

CLINICAL STUDY OF FIELD BLOCK ANAESTHESIA FOR INGUINAL HERNIA REPAIR AT A TERTIARY HOSPITAL

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Abstract

Background: Groin hernia has emerged as a peculiar problem of human race due to erect posture. Repair of inguinal hernia is one of the commonest surgical procedures worldwide, Inguinal field block is anaesthetic of choice when reliable anaesthetic equipments unavailable, in the elderly and less fit patients with comorbidities. Present study was aimed to study of field block anaesthesia for inguinal hernia repair at a tertiary hospital. **Material and Methods:** Present study was single-center, prospective, observational study, conducted in department patients >18 years, undergoing elective hernia (direct/indirect) surgery. Field block given using 10 ml lignocaine hydrochloride (2%) with adrenaline (1:200000) and Bupivacaine hydrochloride 5 ml (0.5%) with 5 ml water for injection, injected 12ml at anterosuperior iliac spine point, 5 ml at midpoint inguinal ligament, 5 ml at pubic tubercle, 10 ml subcutaneous infiltration at incision site. **Results:** Among 60 patients enrolled in this study, average age of patient was 52.23 ± 10.23 years. Majority had indirect inguinal hernia (58 %) as compared to direct inguinal hernia (42 %). Average duration of surgery: 43.76 ± 9.57 minutes. In majority of patients 32 ml local anaesthetic was used (89 %). 51 patients (85 %) had excellent type of analgesia and relaxation with patient comfortable, analgesia, and surgical relaxation adequate. 9 patients (15 %) complained of discomfort during surgical handling of the hernial sac or hernia repair. VAS score was 2.73 ± 0.76 at 5th hour of post operative period. Analgesia for 3 patients who required general anaesthesia was for lesser period with early request of analgesia. Only 3 patients have post operative analgesia less than 300 minutes. Mean duration of analgesia 363.08 ± 53.71 min. **Conclusion:** Field block is effective technique of anaesthesia for inguinal hernia repair and it provides good quality of analgesia and relaxation intraoperatively.

INTRODUCTION

Groin hernia has emerged as a peculiar problem of human race due to erect posture. The external abdominal hernia is the commonest form of spontaneous hernia, and these are inguinal, femoral and umbilical in percentages 77 %, 17%, 6% respectively.^[1,2] The inguinal hernia may be indirect if passing through the deep inguinal ring or direct, resulting from weakness in the transversalis fascia in the posterior wall of the inguinal canal. The surgical treatment of inguinal hernia can be carried out by various techniques e.g. Bassini's

repair, Darning, Shouldice's repair, Lichtenstein repair and Laparoscopic hernia repair.^[3]

Repair of inguinal hernia is one of the commonest surgical procedures worldwide, irrespective of country, race or socio-economic status and constitutes a major health-care drain in every country.^[4] However, there is no consensus among surgeons regarding the best choice of anaesthesia. Several studies have shown that local anaesthesia provides the best clinical and economic benefits to the patient. Infiltration of operative site with local anaesthetic is least invasive and safest of all anaesthetic technique for hernia repair.^[5]

Inguinal field block is anaesthetic of choice when reliable anaesthetic equipments unavailable, in the elderly and less fit patients with comorbidities.^[6] Spinal anaesthesia is an easy option, but complications like urinary retention, spinal headache and hypotension are frequently encountered.^[7] Field block anaesthesia technique for inguinal hernia repair utilizes local anaesthetic block in inguinal region in territory of Ilioinguinal. Despite of all benefits, field block technique is still underused and neglected. Present study was aimed to study of field block anaesthesia for inguinal hernia repair at a tertiary hospital.

MATERIAL AND METHODS

Present study was single-center, prospective, observational study, conducted in department of anaesthesiology, at Swami Ramanand Teerth Government Rural Medical College and Hospital, Ambajogai, Dist. Beed (M.S.), India. Study duration was of 2 years (November 2011 to November 2013.). Study approval was obtained from institutional ethical committee.

Inclusion Criteria

- Patients >18 years, undergoing elective hernia (direct/indirect) surgery, ASA grade I/II, willing to participate in present study

Exclusion Criteria

- Patients refusal/unable to co-operate.
- Patients not NBM & Emergency Surgical Procedures.
- Patients having known allergy/sensitivity to local anaesthesia.
- Patients having bilateral repair, recurrent hernia / Incarcerated hernia / obstructed hernia

Pre-anaesthetic evaluation was done a day prior to the elective surgery. History of present complaints, duration of swelling and any co-existing disease, previous surgery etc. are noted. A thorough physical, systemic examination was done which included the size of the swelling, type of hernia, weight of the patient, vital signs, airway assessment etc. Investigation such as Hb%, urine for routine examination, blood urea, serum creatinine, random blood sugar, ECG and chest x-ray were noted.

All patients were assessed and they are graded according to the ASA physical status I and II. They were educated regarding the anaesthetic technique. Study was explained to patients in local language & written consent was taken for participation & study. Local anaesthetic test dose for Lidocaine was carried out on the previous day of surgery.

Local anaesthetic mixture used was made by adding 10ml lignocaine hydrochloride (2%) with adrenaline (1:200000) and Bupivacaine hydrochloride 5 ml (0.5%) with 5 ml water for injection, 2 syringes of 20 ml formed. In surgical theater all patients were monitored for NIBP (Non-invasive blood pressure), SPO₂, HR (Heart Rate)

and ECG monitor. Baseline recordings were recorded

Area and site of block was cleaned and made sterile with povidoneiodine (Betadine) 7.5% w/v and betadine allowed to dry for period of 5 minutes. Residual betadine cleaned with spirit swab. Site was draped with sterile towel. Under strict aseptic precautions with patient in supine position, a skin wheal was made, local anaesthetic injected at 2 cm medial and 2 cm superior from the anterosuperior iliac spine (ASIS) along spinoumbilical line. 20 ml formed mixture of lignocaine with adrenaline and bupivacaine through the skin puncture site perpendicular to the skin. A second wheal was made over the pubic tubercle (PT) and 5 ml of local anaesthetic solution injected. Injecting local anaesthetic mixture slightly cephalad direction towards umbilicus avoiding midline to avoid injury to bladder. Blocking crossed fibres.

A third skin wheal was raised 1.5 cm above the midpoint of the inguinal ligament (MPI) and 5 ml of local anaesthetic mixture was injected to block genital branch of genitofemoral nerve. Subcutaneous Infiltration: 10 ml along line of incision using 25 G spinal needle into subcutaneous tissue parallel with surface of skin, spinoumbilical line and from pubic tubercle to umbilicus to block crossover fibres. Whenever the patient complained of pain, at the neck of sac 2 ml of mixture of local anaesthetic administered.

Blood pressure, heart rate, oxygen saturation, VAS score, ECG monitoring were done every 5 minutes till the end of surgery. Duration of surgery and analgesia, were noted. Those patient having discomfort and complaining of pain at the time of hernia sac handling, local anaesthetic supplementation given at the neck of sac. In spite of this if pain is there fentanyl in dose of 1-2 µ/kg slowly given. If above all measures does not help, general anaesthesia was instituted with propofol induction and suxomethonium facilitated intubation and maintained with O₂ + N₂O narcotic technique + muscle relaxant + controlled ventilation.

Quality of analgesia and relaxation was measured as^[8]

1. Excellent: Patient comfortable, analgesia, and surgical relaxation adequate.
2. Good: Analgesia and relaxation adequate, minimal discomfort during surgery. Alleviated by either supplementary local anaesthetic agent at the neck of sac.
3. Fair: Analgesia and relaxation adequate, discomfort present during surgery. Requires narcotic supplementation (Inj Fentanyl 1-2 µg/kg) in addition of supplementary local anaesthetic agent at the neck of sac.
4. Poor: Patients complaining of severe intolerable pain during surgery without relaxation & required GA.

Side effects and complications of field block

anaesthesia monitored intra and postoperatively like local wound infection, wound hematoma, local seroma, transient femoral nerve block. Then after the surgery post anaesthesia recovery was assessed in operation room by “criteria used to determine

fast-track eligibility after ambulatory anaesthesia”^{8,9} The total duration of analgesia (the duration of onset of analgesia till the subjective complaint of pain) assessed in all the patients.

Table 1: Criteria used to determine fast-track eligibility after ambulatory anaesthesia^{8,9}

Criteria		Score
Physical activity	Able to move all extremities on command	2
	Some weakness in movement of the extremities	1
	Unable to voluntarily move the extremities	0
Respiratory stability	Able to breathe deeply	2
	Tachypnea with good cough	1
	Dyspnoeic with weak cough	0
Hemodynamic Stability	Blood pressure <15% of the baseline MAP value	2
	Blood pressure between 15% and 30% of the baseline MAP value	1
	Blood pressure >30% below the baseline MAP value	0
Level of Consciousness	Awake and oriented	2
	Arousable with minimal stimulation	1
	Responsive only to tactile stimulation	0
Oxygen Saturation Status	Maintains value >90% on room air	2
	Requires supplemental oxygen (nasal prongs)	1
	Saturation <90% with supplemental oxygen	0
Postoperative Pain Assessment	None or mild discomfort	2
	Moderate to severe pain controlled with IV analgesics	1
	Persistent severe pain	0
Postoperative emetic symptoms	None or mild nausea with no active vomiting	2
	Transient vomiting or retching	1
	Persistent moderate to severe nausea and vomiting	0
Total score		14

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

Among 60 patients enrolled in this study, average age of patient was 52.23 ± 10.23 years. Majority of patients were from 51-60 years age group (38 %), followed by 41-50 years (30 %) & 61-70 years (20 %). All patients in this study were male. Mean body weight was 60.54 ± 6.04 kgs. Majority had indirect inguinal hernia (58 %) as compared to direct inguinal hernia (42 %).

Table 2: General characteristics

Characteristics	No. of patients	Percentage
Age groups (in years)		
18-30	3	5%
31-40	4	7%
41-50	18	30%
51-60	23	38%
61-70	12	20%
Mean age (mean±SD)	52.23 ± 10.23	
Gender		
Male	60	100
Female	0	0
Mean body weight (kgs)	60.54 ± 6.04	
Type of inguinal hernia		
Direct	25	42
Indirect	35	58

Duration of surgery in between 20-30 min in 5 patients out of 60, 22 patients duration of surgery was in between 31-40 min. 19 patients required a period of 41-50 min, duration of surgery was in between 51 to 60 minutes in 14 patients. Average duration of surgery: 43.76 ± 9.57 minutes. In majority of patients 32 ml local anaesthetic was used (89 %).

51 patients (85 %) had excellent type of analgesia and relaxation with patient comfortable, analgesia, and surgical relaxation adequate. 9 patients (15 %) complained of discomfort during surgical handling of the hernial sac or hernia repair. 3 patients (5 %) were not comfortable with the above measures and needed fentanyl depending upon their body weight. 3 patients (5 %) had no analgesia in spite of local anaesthetic supplementation and narcotic administration, so general anaesthesia was instituted.

Table 3: Surgical & anaesthesia characteristics

Characteristics	No. of patients	Percentage
Duration of surgery (minutes)		
20-30 min	05	8%
31-40 min	22	37%
41-50 min	19	32%
51-60 min	14	23%
Volume of local anaesthetic used		
32 ml	51	89%
34 ml	9	11%
Quality of analgesia & relaxation		
Excellent	51	85 %
Good	3	5 %
Fair	3	5%
Poor	3	5 %
Indirect	35	58

We found out of 60 patients 57 patients undergone hernia repair under field block anaesthesia successfully, 3 patients required general anaesthesia. Thus success rate was 95 %.

Table 4: Success rate

Field block	No. of patients	Percentage
Success	57	85 %
Field block	3	5 %

Visual analogue scale was 1.10 ± 0.44 at 0 min i.e. in immediate post operative period showing good pain control intra operatively. VAS score was 1.10 ± 0.44 at 1 hour post operatively, 1.16 ± 0.49 , 1.50 ± 0.54 , 1.91 ± 0.59 at 2nd, 3rd 4th hour respectively. VAS score was 2.73 ± 0.76 at 5th hour of post operative period. VAS score reaches 3 in nearly all patients (2.93 ± 0.52) at 6th hours post operatively.

Table 5: Visual analogue scale score

TIME	VAS SCORE
Immediate post op (0 min)	1.10 ± 0.44
1 hour	1.10 ± 0.44
2 hour	1.16 ± 0.49
3 hour	1.50 ± 0.54
4 hour	1.91 ± 0.59
5 hour	2.73 ± 0.76
6 hour	2.93 ± 0.52

Analgesia for 3 patients who required general anaesthesia was for lesser period with early request of analgesia. Only 3 patients have post operative analgesia less than 300 minutes. Mean duration of analgesia 363.08 ± 53.71 min. Minimum duration of analgesia was for 120 min, maximum duration of analgesia was for 420 min.

Table 6: Duration of Post Operative Analgesia

Time range in minute	Number of patients	Percentage
<301 min	3	5 %
301-310min	0	0 %
311-320 min	1	1.66 %
321-330 min	0	0 %
331-340 min	2	3.33 %
341-350 min	5	10 %
351-360 min	8	13.33 %
361-370 min	15	23.33 %
371-380 min	6	10 %
381-390 min	8	13.33 %
391-400 min	8	13.33 %
401-410 min	2	3.33 %
411-420 min	2	3.33 %

'Fast-track eligibility criteria' used for assessing recovery after ambulatory anaesthesia. Number of patients achieve fast track eligibility score of >12: All the patients had a score of 12 at '0' min, all of them had a score of >12 at '15' min and '30' min. All the patients were ready to be shifted to ward bypassing the post anaesthesia recovery room.

Table 7: Fast-track eligibility criteria after ambulatory anaesthesia

Parameter	0 minutes	15 minutes	30 minutes
	Mean ± SD	Mean ± SD	Mean ± SD
Physical Activity	2	2	2
Respiratory Stability	2	2	2
Hemodynamic Stability	2	2	2
Level Of Consciousness	1.95 ± 0.21	1.95 ± 0.21	2
Oxygen Saturation Status	2	2	2
Post Operative Pain Assessment	2	2	2
Post Operative Emetic Symptoms	1.95	2	2
Total Score	13.9 ± 0.43	13.95 ± 0.21	14

DISCUSSION

Inguinal hernia most probably has been a disease ever since mankind existed & inguinal hernia repair is one of the most commonly performed surgical procedure in men. In providing anaesthesia for inguinal herniorrhaphy, the technique chosen must be ^{cost} effective with good speed of recovery. Local anaesthesia could be a choice as it is safe, simple, efficient and cost effective. It is a method of choice in outpatient surgery and for minimizing the cost of surgery.^[4]

Local anaesthetics produce reversible conduction blockade of impulses by inhibiting passage of sodium ions through ion selective sodium channels, in nerve membranes of axons in the central and peripheral nerve pathways after regional anaesthesia. Removal of local anaesthetic is followed by spontaneous and complete return of nerve conduction with no evidence of structural damage to nerve fibres.^[10]

In inguinal field block, it will reduce the anaesthetic risk to a minimum; allow immediate ambulation and food intake, as it causes minimal physiological disturbance. This may be particularly useful for patients with cardiovascular and respiratory diseases. Also reduce postoperative complications such as post operative nausea, vomiting, urinary retention, atelectasis and respiratory complications, and almost eliminate the need for post operative narcotic analgesia.^[11]

Other advantages are long lasting postoperative pain relief as local anaesthesia administered before the incision produces longer postoperative analgesia because local infiltration, theoretically inhibits build of local nociceptive molecules and therefore, there is better pain control in the postoperative period lesser need for postoperative analgesia because most patients felt that the subsequent pain was more tolerable as it comes gradually.^[5]

While choosing local anaesthetic for field block one has to consider duration of surgery, for inguinal hernia repair it is around 30 to 90 minutes. Many authors use lignocaine for field block but it is short acting,^[12] studies of Sparks et al.,^[13] Shivakumar et al.,^[8] Dunn J et al.,^[14] added epinephrine to lignocaine for prolonging the block to a period sufficient for hernia repair. Some authors prefer other local anaesthetic drugs, Privitera et al.,^[15] used mepivacaine,

In this present study the combination of lignocaine with adrenaline and bupivacaine used. Addition of adrenaline to lignocaine increases the intensity and duration of nerve block.^[16] Adrenaline increases the maximum dose limit & decreases the toxicity of both lignocaine and bupivacaine.^[10] In subcutaneous infiltration, it makes the field bloodless due to vasoconstriction. Combination also provides advantage of early & prompt action of lignocaine and longer duration of bupivacaine which improves post operative pain control.^[17]

In present study for inguinal field block, local anaesthetic mixture was injected according to protocol with total 12ml at anterosuperior iliac spine point, 5 ml at mid point inguinal ligament, 5 ml at pubic tubercle, 10 ml subcutaneous infiltration at incision site, spinoumbilical line and from pubic tubercle to umbilicus. 2 ml of local anaesthetic mixture administered at neck of hernial sac by surgeon if required. Protocol used in our study resembles with Dierking et al.,^[17] Srivastava et al.,^[7] Abdul Razzaque et al.,^[3] & Shivakumar et al.,^[8]

In the present study we found 51 (85%) patients had excellent analgesia and relaxation, i.e. patient comfortable, analgesia and surgical relaxation adequate no supplementation was required during surgery. It was observed by various authors like Srivastava et al.,^[7] & Shivakumar et al.,^[8] that at the time of traction on the sac, patients often complain of discomfort. This finding was observed in 9 patients in our present clinical study. Conversion rate to general anaesthesia is low with this technique 5%, in our study, which is comparable with 4% as in field block anaesthesia studies Sparks et al.,^[13] Srivastava et al.,^[7] and Shivakumar K P et al.,^[8] study.

Field block using lignocaine with adrenaline and bupivacaine found to be effective (adequate analgesia and favourable intraoperative conditions) in 57 patients out of 60. 3 patients needed general anaesthesia. Success rate was 95%, failure rate was 5%. Comparable results found in following field block studies, success rate of 96% in Srivastava et al.,^[7] study, Shivakumar K P et al.,^[8] found field block successful in 96%, Sparks et al.,^[13] in 97%, Callsen et al.,^[18] field block successful in 99.5% with less rate of conversion to general anaesthesia.

We found VAS score average of 1.1 in immediate post operatively in all patients except those who required general anaesthesia. This is comparable

with Andersen et al.,^[19] with score of 1.3 in immediate post operative period, suggestive of good intraoperative analgesia.

In our study low pain score with no any requirement of analgesics (mean VAS score < 3) seen upto 6 hour post operatively, similar to Harrison et al.,^[14] Dierking et al.,^[20] Kingsnorth et al.,^[21] all had low pain score in early post operative period for 6 hours, and not beyond that.

It was clear that field block definitely decreases pain score in postoperative period after inguinal herniorrhaphy, though duration of analgesia varies. low pain score in early post operative period definitely eliminates need of opioids and decreases need of other analgesics like NSAIDs.

Most of the studies used bupivacaine alone in strength of either 0.25% or 0.5% or in combination with lignocaine 1%. As lignocaine is short acting post operative pain control can be attributed mainly to bupivacaine. We found the same duration of post operative analgesia with bupivacaine in strength of 0.125%, so one can think low strength of bupivacaine still have same duration of sensory block, but more studies needed. After the surgery post anaesthesia recovery was assessed. Fast track scoring system takes, similar recovery profile found in the study done by Song D et al.,^[22] and Shivakumar KP et al.,^[8]

Inguinal field block is safe method though there are few potential side effects or complications of this method. Most likely complications associated with this are, local wound infection, wound hematoma, local seroma, transient femoral nerve block, Bowel injury, local anaesthetic hypersensitivity or toxicity. We found no any complication with field block, which is comparable with Shivakumar K P et al.,^[8]

CONCLUSION

Field block is effective technique of anaesthesia for inguinal hernia repair and it provides good quality of analgesia and relaxation intraoperatively. Field block is the best method as far as recovery profile is concerned Field block anaesthesia provides long duration of post-operative pain relief. Field block for inguinal hernia repair results in minimal or no complications.

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