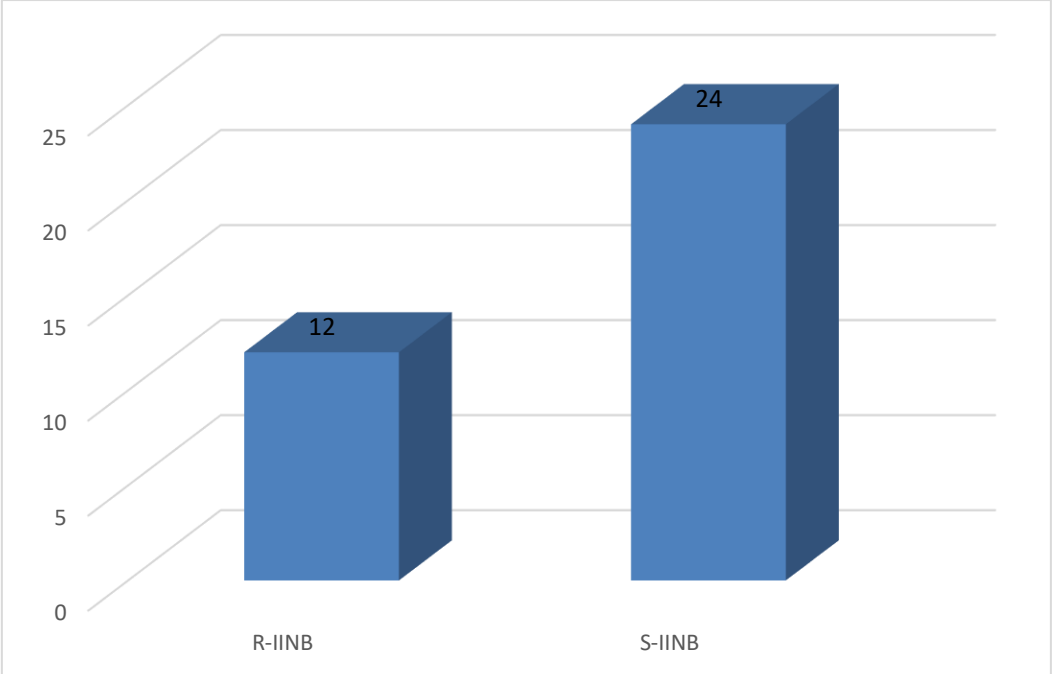
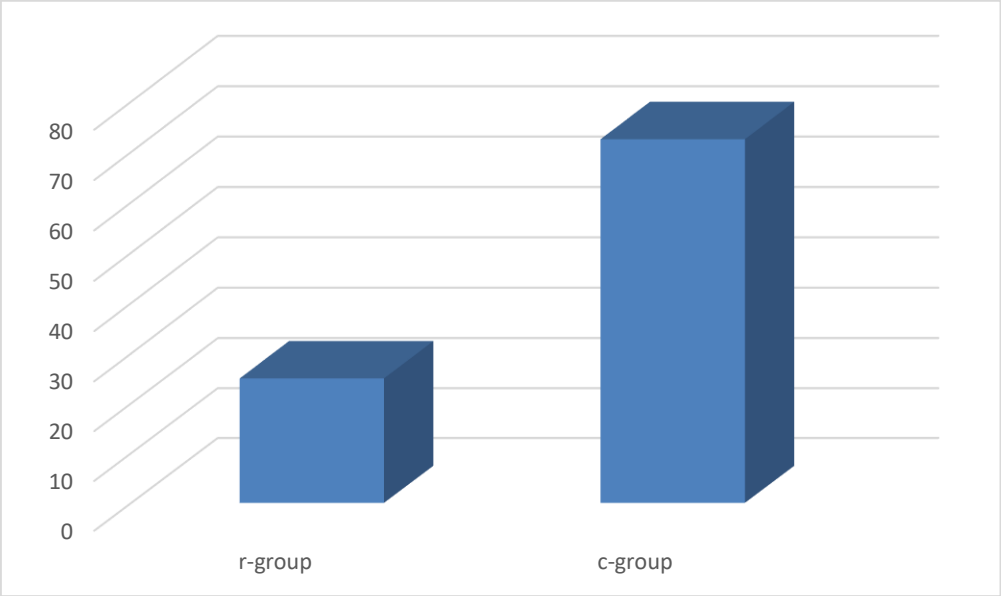


Table: 10 Comparisons of mean dose of diclofenac

Group	N	Mean (mg)	P Value
R- Group	30	25	<.001
C-Group	30	72.5	

Graph: 8 Comparison of mean dose of diclofenac



DISCUSSION

Pain of any origin demands readressal, this in addition to being the right of a patient is also the standard of care in modern medicine. Effective pain control is essential for optimal care of surgical patients. Providing postoperative analgesia to the patients gives subjective comfort, helps in restoring the altered physiology and immunological response.

Postoperative pain is self limiting phenomenon, most severe during the 1st day following surgery, diminishing over the next 24 hours and minimal after 3rd and 4th day. Postoperative pain is considered as a form of acute pain due to surgical trauma with an inflammatory reaction and initiation of an afferent neuronal barrage. It is an assemblage of severe unpleasant sensory, emotional and mental experience precipitated by the surgical trauma and associated with autonomic, endocrine, metabolic, physiological and behavioral response[2].

There are various ways to control the pain, among which certain procedures are common to reduce the pain in case of open inguinal hernia repair. The choice of anesthetic technique for inguinal hernioplasty is based on the preference of the surgeon, anesthesiologist, and patient, complexity and duration of the procedure, ease of execution, length of recovery and cost benefit[11, 20.]

Additional application of field block and/or ilioinguinal and iliohypogastric nerve block to spinal or general anesthesia in inguinal herniorraphy/hernioplasty have better patient outcome in terms of cost-benefit, speed of recovery, patient satisfaction[25].Despite these advantages, according to the majority of studies, local anesthesia is used in only 10%to 15% of herniorrhaphies[43,12] which seems to be related to the lack of information among surgeons and anesthesiologists about the technique, technical ability to perform the block and anatomical variations regarding the distribution of these nerves.[23,24]

In the present study we have observed that pain, as per the VAS, was lowered for upto 12 hours after surgery in test group when compared to control group. In our study, median VAS was 1, 2, 2, 3, 4, 3 in test group at 2, 4, 6, 8, 12, 24 hours postoperatively while it was 2, 4, 3, 4, 5, 3 in control group at same time intervals with p value of 0.015, 0.0001, 0.0002, 0.0005, 0.02, and 0.23. In between 12 to 24 hours there is no significant VAS difference among the groups. Toivoenet al[19] in their study using (0.5%) bupivacaine as infiltrate for ilioinguinal and iliohypogastric nerve block observed a significant VAS difference uptill 4 hours post operatively. After that there was no significant difference in VAS.

However, Dierking et[15] in their study regarding effect of pre vs postoperative inguinal field block on postoperative pain after herniorraphy showed no significant difference between the groups in terms of VAS scores or verbal pain scores during rest or ambulation at any time. There was no significant difference in time to first request for morphine or total morphine consumption. Their results did not show that pre-emptive analgesia with a conventional inguinal field block to be of clinical importance compared with a similar block administered after operation. Results of our study are not congruent to the study result of Dierking et al.

Bugedo et al [14] in their study of the safety, effectiveness and duration of percutaneous ilioinguinal-iliohypogastric nerve block with 10 ml (0.5%) bupivacaine, as a method for postoperative analgesia, in adult patients undergoing unilateral inguinal herniorrhaphy under spinal anesthesia observed that patients had less pain at 3, 6, 24 and 48 hours after surgery and also required less analgesics uptill 48 hours. They concluded that this technique appears to be a simple and safe method for providing effective and long-lasting postoperative analgesia following inguinal hernia repair in adults. Our study is

in full agreement to the results shown by study of Bugedo et al. Guilherme de Castro Santos et al[22] in their study using 10ml of 0.75% ropivacaine in ilioinguinal&iliohypogastric infiltration block along with wound infiltration with the same has observed significant difference in VAS for upto 3 hours postoperatively(p<05). The results of our study are in agreement to their study but our study results showed a prolonged duration of pain relief.

Ding, P.F. White et al[23] in their study using (0.25%) bupivacaine for ilioinguinal nerve block has observed significant difference in VAS in patients undergoing inguinal hernioplasty using TIVA. However their effectiveness of ilioinguinal & iliohypogastric nerve block is quite less (1hr) when compared to our study (12 hours).

Aasbo V et al[28] has observed significant difference in VAS in whom the inguinal field block was applied. They applied the field block using 50-60ml of ropivacaine. VAS was significantly lower in the ilioinguinal field block group, 6.5± 12 vs 28 ±22 (p < 0.001) on admission to the recovery room. 4.6±6.7 vs 32 ± 22 at first postoperative hour (p value<0.001) & 6.6±7.6 vs 21±18 at 2 hour postoperatively (p 0.002). VAS was significantly lower at all time intervals except at 24 hours and day 7.

Preoperatively, there was significant difference in fentanyl (mcg) administered, 48±39 in test group while 102±24 in control group. Propofol consumed (mg) was 51 ±77 in test group while 597±222 in control group. Paracetamol consumed (gm) was 1.07±1.0 in test group while 2.95±7.09 in control group. Codeine consumed (mg) within 24 hour was 60±57 in test group while 43.4±49.8 in control group. Amount of analgesic consumption in first 24 hours postoperatively and time till the first dose of analgesic being administered was significant between the two groups as observed in our study. We have used diclofenac as rescue analgesic whenever there was VAS>4 and the subjects were provided intramuscular 75 mg diclofenac. In our study, the mean time to first analgesic dose demand was 9.5 hour, SD ± 2.85 in test group while it was 5.42 hours, SD ± 2.39 in control group(p value<0.0001) which was highly significant. Bugedo et al[17] also observed that the patients who were applied ilioinguinal & iliohypogastric nerve block consumed less amount of analgesic during the first two postoperative days. Median and 25-75th percentile pain scores during post-operative period were significantly different. Mean analgesic requirement (Mepiridine) was 10± 5 mg in test group while it was 45 ± 10 mg in control group. Mean clonixin consumption was 655± 233 mg in test group while it was 1676 ± 356 mg in control group. Total number of dosage (Median and 25-75th percentile) was 2(0-3.0) in test group while 5(3.8-6.3) in control group.

In our study comprising 60 patients, number of patients in test group requiring rescue analgesia within 24 hours was 12(40%) while they were 24(80%) in control group(p<0.05). Mean dose of analgesic required in test group was 25 mg while in control group was 72.5 mg (p<0.01).

J.Toivonen et al[19] too observed that fewer patients in their field block group received supplemental analgesics (52% vs 78%) and also the mean number of doses of supplementary analgesics in the field block group was less(658 mg of ketoprofen vs 806 mg). Although similar number of patients received post-operative analgesics (ketorolac & fentanyl) in the postoperative period, the average time latency to do so widely differed between the two groups(8.1 vs 4.3 hours). Saeed M et al[25] showed that the time to the first dose of analgesic was prolonged in their inguinal field block group using 0.75% ropivacaine (1.19 vs 5.31 hours). The hospital stay was also shorter in the field block group (14.1 vs 5.31hours).

Our result were contradictory to the observation took by Guilherme de Castros et al[31] where the time to the first dose of dipyrone, ketorolac & nalbuphine did not differ between their control group and the group who received inguinal field block (4.0, 6.2, 6.6 hours vs 5.0 , 7.78 , 8.5 hours). The number of doses of each drug in either group was also similar postoperatively.

Roshan Radhakrishnan et al[26] in their study of ilioinguinal and iliohypogastric nerve block in hernia repair surgeries under spinal anesthesia using (0.75%)ropivacaine observed significant difference of VAS between the groups at 3, 6 & 12 hours. Mean time before the first dose of ketorolac, diclofenac and tramadol did not differ between the two groups. In test group it was 4.0 ±2.1 hours while 6.2±2.7 hours in control group.

William F Casey et al[13] compared the pain relief by simple instillation of bupivacaine into a hernia wound with that provided by ilioinguinal /iliohyogastric nerve block using (0.25%) bupivacaine at the dose of 0.25 ml/kg . They concluded that wound instillation was as effective as that provided by ilioinguinal /iliohypogastric block. Our study was congruent with the results of their study demonstrating the effectiveness of inguinal field block in providing postoperative pain relief.

C.A Harrison et al[16] using (0.5%) bupivacaine for Preincisional ilioinguinal and iliohypogastric block along with infiltration at the proposed incision site for patients undergoing herniorraphy under general anesthesia. Each patient received constant morphine infusion postoperatively. They observed that there was no significant difference in VAS at rest in test and control group while there was significant difference in VAS on movement. Median rate for use of morphine in the Bupivacaine group was lower in the test group in initial hours (1.0 vs 2.67 mg/hour) and overall (0.67 vs 1.08 mg/hour) over 24 hours. Median time to first analgesic dose was 67.5(15-226) min in the Bupivacaine group and 26(13-65) min in the saline group (p< 0.0001). Our results are too in agreement to this study showing the efficacy of inguinal field block.

There was no significant difference between the test group and control group regarding the adverse effects. Postoperative nausea and vomiting was noticed in 2 patients in test group and 3 patients in control group. No post dural puncture headache, transient neurological symptoms or any other serious complication owing to the spinal anesthesia occurred in the study patients.

J.Toivonen et al [19] also noticed similar results in terms of postoperative nausea, vomiting and urinary retention. Although simple to apply, wound instillation or spray with local anesthetic provides only moderate pain relief and has not been found better than local anesthetic infiltration.

SUMMARY

This study was designed to evaluate analgesia (pain intensity and analgesic consumption) and adverse effect on patients who underwent ilioinguinal (II) and iliohypogastric (IH) nerve block with (0.75%) ropivacaine after inguinal hernia repair surgery under spinal anesthesia. This was a prospective, randomized, double-blind study with 60 patients undergoing inguinal hernia repair. Patients were divided into two groups: control (C) and II and IH nerve block (B). Group C (n = 30) received spinal anesthesia with 15 mg hyperbaric (0.5%) bupivacaine along with infiltration of 14ml of normal saline and Group B (n = 30) received spinal anesthesia with 15 mg hyperbaric (0.5%) bupivacaine along with ilioinguinal and iliohypogastric nerve block (14 mL of 0.75% ropivacaine). The following data were analyzed: demographic data, pain intensity according to the visual analog scale (VAS), and number of doses of analgesic (diclofenac) in the immediate postoperative period. The VAS at rest was significantly lower in Group B compared with Group C ($p < 0.05$), ten hours after the procedure. The number of dose of analgesic required during the postoperative period was significantly different among the groups. We can conclude that ilioinguinal and iliohypogastric nerve block with (0.75%) ropivacaine provides better postoperative analgesia for in patients undergoing inguinal hernia repair under spinal anesthesia.

CONCLUSION

Preincisional Ilioinguinal, Iliohypogastric nerve blocks with 14 ml (0.75%) ropivacaine along with spinal anesthesia is effective in managing pain following inguinal hernia repair. It is evident from our study that this technique significantly reduces postoperative pain perception and analgesic requirement. We suggest that this block should be included on regular basis in routine surgeries of hernioplasty.

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