



A COMPARISON STUDY BETWEEN ULTRASOUND-GUIDED AND CONVENTIONAL (BLIND) ILIOINGUINAL/ ILIOHYPOGASTRIC NERVE AND GENITAL BRANCH OF GENITOFEMORAL NERVE BLOCKS FOR OPEN INGUINAL HERNIA REPAIR.

Dr. Binish Khan*Resident , Department of anaesthesia, KEM Hospital, Parel, Mumbai.
*Corresponding Author**Dr. Nirav Kotak**

Associate professor, Department of anaesthesia, KEM Hospital, Parel, Mumbai.

Dr. Kartika Rathi

ex resident, Department of anaesthesia, KEM Hospital, Parel, Mumbai.

Dr. R.D Patel

Professor, Department of anaesthesia, KEM Hospital, Parel, Mumbai.

ABSTRACT

Background: Inguinal hernia repair is the commonest operation in surgical practice. Now it is also performed under regional nerve blocks by blocking nerves ilioinguinal (II)/iliohypogastric (IH) and genital branch of genital femoral nerve combined with a surgical feild infiltration with a long-acting local anaesthetic(LA) agent. LA infiltration improves acute postoperative pain management, decreases postoperative visual analogue scale(VAS)scores, opioid demand, and time to first rescue analgesic administration. **Objective:**This study was carried out to compare the effect of ultrasound guided ilioinguinal/ iliohypogastric nerve and genital branch of genitofemoral nerve block with conventional (blind) block in terms of success rate, postoperative analgesia and complications. **Method:** We conducted a prospective randomized controlled study amongst 100 ASA I-III patients posted electively for open inguinal hernia repair. Various parameters such as age, sex, weight, BMI, vitals like pulse rate, ECG, blood pressure was recorded and Post-Operative VAS at 30minutes, 1hr, 1hr30mins, 2hrs, 2hrs30mins, 3hrs, 3hrs30 minutes and 4hours was noted. Qualitative and quantitative analysis was done. **Result:** In conventional group 8 (16%) patients amongst 50 (100%) required general anaesthesia in between the surgery even after sedation + analgesia+ propofol whereas in USG group 2 (8%) patients required general anaesthesia. The patient receiving USG guided block had significantly lower post-operative VAS scores till 2 hours 30 mins as compared to the patient receiving conventional ILN/INH nerve blocks who had higher VAS scores. **Conclusion :** Thereby we found that ultrasound guided block for open inguinal hernia repair has significantly better patient care in comparison with conventional block.

KEYWORDS : Ultrasound-guided, Hernia, Block, Analgesia**INTRODUCTION:**

Inguinal hernia repair is commonly performed under local anaesthesia-sedation or general anaesthesia or under subarachnoid block^[1] Now it is also performed under regional nerve blocks by blocking nerves ilioinguinal (II)/iliohypogastric (IH) and genital branch of genital femoral nerve combined with a surgical feild infiltration with a long-acting local anaesthetic(LA) agent. LA infiltration improves acute postoperative pain management, decreases postoperative visual analogue scale(VAS)scores, opioid demand, and time to first rescue analgesic administration. Blind injection of LA solution is usually performed after perception of a loss of resistance, between the external and internal oblique muscles fascia or between the internal oblique muscle and the transverses abdominis muscle. Ultra sound guided blocks allows real-time deposition of the LA agents between internal oblique and transverses abdominis muscles and guarantees distribution of the LA solution to the nerves lying underneath it.

ANATOMY OF ABDOMINAL WALL:

Both the iliohypogastric (IH) and ilioinguinal (II) nerves arise from L1 and emerge from the upper part of the lateral border of the psoas major muscle. Both nerves cross obliquely anterior to the quadrates lumborum and iliacus muscles and perforate the transverse abdominis muscle near the anterior part of the iliac crest.

Because the lateral cutaneous branch of the IH nerve may pierce the internal and external oblique muscles immediately above the iliac crest, it is worthwhile to block the nerves as proximal as possible (i.e. posterior to the anterior superior iliac spine) before the nerve branches.^[3]

AIMS AND OBJECTIVES:

- To compare the anaesthesia effect of ultrasound-guided ilioinguinal / iliohypogastric nerve and genital branch of

genitofemoral nerve blocks versus conventional (blind) Ilioinguinal / iliohypogastric nerve and genital branch of genitofemoral nerve blocks for open inguinal hernia by comparing duration of post op analgesia , complications, success rate and failure rate in terms of conversion to other mode of anaesthesia.

MATERIALS AND METHOD:**Study design**

This study was conducted in KEM Hospital under the Department of Anaesthesia over a period of 1 year. Study included 100 ASA I-III patients between 18- 80 yes posted for elective primary unilateral open inguinal hernia repair. 50 subjects in each group randomized by allocation concealment method. After approval from DRB and research Ethics Committee and written informed consent from the subject ,the patient arrived in the operating theatre, routine monitoring (ECG, heart rate, non-invasive arterial pressure, and pulse-oximetry) and intravenous access was established before they were positioned in the supine position.

TECHNIQUE:

The skin of the anterior and lateral parts of the abdominal wall was disinfected with 5% alcoholic povidone-iodine.

Ultrasound-guided block

- The abdominal wall was scanned using a linear array transducer probe(6–13 MHz) in the multibeam mode which was connected to a portable ultrasound unit. The probe was covered by a sterile TEGADERM and polydrape sheath and a sterile gel was applied over it. Anterior superior iliac spine(ASIS), inguinal ligament and line connecting the ASIS with the umbilicus were the anatomical landmark for performing this block. A linear probe of high frequency (6-13 MHz) was oriented perpendicular to the inguinal ligament and was

positioned so that the lateral aspect of the probe lied on top of the iliac crest. From the ASIS the transducer was moved slowly along the ASIS-umbilicus line Ilioinguinal and iliohypogastric nerves are sought in the fascial plane between the external oblique and internal oblique and between internal oblique and transverse abdominis muscle. The ilioinguinal nerve is usually found close to the iliac crest and the iliohypogastric nerve lies medial to it. The peritoneal fascia and cavity lie deep to the transverse abdominis muscle and peristaltic movements of the bowel could be detected. The needle was advanced in the fascial plane between the internal oblique and transversus abdominal muscles and was placed adjacent to the ilioinguinal and iliohypogastric nerves which are in enclosed in fascial split. The progression of the needle, visible as a bright hyperechoic line, was assessed under direct ultrasonography. During insertion, the transducer was moved with careful manipulation to continuously visualize the shaft and the tip of the needle and the forementioned structures. If necessary, saline 0.9% (1 ml) was injected to optimize the tip location with small in-and-out movements. After confirmation of needle's tip 15ml of 0.5% bupivacaine was administered around the nerves and dispersion of drug around both the nerves was also be simultaneously observed.



- For genitofemoral nerve block 1.25 cm above the inguinal ligament scanning over the external iliac artery (EEA) and vein. At this location the probe was tilted slightly cephalad to visualize the inferior epigastric artery (IEA) that is emerging medially from the IEA. The needle was introduced in-plane from the lateral end of the probe until the needle tip was at the lateral vicinity of the IEA; 5 ml of 0.5% bupivacaine was deposited after negative aspiration. And lastly probe is placed just lateral to pubic tubercle and 2ml of 0.5% bupivacaine is injected lateral to it by needle, in order to block nerve twigs overlapping from the opposite side.

Conventional block:

- After LA infiltration with lidocaine 2% (2 ml) at the puncture sites, a 100 mm 22 G short-bevel stimplex needle or 23 G quinckes spinal needle was used. A total of 22ml of 0.5% bupivacaine was given. The first dose of 15ml of 0.5% bupivacaine was injected with a needle entry point localized at one-third of a distance along a line from the anterior superior iliac spine to the umbilicus, and after detection of the second loss-of-resistance (i.e. between internal oblique and transverses abdominis) when the needle tip crosses the internal oblique muscle aponeurosis for blocking ilioinguinal and iliohypogastric nerve. The second dose of bupivacaine 0.5% 5ml was injected after obtaining the fascial click of external oblique with a needle entry point localized at 1.5cm above the midpoint of inguinal ligament, this is to block the genital branch of genitofemoral nerve and lastly 2ml of 0.5% of bupivacaine is injected lateral to pubic tubercle

over pubic rami to block the nerve twigs overlapping from other side.

- The sensory block level was assessed in the related nerve innervation area with the "pinprick test" following the II and IH nerve block with both conventional (blind) and US guided techniques. After required sensory blockade only incision was taken. In case of inappropriate sensory blockade we waited maximum 20mins (from the time of block given). Patient was given general anaesthesia if the sensory blockade wasn't achieved even after waiting for 20 mins. If level recedes in between the surgery it was supplemented by sedation with midazolam + pentazocin / fentanyl, by analgesic paracetamol and if required titrated sub hypnotic dose of propofol was given.
- After surgery patient was assessed for pain till 4hrs at 30mins, 1hr, 1.30mins, 2hr, 2.30mins, 3hr, 3.30mins and 4hr by VAS score.

STATISTICAL ANALYSIS:

After data collection, data entry was done in Excel. Data analysis was done with the help of SPSS Software version 20. Qualitative and quantitative analysis was done by using various tests like Chi square test, Mann whitney U test, Unpaired t test and Fischer's Exact Test.

RESULT :

In our study a total of 100 male patients undergoing elective open inguinal hernia surgery 50 received conventional ilioinguinal/iliohypogastric (ILN/INH) nerve and genital branch of genitofemoral nerve block and 50 received ultrasound ilioinguinal/iliohypogastric (ILN/INH) nerve and genital branch of genitofemoral nerve guided block. Both the groups have received same drug (0.5% Bupivacaine) and same volume 22 ml and all patients in both the groups have received unilateral blocks.

1. DEMOGRAPHICS:

| Study Parameter | Conventional | | USG | | Unpaired t test | P Value | Difference is |
|-----------------|--------------|---------|--------|---------|-----------------|---------|-----------------|
| | Mean | Std Dev | Mean | Std Dev | | | |
| AGE(yrs.) | 50.32 | 18.18 | 47.5 | 14.89 | 0.94 | 0.4 | Not Significant |
| WEIGHT (kgs) | 61.88 | 9.36 | 62.53 | 8.86 | -0.508 | 0.72 | Not Significant |
| HEIGHT (cm) | 165.02 | 4.09 | 166.42 | 4.9 | -1.269 | 0.11 | Not Significant |
| BMI (kgs/m2) | 22.68 | 3.42 | 22.43 | 2.4 | 0.106 | 0.66 | Not Significant |

- No statistical differences was found amongst demographic data of both the groups.

2. Comparison among the study group for Intra-Operative analgesia required, Intra operative analgesia + propofol, conversion to general anaesthesia (in between surgery), failure and success of the blocks :

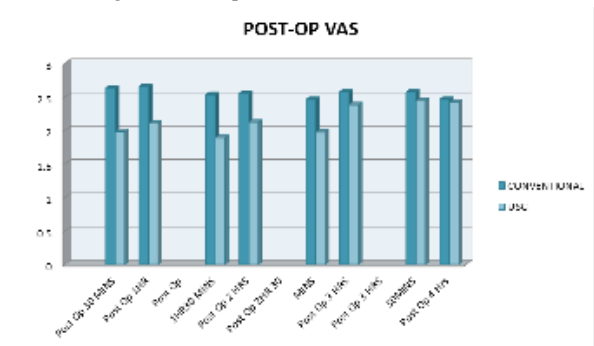
| | CONVENTIONAL | USG | p VALUE | |
|-----------------------------------|--------------|---------|---------|-----------------|
| ANALGESIA | 11(22%) | 12(24%) | 0.40 | Not Significant |
| SEDATION + ANALGESIA + PROPOFOL | 14(28%) | 10(20%) | 0.17 | Not Significant |
| CONVERSION TO GENERAL ANAESTHESIA | 8(16%) | 2(8%) | 0.02 | Significant |
| FAILURE (NO ACTION IN 20MINUTES) | 12(24%) | 4(8%) | 0.01 | Significant |
| SUCCESSFUL BLOCK | 5(10%) | 22(44%) | 0.000 | Significant |

| | | | | |
|-------|----------|-----------|--|--|
| TOTAL | 50(100%) | 50 (100%) | | |
|-------|----------|-----------|--|--|

- 8 subjects i.e 16% of conventional group as compared to usg guided group only 4 subjects i.e 8% required general anaesthesia due to failure of block
- The success rate of block was 44% in usg guided block as compared to only 10% in conventional group.

3. Comparison among the study group for Post-Operative VAS at 30 mins, 1hr, 1hr30mins, 2hrs, 2hrs30mins, 3hrs, 3hrs30 mins and 4hours.

The data was analysed by mannwhitney u test and p value at 30 mins, 1hr, 1hr30mins, 2hrs, 2hrs30mins, 3hrs, 3hrs30 mins and 4hours are 0.00, 0.00,0.006,0.00,0.01,0.07,0.5 and 0.7 respectively. Which shows statistically significant difference between both the groups indicating that the usg block has better analgesic efficacy.



4.Comparison among the study group for Post-Operative analgesiarequired at 30 mins, 1hr, 1hr30mins, 2hrs, 2hrs30mins, 3hrs, 3hrs30 mins and4hours and total analgesia rescues required.

| TIME | CONVENTIONAL | USG | P VALUE | SIGNIFICANCE |
|-----------|--------------|---------|---------|-----------------|
| 30min | 4(8%) | 0(0%) | 0.02 | Significant |
| 1hr | 6(12%) | 1(2%) | 0.02 | Significant |
| 1hr 30min | 3(6%) | 0(0%) | 0.03 | Significant |
| 2hr | 3(6%) | 1(8%) | >0.05 | Not Significant |
| 2hr30min | 1(2%) | 2(4%) | >0.05 | Not Significant |
| 3hr | 4(8%) | 5(10%) | >0.05 | Not Significant |
| 3hr 30min | 4(8%) | 4(8%) | >0.05 | Not Significant |
| 4hr | 3(6%) | 2(4%) | >0.05 | Not Significant |
| TOTAL | 28(56%) | 15(30%) | 0.004 | Significant |

| | | | | |
|------------------------------|---------|-------------------|----------------------------------|---------|
| pvalue- <0.05 – significant. | 0.04592 | # Chi square test | p value >0.05 – not significant; | p value |
|------------------------------|---------|-------------------|----------------------------------|---------|

- The need for rescue analgesia p value at 30 mins, 1hr, 1hr30mins, 2hrs, 2hrs30mins, 3hrs, 3hrs30 mins and 4hours was compared using chi square test and p value 0.02, 0.02, 0.03,>0.05,>0.05,>0.05,>0.05, and>0.05 showed statistical significance amongst both the groups at 30 mins, 1 hr and 1 hr 30 mins whereas no statistical difference amongst both the group after 1hr 30 mins till 4 hrs.
- Therefore rescue analgesia like paracetamol , tramadol was required after 1hr 30mins in usg guided group whereas it was required just within 30mins in conventional group.

5.DISCUSSION:

The conventional block is depositing of drug by feeling a fascial click which is very subjective and as a result have higher failure rates in comparison of USG guided block which is depositing of drug with the help of real time imaging. USG guided block can be used in patients in which neuraxial blockade is contraindicated. In our study we found out that In conventional group 8 (16%) patients amongst 50 (100%)

required general anaesthesia in between the surgery even after sedation + analgesia+propofol whereas in USG group 2 (8%) patients required general anaesthesia in between the surgery even after sedation + analgesia + propofol. Whereas in conventional group 12(24%) patients amongst 50 (100%) there was complete failure of block i.e. there was no action of block till 20 mins after giving block required different mode of anaesthesia and only 5(10%) pateints had successful block complete surgery was completed under block whereas in USG group only 4(8%)amongst 50 (100%) patients there was complete failure of block and 22(44%) patients had successful block.

Similar results were found in other study in which intraoperative analgesia required was more in conventional group than in USG group of patients^[7] Postoperatively vas score and time for first rescue analgesia was noted and was found that post opearative VAS scores between both the groups were statistically significant at 30 mins, 1hr, 1hr30mins, 2hrs, and 2hrs30mins whereas there was no statistical difference between both the blocks at 3hrs, 3hrs30 mins and 4hours respectively. This indicates that the patient receiving USG guided block had significantly lower post-operative VAS scores till 2 hours 30 mins as compared to the patient receiving conventional ILN/INH nerve blocks who had higher VAS scores. After 2.30 hrs no statistical difference was observed among both the blocks till 4 hr.

It was also found thatanalgesia efficacy of USG block was better than conventional INH block till 1.30 hrs post op thereafter the efficacy of both the blocks were same and some kind of analgesia. Similar results were found in a study of adults in which first rescue to analgesia was after 8.4 hours in USG group of patients^[11] and in also other study amongst children also showed that need for rectal acetaminophen as a rescue analgesia was very less in USG group of patients.^[6]

COMPLICATIONS:

In both the groups conventional ILN/INH group and USG group no complications like Local anaesthesia toxicity, intraperitoneal injection, bowel injury or hepatic injury or any other complications were found.

CONCLUSION:

Hence we can conclude that ultrasound-guided ilioinguinal/ iliohypogastric nerve and genital branch of genitofemoral nerve blocks are better than conventional (blind) ilioinguinal/iliohypogastric nerve and genital branch of genitofemoral nerve blocks for open inguinal hernia in terms of success rate,and longer duration of post-operative analgesia.

Abbreviations: ilioinguinal (II)/iliohypogastric (IH) local anaesthetic(LA) visual analogue scale(VAS)scores external iliac artery (EEA) inferior epigastric artery (IEA)

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