



## Original Research Article

## A clinical study: Inguinal hernia repair under local block

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## ABSTRACT

**Objectives:** This study was conducted to evaluate advantages of local anaesthesia in high risk patients and to assess patient's satisfaction, speed of recovery and postoperative analgesia.**Materials and Methods:** In our study we gave combined Ilioinguinal and Iliohypogastric nerve block with field block in 30 patients. The patients were monitored for hemodynamic changes and total duration of analgesia and quality of analgesia.**Results:** In this study 23% patients were of ASA I, 30% ASA II and 46.7% had ASA III grade. All patients were hemodynamically stable throughout procedure and surgery. Average duration of the analgesia was 188 min (about 3 hours). Quality of analgesia was excellent in 66.6% patients, good in 16.6% patients, poor in 6.6% patients and 10% patients had severe intolerable pain and converted to GA.**Conclusion:** We found that inguinal hernia repair under local anaesthesia was safe, simple, cost-effective and also provides good postoperative analgesia. It is more useful in high risk patients where we need to avoid effects of general, spinal or epidural anaesthesia for hernia surgeries.© This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## 1. Introduction

Hernia defined by Sir Astley Cooper (1804) as “protrusion of any viscus or part of the viscus through an abnormal opening in the walls of its containing cavity”.<sup>1</sup> A wide variety of anaesthetic techniques have been used for inguinal hernia repair such as local anaesthesia, spinal/epidural anaesthesia and general anaesthesia.<sup>2</sup> The patients of hernia repair always have some chronic factor which leads to formation of hernia.<sup>3</sup> Also, these patients have associated systemic disease like Ischemic Heart Disease, Diabetes Mellitus, Hypertension, COPD etc. Due to all these factors patients undergoing hernia repair surgery have higher chances of being in the ASA class II/III so higher risk to operate these patients under general, epidural or spinal anaesthesia.

Dr Harvey Cushing reported in the Annals of Surgery in 1900s that, “Almost all cases of hernia, with the possible

exception of those in young children, could undoubtedly be subjected to the radical operation under local anaesthesia.” Local Anaesthesia for inguinal hernia repair is a good alternative type of anaesthesia. It is safe, more economic and requires a shorter time in the operating room and shorter stay in the institution. Most importantly, local anaesthesia is the most suitable type of anaesthesia in elder, fragile patients and patients with ASA II-IV scores as it avoids airway manipulation and the unwanted effects of anaesthetic drugs used during general anaesthesia.<sup>4</sup> And it can be mastered with little training. These advantages initiated us to do this study of hernia operation under local anaesthesia.

## 2. Aims and Objectives

1. To evaluate the advantage of field block for hernia repair over general, spinal or epidural anaesthesia.
2. To study how local nerve block can provide safe and quick anaesthesia to geriatric patient who usually have associated co morbid disease.

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3. To study local nerve blocks by assessment of patient's satisfaction, speed of recovery and early ambulation leading to earlier discharge.
4. To assess duration and quality of post operative analgesic effect of local block.

### 3. Materials and Methods

This clinical study was undertaken in 30 patients aged 18-60 years posted for elective inguinal hernia repair, agreeing and co-operative for inguinal field block. Study was conducted in Vadilal Sarabhai Hospital attached to Smt NHL Municipal Medical College during august 2016 to September 2017 after ethical committee approval.

#### 3.1. Selection of patients

Inclusion criteria: Adult male above 18 years age belonging to American Society of Anaesthesiologists (ASA) Grade I to IV coming for elective inguinal hernia repair, who gives informed consent for this procedure after complete procedure and risks associated are explained to him.

#### 3.2. Exclusion criteria

Negative consent for the procedure, infection at local site to be injected, allergy to local anaesthetic solution, obstructed, irreducible or recurrent hernia, BMI more than 30.

Thorough preoperative evaluation done on day prior to elective surgery and written consent taken. On day of surgery NBM status confirmed, iv line taken and iv fluid started. ECG, NIBP, SPO2 monitoring connected. Premedication with inj. Glycopyrrrolate 0.2mg and inj. Midazolam 1 mg (only to those who are anxious) given.

Procedure of local block for inguinal hernia repair:

We combined IIN and IHN block with field block with intention of providing good analgesia and relaxation and to make it more successful. Under all aseptic precaution local anaesthetic solution is prepared in which 15 ml of 2% Xylocaine with adrenaline, 15 ml of 0.5% Bupivacaine and 15 ml normal saline taken. Patient lies supine on operation theatre table.

At each given point local anaesthetic was injected after doing negative aspiration test so that intravenous delivery of drugs are minimized.

1. A point 2 cm medial and 2 cm above ASIS as marked. At this point 23 gauge 1.5 inch needle with attached syringe filled with local anaesthetic solution, was inserted perpendicular to the skin. Two resistances were felt suggestive of external oblique aponeurosis and internal oblique muscle respectively. 5-7 ml of local anaesthetic solution was injected after 2nd resistance. After injecting the drug, needle is withdrawn 1-2 mm, 5-7 ml of local anaesthetic solution was injected at that point. Two to Three ml of drug

is also injected in fan shape manner in subcutaneous tissue. At this point Ilioinguinal and Iliohypogastric nerves are blocked.

2. Field block: A point just above the pubic tubercle on the side to be operated was marked and a skin wheal is made just lateral to the pubic tubercle by injecting 2-3 ml of LA to block the genital branch of genitofemoral nerve. From the same point, 23 gauge inch needle with attached syringe inserted towards Anterior superior iliac spine (at an angle of around 50-60 degree) and 5-7 ml of local anaesthetic solution was injected in subdermic plane to block subdermic nerve endings and intradermic plane 3 ml was given to block crossover fibres. The same subdermic and intradermic infiltration with 5-7ml of mixture is done from pubic tubercle towards umbilicus.

After 10 minutes surgeon was allowed to begin surgery after checking the paraesthesia at the incision site. ECG, NIBP, HR, SPO2 monitoring were done till the end of surgery. The sign and symptoms of local anaesthetic's toxicity were observed. After opening inguinal canal when sac of the hernia was held by surgeon, patient sometimes complaints of pulling or dragging type sensation. At this point local anaesthetic solution can be injected around the neck of the sac. Also, whenever the patient complains of pain anytime during surgery, surgeon can infiltrate the local anaesthetic solution.

Following scale was adopted to grade analgesia and relaxation during surgery.

1. Excellent: Patient comfortable, analgesia, and surgical relaxation adequate
2. Good: Analgesia and relaxation adequate, minimal discomfort present during surgery alleviated by supplementary local anaesthetic agent at the neck of sac.
3. Fair: Analgesia and relaxation adequate, in addition to infiltration of the sac patients needed a narcotic supplementation.
4. Poor: Patients complaining of severe intolerable pain during surgery without relaxation and required GA. It was considered as a failed block.

The total duration of analgesia (the duration of onset of analgesia till the subjective complaint of pain) assessed in all the patients.

### 4. Observation and Results

In our study 30 cases of inguinal hernia repair under local anaesthesia were taken which was operated during the period of august 2016 to September 2017 at V. S. General hospital, Ahmedabad. All patients were adult male. The mean age of the all the patients in the study was 49.27 with STD deviation of 15.2 as shown in Table 1.

**Table 1:** Age wise distribution of patients (n=30)

Age group	Frequency
<31	4
31-40	5
41-50	7
51-60	7
61-70	5
71-80	2

Usually 70% of hernias occurs in older age group (i.e. 41-80 years). Out of 30 patients 8 had left sided inguinal hernia while 22 had right sided inguinal hernia. This was in correlation that inguinal hernias are more common on right side. In our study 23% patients of ASA I, 30% ASA II and 46.7% had ASA III grade as shown in Table 2.

**Table 2:** SA grade of patients

ASA Grade	No. of Pts	Percentage (%)
I	7	23.3
II	9	30
III	14	46.7

Out of 30, ten patients received Inj Glycopyrrolate + Inj Midazolam as premedication due to patient's anxiety, 4 patients (13.33%) complained pain and 3 patients (10%) complained of discomfort. Pain and discomfort were treated with intravenous fentanyl 1-2 mcg/kg.

Quality of analgesia was excellent in 66.6% patients, good in 16.6% patients and poor in 10% patients as shown in Table 3. Ten percentage patients had severe intolerable pain and converted to GA.

**Table 3:** Grade of analgesia and relaxation

Grade of analgesia and relaxation	No. of Pts	Percentage (%)
Excellent	20	66.7
Good	5	16.6
Fair	2	6.7
Poor	3	10

Maximum duration of surgery was 108 min, minimum duration was 42 min and average duration was 66.33 min as shown in Table 4.

**Table 4:** Duration of surgery

Duration (min)	Number of patients	Percentage (%)
41-50	9	30
51-60	7	23.3
61-70	3	10
71-80	3	10
81-90	4	13.3
91-100	3	10
101-110	1	3.3

Most of the patients had duration of the block or the pain free period more than 120 min. Therefore local anaesthesia effectively provides postoperative analgesia and average duration of the analgesia was 188 min (about 3 hours) as shown in Table 5.

**Table 5:** Duration of analgesia

Duration of analgesia (min)	Number of patients	Percentage (%)
0 – 60 (1 hr)	4	13.3%
61 – 120 (2 hr)	4	13.3%
121 – 180 (3 hr)	8	26.7%
181 – 240 (4 hr)	3	10%
241 – 300 (5 hr)	6	20%
More than 300 (5 hr)	5	16.7%
Up to 6 hrs	0	0

Average hospital stay was 3 days because around 77% patients were suffering from systemic disease like hypertension, COPD, diabetes and past history of IHD. Discharge was given after taking care of stabilizing these conditions as shown in Table 6.

**Table 6:** Average hospital stay

	Present series (n = 30)
Average stay in hospital (median in days)	3±0.57 days

## 5. Discussion

Inguinal hernia is a common pathologic entity and it compromises the quality of life of the patients. As patients undergoing hernia repair surgery are usually middle to old age and having various co-morbidity and physiological age-related changes, even after using short acting induction agent and muscle relaxant, postoperative complications remain very high after general anaesthesia. Also the effects of spinal anaesthesia on autonomic nervous system and urinary retention poses risks for using spinal anaesthesia in elderly patients undergoing hernia repair surgery. Epidural anaesthesia is not associated with rapid changes in autonomic system as seen with spinal anaesthesia and can be used but for a short procedure like hernia repair surgery, inserting an epidural catheter seems impractical. So, the obvious alternate choice remains LA for inguinal hernia repair.

Our main focus in the study was to observe patient's and surgeon's acceptability for the procedure, length of hospital stay, intraoperative and postoperative complication seen with the local anaesthesia, duration of pain free period provided by the local anaesthetics and total amount of local anaesthetic required for a successful block. In this study we used the combined method of IIN IHN nerve block plus field block for repair of inguinal hernia. The original

method as used by Shouldice's and other authors mentions block at anterior superior iliac spine and along the incision line. We had blocked genital branch of genitofemoral nerve nearby pubic tubercle and also the line from pubic tubercle to umbilicus which blocks the crossover fibers from opposite side. This leads to minimization of pain during cord structure handling which is the main reason for intra operative discomfort and pain to the patient.

### 5.1. Asa risk grade

Ribeiro et al,<sup>5</sup> Shaikh AR et al,<sup>6</sup> Kirti Kamal et al,<sup>7</sup> included pts with only ASA grade I and II. In our study 30% patients belong to ASA grade II and 46.7% belong to ASA grade III. Other 23.3% were healthy adult male patients (ASA grade I). This shows that most of the patients were high risk for anaesthesia in whom we used hernia block without significant complications and hemodynamic changes.

### 5.2. Concious sedation

In our study more than 75% patients belong to ASA grade II/III with one or more systemic disease which makes them high risk for even mild sedation. Out of 30 patients, 10 patients received inj midazolam as pre medication. Leake PA et al<sup>8</sup> demonstrated acceptable patient outcomes with no mortality in inguinal hernioplasty using LA with conscious sedation (LACS) with midazolam. Use of sedation in addition to LA for surgical procedures allays patient anxiety, reduces autonomic arousal and often provides amnesia for the procedure.

### 5.3. Per operative complaints

In a study by Jihad Odeh et al<sup>9</sup> in 2011 out of 72 patients 60 (83.3%) patients denied any discomfort, 5 patients (7%) experienced mild discomfort which was tolerable, 4 (5.5%) had slight pain which settled with further sedation and local anaesthetic infiltration allowing uneventful completion of the procedure. Singh S. K and Giri S.<sup>10</sup> in 2017 performed IIN and IHN block in 100 patients using PNS and was deemed to be successful in 92% of the patients. In our study, 4 patients (13.33%) complained of pain and 3 patients (10%) complained of discomfort in the starting of surgery. Pain and discomfort were treated with intravenous fentanyl. Pulling sensation while cord handling was treated with LA infiltration at the neck of the sac by surgeon. After the infiltration, patients were reassessed and patients felt comfortable and no further pain during surgery

### 5.4. Intra operative complications

De Sá Ribeiro et al<sup>5</sup> in a study of 454 patients undergoing local anaesthesia found intraoperative complication rate to be 2.64% (12 patients out of 454). In a study by Shaikh AR

et al,<sup>6</sup> 21.25% patients had operative complications in form of pain, vomiting and hypotension during the procedure.

In our study only 1(3.3%) patient developed intraoperative complication in form tachycardia because of the partial effect of block. It shows that for hernia surgeries under LA, there is requirement of more rigorous training in technique of block and knowledge of the anatomy.

### 5.5. Hemodynamic stability

In our study ECG, NIBP, HR and SPO2 were recorded during preoperative, intraoperative and postoperative period and these parameters did not show any significant change. Our results are comparable with the study by Bunting and mcconachie,<sup>11</sup> E. Gianetta et al,<sup>12</sup> Yilmazlar A. et al,<sup>13</sup> Y. Sze et al<sup>14</sup> and Shivkumar Singh.<sup>10</sup> All observed no significant hemodynamic changes during pre, intra and postoperative.

### 5.6. Faliure rate

In a study by Jihad Odeh et al<sup>9</sup> out of 72 patients, three (4.2%) required conversion to GA due to patient anxiety. In a study by Singh S. K and Giri S.<sup>10</sup> 8% of patients required conversion to GA even after using PNS for IIN and IHN block. Study done by Song et al<sup>15</sup> found that the need for conversion of local anaesthesia to general anaesthesia was because of pain during dissection of the sac. This can be minimized by dissecting the nerve first and applying minimum traction on the sac. In our study 3 patients (10%) developed severe intolerable pain during surgery due to failed block and so were converted to GA. So, it concludes that better preoperative counselling, patient preparation, technique of block, more experience, use of PNS or USG increases the chances of successful block.

### 5.7. Local anaesthetic

In our study we have used the combination of L.A. as 2% lignocaine with adrenaline (1:2,00,000) and bupivacaine 0.5%. It provides higher therapeutic dose and decreases the chances of LA toxicity and also provides longer duration of analgesia. In our study mean volume of drug used was 37.23 ml. Jihad Odeh et al<sup>9</sup> used 50:50 mixture of 1% lidocaine and 0.5% bupivacaine in his study in which the mean volume of solution used was 50 ml.

### 5.8. Duration of analgesia

In a study by Shafique et al<sup>16</sup> mean duration of pain free ambulation was 108 min. In our study average duration of the analgesia was 188 min with no further postoperative complications. This shows hernia surgeries performed under LA provided remarkable post op analgesia and early ambulation to the patients.

### 5.9. Acceptability

In our study, 27(90%) patients got operated successfully under LA with mild sedation, it provided good relaxation and better surgical field to the surgeons. Therefore, we conclude that local anaesthesia has high acceptability by both patients and surgeons. Uma Srivastava<sup>17</sup> et al in a study of 92 adult male patients found that 87% of surgeons and 90% of patients were satisfied with the local anaesthesia.

### 5.10. Average hospital stay

In study by Tao Chen et al<sup>18</sup> in 2016, patients in LA group ( $4.31 \pm 1.58$ ) had a shorter hospital stay than those in GA group ( $5.88 \pm 2.82$  days)  $P = 0.001$ . Collensen T<sup>19</sup> found the hospital stay to be 1 day in 1000 patients. In our study average duration of hospital stay was 3 days with a maximum of 4 and minimum of 2 days. In our study duration of the hospital stay was more because more patients were in ASA grade II (30%) and III(46.7%) and some of them had uncontrolled systemic disease, so, they were not discharged until their systemic diseases were stabilized.

### 5.11. Cost analysis

A study by Bourgon et al.,<sup>20</sup> P Nordin et al<sup>21</sup> concluded that open inguinal hernia repair under local anaesthesia reduces healthcare charges. When we compare the cost for general and spinal/epidural anaesthesia with local anaesthesia, we can conclude that in contrast to general anaesthesia and spinal/epidural anaesthesia; local anaesthesia requires less amount of intravenous fluid for infusion as maintenance fluid. As spinal anaesthesia requires costlier spinal needles or epidural anaesthesia require epidural set, while local anaesthesia requires simple block needles. Also, general anaesthesia requires various drugs for induction, maintenance and premedication, it is well understood that local anaesthesia is very cost effective compared to other anaesthesia.

## 6. Conclusion

In conclusion, we found that inguinal hernia repair under local anaesthesia was safe, simple, cost-effective and also provides good postoperative analgesia. It is more useful in high risk patients where we need to avoid effects of general, spinal or epidural anaesthesia for hernia surgeries.

## 7. Abbreviation

ASA: American Society of Anesthesiologists; ASIS: Anterior Superior Iliac Spine; COPD: Chronic Obstructive Pulmonary Disease; DM: Diabetes Mellitus; ECG: Electrocardiography; GA: General Anesthesia; HR: Heart Rate; IHD: Ischemic Heart Disease; IHN: Iliohypogastric Nerve; IIN: Ilioinguinal Nerve; IV: Intra Venous; LA: Local Anesthetic; mcg: Microgram; mg: Milligram; min: Minute;

ml: Milliliter; mm: Millimeter; NBM: Nil By Mouth; PNS: Peripheral Nerve Stimulator; SpO<sub>2</sub>: Percentage Oxygen Saturation : USG: Ultra Sonography.

## 8. Source of Funding

None.

## 9. Conflict of Interest

The authors declare that there is no conflict of interest.

## References

1. Kingsnorth B, Dh. Hernias, Umbilicus, Abdominal Wall Chapter 62. *Short practice of surgery Bailey and Love*. 2000;p. 1143–1143.
2. Young DV. Comparison of local, spinal and general anaesthesia for inguinal hernia repair. *Am J Surg*. 1987;153:560–563.
3. Vinci A. Inguinal hernia: contribution to its etiopathogenesis. 1987;42(1516):125966.
4. Kulacoglu H, Alptekin A. Current options in local anesthesia for groin hernia repairs. *Acta Chir Lugoslavica*. 2011;58(3):25–35. doi:10.2298/aci1103025k.
5. Ribeiro FS, Padron F, Castro TDM, Filho LCA, Fernandes BA. Inguinal hernia repair with local anaesthesia in the outpatient. *Rev Col Bras Cir*. 2010;37(6):397–402.
6. Shaikh AR, Rao AM, Muneer A. Inguinal mesh hernioplasty under local anaesthesia. *JPMA J Pak Med Assoc*. 2012;62(6):566.
7. Bansal T, Kamal K, Jain P, Ahlawat G. A comparative study to evaluate ultrasound-guided transversus abdominis plane block versus ilioinguinal iliohypogastric nerve block for post-operative analgesia in adult patients undergoing inguinal hernia repair. *Indian J Anaesth*. 2018;62(4):292–7. doi:10.4103/ija.ija\_548\_17.
8. Leake PA, Toppin PJ, Reid M, Plummer JM, Roberts PO, Goldson HH. Local Anesthesia Versus Local Anesthesia and Conscious Sedation for Inguinal Hernioplasty: Protocol of a Randomized Controlled Trial. *JMIR Res Protoc*. 2017;6(2):e20. doi:10.2196/resprot.6754.
9. Odeh J, Alomari M, Rababaah A, Maslamani A. Inguinal herniorrhaphy under local anesthesia: outcome and tolerance among patients in Royal Medical Services. *Pak Med Assoc*. 2011;36:120–2.
10. Singh SK, Giri S. A novel approach to ilioinguinal and iliohypogastric nerve block using peripheral nerve stimulator for hernia surgery: A prospective observational study in 100 patients. *J Anaesth Crit Care Case Rep*. 2017;3(3):10–3.
11. Bunting P, McConachie I. Ilioinguinal nerve blockade for analgesia after caesarean section. *Br J Anaesth*. 1988;61(6):773–5. doi:10.1093/bja/61.6.773.
12. Gianetta E, Cuneo S, Vitale B, Camerini G. Anterior Tension-Free Repair of Recurrent Inguinal Hernia Under Local Anesthesia. *Ann Surg*. 2000;231(1):132–6.
13. Brygel M. Hernia repair in elderly patients. Hernia surgery in elderly. *Middle East J Family Med*. 2005;2(2).
14. Thong SY, Lim SL, Bwe AS. Retrospective review of ilioinguinal-iliohypogastric nerve block with general anesthesia for herniotomy in ex-premature neonates. *Ped Anesth*. 2011;21(11):1109–13.
15. Song Y, Han B, Lei W, Kou Y, Liu Y, Gong Y. Low concentrations of lidocaine for inguinal hernia repair under local infiltration anaesthesia. *J Int Med Res*. 2013;41(2):371–7.
16. Shafique N, Rashid HU, Raja MI, Saeed M. Comparison of efficacy of spinal anaesthesia and sub-fascial local anaesthetic inguinal field block for open inguinal hernia repair-a single institutional experience. *J Ayub Med Coll Abbottabad*. 2015;27(1):197–200.
17. Srivastava U, Kumar S, Saxena S. Comparison of local, spinal and general anaesthesia for inguinal hernia repair. *J Anesth Clin Pharmacol*. 2007;23(2):151–4.
18. Chen T, Zhang Y, Wang H, Ni Q, Yang L, Li Q, et al. Emergency inguinal hernia repair under local anaesthesia: A 5-year experience in

- a teaching hospital. *BMC Anesthesiol.* 2015;doi:10.1186/s12871-016-0185-2.
19. Callesen T, Bech K, Kehlet H. Feasibility of local infiltration anaesthesia for recurrent groin hernia repair. *Eur J Surg.* 2001;167(11):851–4.
  20. Bourgon AL, Fox JP, Saxe JM, Woods RJ. Outcomes and charges associated with outpatient inguinal hernia repair according to method of anesthesia and surgical approach. *Am J Surg.* 2015;209(3):468–72. doi:10.1016/j.amjsurg.2014.09.021.
  21. Nordin P, Zetterström H, Carlsson P, Nilsson E. Cost-effectiveness analysis of local, regional and general anaesthesia for inguinal hernia repair using data from a randomized clinical trial. *Br J Surg.* 2007;94(4):500–5. doi:10.1002/bjs.5543.

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