

**INGUINAL NERVE BLOCK FOR PATIENTS UNDERGOING INGUINAL HERNIOPLASTY**S. M. Amirthagadeswar<sup>1</sup>, B. Balamurugan<sup>2</sup>, G. N. Pitchchaiya<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

S. M. Amirthagadeswar, B. Balamurugan, G. N. Pitchchaiya. "Inguinal Nerve Block for Patients Undergoing Inguinal Hernioplasty". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 16, February 23; Page: 2672-2680, DOI: 10.14260/jemds/2015/385

**ABSTRACT:** Inguinal hernia repair is the most common elective surgical procedure performed under general, regional or local anesthesia. The advantages of day case surgery include greater patient satisfaction and reduced financial costs to the health service. Inguinal nerve blocks may be particularly helpful for patients with cardiovascular or respiratory disease, for whom there may be advantages in avoiding general anesthesia. The absence of post-operative sedation or drowsiness allows early ambulation and diminishes the requirement for recovery facilities with inguinal nerve block.

**KEYWORDS:** Inguinal nerve block, Inguinal Hernia, Bupivacaine.

**INTRODUCTION:** Inguinal hernia repair is the most common elective surgical procedure performed under general, regional or local anesthesia. According to the guidelines of Royal College of Surgeons of England at least 30% of elective inguinal hernia repairs are performed as day care cases and overall 50% of inguinal hernia repairs are performed on a day care case basis in the U.K. The advantages of day case surgery include greater patient satisfaction and reduced financial costs to the health service. With a careful technique, local anesthesia causes minimal physiological disturbances. The absence of post-operative sedation or drowsiness allows early ambulation and diminishes the requirement for recovery facilities.

The nerve supply to inguinal and femoral region comes from the anterior branch of the six lower intercostal nerves, which continue forward on to the anterior abdominal wall accompanied by the last thoracic (subcostal) nerve. The iliohypogastric and ilioinguinal nerves (T<sub>12</sub> & L<sub>1</sub>) supply the lower abdomen. They are blocked by an injection of local anesthetic solution deposited in the internal and external oblique muscles just medial to the anterior superior iliac spine. The genitofemoral nerve (L<sub>1</sub>, L<sub>2</sub>) supplies inguinal cord structures and the anterior scrotum via its genital branch and supplies the skin and subcutaneous tissues of the femoral triangle via the femoral branch.

**AIMS AND OBJECTIVES:**

**AIM OF THE STUDY:** To evaluate the efficacy of Inguinal Nerve Block in providing adequate intraoperative anesthesia with less awareness and extended postoperative analgesia.

**OBJECTIVES OF THE STUDY:** Adequate Anesthesia and Intraoperative Analgesia.

**MATERIALS AND METHODS:** Ethical committee conducted this study in Rajah Muthiah Medical College and Hospital, Annamalai University, Annamalai Nagar from January 2004 to January 2006 after formal approval.

Forty Male patients of 20-60 years age group for Inguinal Hernioraphy were included in this study. Informed consent was obtained from all the patients.

**INCLUSION CRITERIA:**

1. Physical status ASA 1 and ASA 11.
2. Age 20-60.

**EXCLUSION CRITERIA:**

1. Patients with chronic respiratory illness.
2. Patients allergic to local anesthetic.
3. Patients with congenital/acquired valvular heart disease.
4. Physical Status ASA 111 and IV.

All the patients were subjected to continuous ECG, pulse oximetry, Non-invasive blood pressure monitoring during the intraoperative and immediate postoperative period.

**PROCEDURE:** After preoperative assessment and explaining the entire procedure to the patients, a written consent was obtained. Intravenous access WAS secured and assessing the cardio respiratory status of the patient, recording the vitals. Patients were pre medicated with Inj. Glycopyrolate 0.2mg im, Inj. Diazepam 10mg im 45 minutes before the procedure.

Under strict aseptic precautions wheels were raised over the two points with Inj.xylocaine 2%. A give away feeling WAS felt due to piercing of external oblique apournesis. After negative aspiration 5ml of 0.5% bupivacaine WAS deposited. Then the needle WAS repositioned horizontally beneath the external oblique aponeuronesis and after negative aspiration 5ml of 0.5% bupivacaine WAS deposited in a fan shaped manner which blocks ILLI INGUINAL and ILLIO HYPOGASTRIC nerves.

The needle WAS introduced in point B vertically 2-2.5cm and after negative aspiration 5ml of Inj.Bupivacaine 0.5 % was deposited, again the needle is repositioned horizontally after negative aspiration 5ml of Inj. Bupivacaine 0.5% was deposited in fan shaped manner which WAS to block GENTIOFEMORAL nerve. Subcutaneous infiltration with 3 ml of Inj. Bupivacaine 0.5% was given over the line of incision. The adequacy of sensory blockade was determined by pinprick method. After adequate sensory blockade was established the operative procedure was started.

**REVIEW OF LITERATURE:** Harvey Cushing first introduced the technique of successive infiltration of Local anesthetic after incision of various layers step by step.<sup>1</sup> A.P.Winne et al performed field block technique and they observed illioinguinal, illiohypogastric nerve are blocked at the onset itself which produce adequate muscle relaxation.<sup>2</sup> Lichrenstein I performed infiltration technique. They observed excellent analgesia but little or no muscle relaxation.<sup>3</sup> M.S. Dunn et; al used a total volume of 100ml of anaesthetic solution infiltrated in 20ml increments through 20Gspinal needle. In a way of multiple infiltration technique.<sup>4</sup> Dierking G.W. et; al they studied the effect of local anaesthesia for inguinal herniorraphy by field block provided extended period of post-operative pain relief.<sup>5</sup>

Carre P et al performed illioinguinal, illiohypogastric nerve block in a single puncture technique. This simplified nerve block better than conventional approach in inguinal hernia repair in high risk patients where general anaesthesia is harmful.<sup>6</sup> Spark S. L et al performed inguinal hernia repair under local infiltration using short bevel needle technique which facilitates correct needle placement while injecting local anesthetic agent.<sup>7</sup> Liehtenstein I (1994) Lane employed a mixture of Lignocaine and Bupivacaine 50%: 50% mixture of 1% lignocaine provided rapid onset of anesthesia while Bupivacaine ensured a longer duration reduction in time of onset was reported with addition of

## ORIGINAL ARTICLE

soda bicarbonate 1 meq for every 10ml of lignocaine used.<sup>8</sup> Karatassas (1993) demonstrated a wide safety margin with local anesthetic drug in inguinal herniorrhaphy. Based on this study they recommended that large volume of local anesthetic agents can be safely used.<sup>9</sup>

Young series studied comparison of local, spinal and general anesthesia for inguinal herniorrhaphy. In their observation 28% of spinal anesthesia cases required conversion to general anesthesia but only 2% in local anesthesia patients required general anaesthesia.<sup>10</sup> Patrick J. 'O' Dwyer et; al compared the effect of local or general anesthesia for open inguinal hernia repair. They observed local anesthesia for inguinal hernia repair is thought to be safe for patients, which causes less post-operative pain, less cost and associated with a rapid recovery when compared with inguinal hernia repair under general anaesthesia.<sup>11</sup> In Pea S dale (1982) and Bell's study where local anesthesia is used, general anesthesia conversion is not required.<sup>12</sup> Merhav et; al (1993) studied the effect of local, spinal and general anesthesia on pulmonary function of oxygenation in patients undergoing inguinal herniorrhaphy. Their observation revealed the superior ventilation oxygenation pattern in local anesthesia group.<sup>13</sup>

Godfrey (1981) assessed ventilator's capacity in patients undergoing herniorrhaphy under three methods of anesthesia. He observed ventilatory capacity was well maintained in local anesthesiagroup.<sup>14</sup> Lichtenstein's study patients operated under local anaesthesia had normal diet post operatively.<sup>15</sup> Bellis '(1992) study observed early ambulation in postoperative period has no deleterious effect on wound healing.<sup>16</sup> In Teasdale's (1982) study 85% of local anesthesia patients experienced mild intra operative discomfort.<sup>17</sup> Baskerville P.A's study showed 7% of patients had intraoperative pain,<sup>18</sup> but Earle's study observed 50% of patients had slight pain intraoperatively.<sup>19</sup>

Fred man (1978) observed the pain occurred was during sac dissection or following peritoneal traction.<sup>20</sup> Chap man Mark et al assessed intraoperative discomfort using visual analogue pain scale.<sup>21</sup> Snzell (1994) observed quadriceps weakness following hernia repair using infiltration technique.<sup>22</sup> Kornhal et; al (1976) abandoned hernia repair under local anesthesia due to patient's discomfort during surgery.<sup>23</sup> Pelisses& Girard (1985) reported bradycardia and hypertension in some patients posted for herniorrhaphy under local anaesthesia.<sup>24</sup> Simpson diluted Bupivacaine 0.26% with eight different solutions by mixing bupivacaine with saline of different molecular weight (40, 70, 110) with or without the addition of adrenaline. The maximum prolongation of action was achieved by bupivacaine in combination with dextrin 110 and adrenaline.<sup>25</sup>

### OBSERVATION:

PULSE RATE (Min)	MEAN	STANDARD DEVIATION	F VALUE	P VALUE	CONTRAST VALUE
PR0	78.7667	8.9892	8.245	<0.001	Initial Value Vs. All
PR10	81.9333	8.7649			
PR20	83.3333	9.4735			
PR30	82.6333	10.6301			
PR45	81.3333	9.0984			
<b>PULSE RATE</b>					

## ORIGINAL ARTICLE

Before the start of anesthesia the mean pulse rate was 78.8 beats/min with the standard deviation of 9 beats/min. After 10 minutes it increased to 82 beats/min, at 20<sup>th</sup> minute it is 83 beats/min. After 30 minutes it is 82 beats/min and at 45<sup>th</sup> minute the mean pulse rate is 81-beats/min. The above mean values are statistically significant.

<b>SYSTOLIC BLOOD PRESSURE (SBP) (Min)</b>	<b>MEAN</b>	<b>STANDARD DEVIATION</b>	<b>F VALUE</b>	<b>P VALUE</b>	<b>CONTRAST VALUE</b>
SBP0	126.8	12.0756	5.78	<0.001	Initial Vs 3,4,5
SBP10	122.73	10.4714			
SBP20	121.7	9.4939			
SBP30	119.3	8.6834			
SBP45	119.0	8.0301			
<b>SYSTOLIC BLOOD PRESSURE</b>					

Before start of anesthesia the mean systolic blood pressure was 126.8 mmHg with the Standard deviation of 12 mmHg. Till 10 minutes there was no change in the mean systolic blood pressure. After 20 minutes the mean systolic blood pressure was 121.7 mmHg, at 30minute it was 119.3 mmHg. After 45 minutes the mean systolic pressure was 119 mmHg. The above mean values are statistically significant. From the contrast values till 10 minutes there was no change in the systolic pressure. But from the 20<sup>th</sup> minute the mean systolic blood pressure are different from the initial value

<b>DIASTOLIC BLOOD PRESSURE (DBP) (Min)</b>	<b>MEAN</b>	<b>STANDARD DEVIATION</b>	<b>F VALUE</b>	<b>P VALUE</b>	<b>CONTRAST VALUE</b>
DBP0	81.5	6.0042	6.576	<0.001	Initial Vs 3,4,5
DBP10	78.5	6.8266			
DBP20	77.5	6.7810			
DBP30	76.7	6.6089			
DBP45	76.0	6.2146			
<b>DIASTOLIC BLOOD PRESSURE</b>					

Before anesthesia the mean diastolic blood pressure was 81.5 mmHg with the standard deviation of 6 mmHg. After 20 minutes the mean diastolic blood pressure was 77.5 mmHg, at 30 minutes it was 76.7 mmHg. After 45 minutes the mean diastolic blood pressure was 76 mmHg. The above values are statistically significant. From the contrast values till 10 minutes there was no change

## ORIGINAL ARTICLE

in the mean diastolic blood pressure, but from the 10<sup>th</sup> minute mean diastolic blood pressure are different from the initial values.

MEAN ARTERIAL PRESSURE MAP (Min)	MEAN	STANDARD DEVIATION	F VALUE	P VALUE	CONTRAST VALUE
MAP0	96.1	7.3782	7.552	<0.001	Initial Vs All
MAP10	92.5	7.6777			
MAP20	91.4	7.3934			
MAP30	90.3	7.0189			
MAP45	89.7	6.4791			
<b>MEAN ARTERIAL PRESSURE</b>					

Before anesthesia the mean arterial pressure was 96 mmHg with the standard deviation of 7.4 mmHg. After 10 minute the mean arterial pressure 92.5 mmHg, at 20 minutes it was 91.4 mmHg. After 30 minutes it was 90.3 mmHg and after 45 minutes the mean arterial pressure was 89.8 mmHg. The above mean values are statistically significant. From the contrast values the mean arterial pressure value are different from the initial value

RESPIRATORY RATE RR (Min)	MEAN	STANDARD DEVIATION	F VALUE	P VALUE	CONTRAST VALUE
RR0	14.3	0.8769	19.185	<0.001	Initial Vs 10, 20, 30
RR10	15.6	1.1017			
RR20	15.9	1.1121			
RR30	15.2	1.1121			
RR45	14.4	0.8137			
<b>RESPIRATORY RATE</b>					

Before anesthesia the mean respiratory rate was 14.3-breaths/ minute with the standard deviation of 0.8 breaths/minute. After 10 minutes the mean respiratory rate was 15.6 breaths/minute. After 20 minutes it was 15.9 breaths/minute. At 30<sup>th</sup> minute it was 15.2 breaths/minute and after 45 minutes the mean respiratory rate was 14.4 breaths/minute. The above mean values are statistically significant. From the contrast values all the mean respiratory rates are different from the initial rate except the 45th minute.

## ORIGINAL ARTICLE

SpO <sub>2</sub> (Min)	MEAN	STANDARD DEVIATION	F VALUE	P VALUE	CONTRAST VALUE
SpO <sub>2</sub> 0	97.9	0.3051	2.887	0.025	Initial Vs 45
SpO <sub>2</sub> 10	97.8	0.6989			
SpO <sub>2</sub> 20	97.8	0.7739			
SpO <sub>2</sub> 30	97.8	0.5921			
SpO <sub>2</sub> 45	98.1	0.5307			
<b>OXYGEN SATURATION</b>					

Before anesthesia the mean oxygen saturation was 97.9 with standard deviation of 0.3051. The mean oxygen saturation through-out the surgery had no significant changes from the mean value. At the 45<sup>th</sup> minute the mean oxygen saturation was 98.8. The above mean values are statistically significant. From the contrast values the only difference is between the initial and the final value.

**VISUAL ANALOGUE PAIN SCALE:** The visual analogue pain score was zero before start of anesthesia till ten minutes. After 20 minutes the patients had mild pain due to traction of cord structure and dissection of sac, which was relieved by injecting local anesthetic solution around the cord by the surgeons.

**DISCUSSION:** Inguinal herniorrhaphy is one of the commonest operation performed in any General Surgical unit.

In our study, the patient's age groups were ranging between 20-80 years. We selected only the male patients for our study. Two patients with valvular heart disease were included in our study. Physical examination was done in all the patients. They were well informed about the anesthetic procedure and they were psychologically prepared. Inj. Glycopyrolate 0.2mg and Inj. Diazepam 10mg were administered intra muscularly to produce antisialogogue and anticholinergic effect.

In our study, patients received Bupivacaine as local anesthetic agent, whereas Rayan<sup>26</sup> and Basker Ville,<sup>18</sup> advocate the use of Lignocaine. Earle<sup>19</sup> and Abdu<sup>27</sup> used Bupivacaine as the local anesthetic agent. Lichtenstein<sup>15</sup> used the combination of Lignocaine and Bupivacaine.

Freedman<sup>20</sup> and Belli's<sup>16</sup> used Procaine to conduct local anesthesia for inguinal herniorrhaphy. Surgeons were asked to proceed with surgery after 15 minutes of the block. The surgeons blocked cord structures intra operative.

In our study, 4 patients (12%) complained of the intra operative pain during the procedure. In Offils<sup>28</sup> study intraoperative pain was mild in 19% and moderate in 6%, whereas Teasdale<sup>17</sup> study reported 85% of patients had mild intra operative pain.

Temporary or permanent neurological complications where not recorded in our study. Earle<sup>19</sup> reported Vasovagal attack intraoperative, whereas in our study we did not observe any significant change in the heart rate from the preoperative level.

## ORIGINAL ARTICLE

---

In our study no patients were converted to general anesthesia, which is in coincidence with Belli's<sup>16</sup> and Teasdale.<sup>17</sup> In Young's<sup>10</sup> series 2% of patients converted to General anesthesia. In our study 10 patients (33%) were highly satisfied with the anesthetic technique, 18 (60%) patients were satisfied, and 2 patients (6%) were unsatisfied with the anesthetic technique for inguinal herniorrhaphy.

In Young's<sup>10</sup> study 82% of patients were satisfied, Offili<sup>28</sup> noted that 68% of patients were satisfied even though they experienced intra operative discomfort. Teasdale<sup>17</sup> reported 85% of patients satisfaction rate. In Earle<sup>19</sup> series 50% of patients had intra operative pain but satisfaction rate was 100%. Basker Ville<sup>18</sup> and Jarett reported 96% acceptability. Postoperative pain was assessed by visual analogue pain scale. When the pain score is 5, patients were given rescue analgesic. In our study the requirement of rescue analgesic was 6.5 hours ranging from 4-8 hours.

**SUMMARY:** In our study of inguinal block with 0.5% bupivacaine for inguinal hernia repair we found that,

- Postoperative analgesia was prolonged.
- Majority of patients were able to take normal diet post operatively.
- There were no incidence of postoperative nausea and vomiting.
- Patients ambulatory period was earlier.
- There was no incidence of urinary incontinence.
- Majority of patients were satisfied with the anesthetic technique.
- Hospital stay and cost for the patients were comparatively less than other methods of anesthesia.
- There was no significant change in the cardio respiratory status.

**CONCLUSION:** From this study we conclude that inguinal block with 0.5% Bupivacaine is an effective alternative for the other methods of anesthesia. Especially patients with cardiac disease where regional anesthesia is contraindicated.

The policy of performing inguinal hernia repair under local anesthesia and day care service may help in the utilization of hospital beds for other needy patients.

### REFERENCES:

1. Harrey – Cushing International Surgery 1986.
2. Winne A.P., Zsigmond E.P. Anaesthesia for Herniorrhaphy in Nyhus and condon hernia 3<sup>rd</sup> edition. Philadelphia J.B. Lipinoh 1989; 487-520.
3. Lichtenstein J.T. Shulman A.S., Amid P.K., Local anaesthesia for inguinal hernia repair, step by step procedure. *Annals of Surgery* 1944, 220: 735-737
4. M.S.J. Dunn, C.J. Enary: Local anaesthetic for Inguinal hernia repair.
5. Dierking S.W., Dahl J.B, Kenelt H: Effect of Pre Vs Post-Operative Inguinal field block on post-operative pain after herniorrhaphy, *British Journal Anaesthesia* – 1992: 68: 344-8.
6. Carre P, Mollet; et; al, illio-inguinal, illio-hypogastric nerve block, with a single puncture an alternative for a anaesthesia in England inguinal surgery.
7. Sparks CJ, et; al: Inguinal field block for adult inguinal hernia repair using short level needle. *Anaesthesia Intensive Care* 1995 Apr 23 (2): 143-8.



## ORIGINAL ARTICLE

---

8. Lichtenstein J, Sheelman A.G., Ambulatory OPD hernia surgery; Introducing a new concept; Introducing a tension free repair: *International Surgery* 1986, 71: 1-4.
9. Karatassas, Morris, Walsh, Heinz, Slarotinek. Evaluation of the safety of Inguinal hernia repair in the elderly using Bupivacaine infiltration anaesthesia. *Australian Newzealand Journal of Surgery* 1993 63: 266-268.
10. Young V.D. Comparison of local, spinal and general anaesthesia for inguinal herniorraphy. *American journal of surgery* 1987, 153: 560-566.
11. Patrick J, O'Dwyer, Michael G. Serpell, Keith Millar Local Anaesthesia for open Hernia repair.
12. Peasdale and Bell's conversion of general anaesthesia not required (1982).
13. Merhar H. Rothstein M, Eliraz A; Hana R and Pfeffermann R. Comparison of pulmonary function and oxygenation following local, spinal and general anaesthesia in patients undergoing inguinal hernia repair. *International Surgery*, 1993, 78: 257-261.
14. Godfrey, Ventilatory capacity after 3 methods of anaesthesia for inguinal hernia repair. *British Journal of Surgery* 1981, 68: 587-589.
15. Lichtenstein J, Shulman A.S., Early Ambulatory OPD hernia repair.
16. Belli's C.J. immediate return to unrestricted work after inguinal herniorraphy. *International Surgery*. 1992, 77; 167-169.
17. Teasdale C, Mc. Cromm A, Williams N.B., A randomized controlled trial to compare local with general anaesthesia for short stay inguinal hernia repair. *Annals of Royal College of Surgeons of England* 1982, 63: 238 -242.
18. Baskerville P.A., Jarett P.E.M., Day care inguinal hernia repair under local anaesthesia *Annals of the Royal College of Surgeons of England* 1983, 65: 242-22.
19. Earle S. A. Local anaesthesia for inguinal herniorraphy. *American Journal of Surgery*, 1960: 100: 782 - 786.
20. Freedman inguinal herniorraphy in a health centre. *Acta. Chir. Scand.* 1978, 143: 235-237.
21. Chapman, Casey, Dubner, Foley, Gracely, Pain measurement, An overview *Pain*, 1983, 22: 1-31.
22. Szell. Local Anaesthesia and inguinal hernia repair. *Annals of the Royal College of Surgeons of England*. 1994, 76: 138 - 140.
23. Kornnall, S. Obsson. Ambulatory inguinal hernia repair. Comparison with short stay surgery *American Journal of Surgery*. 1976, 132 - 32.
24. Pelissier. Girard, Inguinal herniorraphy under local anaesthesia *Chirurgie*. 1981, 117: 186-188.
25. Simpson, Hughes, Lung prolonged local anaesthesia for inguinal herniorraphy with bupivacaine and dextran. *Annals of the Royal Collge of Surgeons of England* 1982, 64: 89-82.
26. Rayan OPD inguinal herniorraphy with local anaesthesia. *American Journal of surgery*. 1994, 148; 313-316.
27. Abdu R.A. ambulatory herniorraphy under local anaesthesia in a community hospital. *American Journal of Surgery*. 1983, 143; 353-356.
28. Offili O.P. A comparison of intra operative pain during inguinal herniorraphy under local anaesthesia. *Tropical doctor*, 1991, 21; 40-41.



## ORIGINAL ARTICLE

---

### **AUTHORS:**

1. S. M. Amirthagadeswar
2. B. Balamurugan
3. G. N. Pitchchaiya

### **PARTICULARS OF CONTRIBUTORS:**

1. Consultant Anaesthesiologist, Department of Anaesthesia, Jagannath Hospital, Dindugul.
2. Associate Professor, Department of Anaesthesia, CHRI Kelambakkam, Chennai.

### **FINANCIAL OR OTHER**

**COMPETING INTERESTS:** None

3. Professor & HOD, Department of Anaesthesia, Annamalai University, Chidambaram.

### **NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. B. Balamurugan,  
Flat F3, No. 24, Akshaya Apartments,  
Venkatesan Street,  
T. Nagar, Chennai-600017.  
E-mail: drbala.srmc@gmail.com

Date of Submission: 20/01/2015.  
Date of Peer Review: 21/01/2015.  
Date of Acceptance: 13/02/2015.  
Date of Publishing: 20/02/2015.