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LOCAL INFILTRATION ANESTHESIA VERSUS BLOCK ANESTHESIA IN INGUINAL HERNIA REPAIR

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Background ; The aim of this study was to evaluate and compare the effectiveness of local infiltration versus block anesthesia in inguinal hernia repair and their influence on post operative pain and time of return to normal activity.

Methods: 49 unselected cases of inguinal hernia aged 21-67 years were operated upon. 21 cases received local infiltration anesthesia given by the surgeon and 28 other cases received block anesthesia given by anesthetist . The success rate of both methods was compared . Postoperative pain was also scored and compared during the first two weeks by four point verbal rank scale , at rest and during mobilization . In addition the time of return to normal activity for both groups were studied.

Results: There was a significant difference in the success rate in favor of local infiltration anesthesia versus block anesthesia (95.23% vs 67.85%). Concerning post operative pain control, local infiltration anesthesia group showed better result but the difference was statistically insignificant.

Conclusion: Local infiltration anesthesia is more reliable , easy to perform by the surgeon and less anesthesia volume is needed compared to block anesthesia although both methods showed a comparable results concerning post operative pain control and time of return to normal activity.

INTRODUCTION

Ambulatory surgery is one of the main procedures taken to contain costs of hospital's stay. By the beginning of the twenty first century, more than 70% of all elective procedures in the United States will be performed on ambulatory basis. As post-operative pain is one of the main barriers for increasing the range of ambulatory procedures, its control is of prime importance [2]. With loco-regional anesthesia, it is possible to treat any type of inguino-femoral hernia, reducing the risks related to total anesthesia and the complications arising from bedrid. Excellent results were achieved especially in the elderly and high-risk patients like cardiopathic or those affected by respiratory and hepatorenal insufficiency with complete absence of mortality and morbidity. It was also found that local anesthesia is less detrimental to pulmonary function in hernia operations than spinal or general anesthesia [10]. Although local infiltration and block anesthesia has been extensively used in different types of hernia repair, up to our knowledge, no comparative study has been done.

This study aims, at evaluating and comparing the effectiveness of local infiltration versus block anesthesia in inguinal hernia repair and their impact on post-operative pain and time of return to normal activity.

PATIENTS AND METHODS

Patients selection:

Forty nine elective cases of inguinal hernia, aged 21 to 67 years old, were operated upon. Of the 49 cases, 21 had received local infiltration anesthesia given by the surgeon during surgery. The other 28 cases had received block anesthesia given by the anesthetist pre-operatively. Random selection of cases for either type of anesthesia was done with no inclusion or exclusion criteria.

Surgical procedure:

Initially, all patients received 5mg midazolam intramuscular, 15-30 minutes before surgery. Also, a single dose of antibiotic, 1gm cefoperazone sodium was given intravenously, on table.

All hernias whether direct or indirect were repaired using mesh or mesh plug repair. Only a single case of the local infiltration group was repaired using darning repair (tension free method). Selection of the surgical procedure was according to the type and size of hernia.

Anesthesia technique:

***Local infiltration anesthesia technique done by the surgeon*:**

The technique was described by Amid et al., (1994) [1]. A skin marker was used to mark a low transverse skin crease incision in the inguinal area; the center of which lies over the internal ring. This was done a day before or in the same day of surgery. Sedative (midazolam) was given while patient was in the ward, then he was transferred to operative theatre. The operation site of the patient was prepared as usual.

Thirty ml of 2% lidocaine was added to 10 ml of 0.25% bupivacaine with 1: 100,000 adrenaline in two syringes 20 ml each putting into consideration the recommended maximum for lidocaine infiltration (7mg/kg) [7]. First about 10 ml was injected in the subcutaneous tissue along the marked line after explaining to the patient what was being done. Then, about 3 ml was injected into the dermis along the marked line, after which there was an immediate complete anesthesia along the incision site. The incision was then done till the external oblique aponeurosis was reached, and then another 10 ml was injected in the subaponeuritic space and an incision was done along its fibers and the ilio-inguinal nerve was identified, and a few milliliters of local anesthetic (2-3 ml) was injected into the peri-neural tissue. Another 1 to 2 ml was injected into the pubic tubercle. The operation was proceeded as usual. If pain is still encountered by the patient during cord dissection, a few milliliters may be injected directly into the cord.

Block anesthesia technique done by anesthetist: [6]

Ilioinguinal and Iliohypogastric nerves:

About 1 inch medial to the anterior superior iliac spine and on a line between the spine and the umbilicus a ¾ to 1½-inch needle was inserted and 8 to 10 cc of local anesthetic was deposited as the needle pierces the fascias of the oblique muscles, in the form of wheals.

Genitofemoral nerve:

The terminal branches of the genital division were blocked by spreading 2-3 cc of local anesthetic through a 1-inch, 22-gauge block needle in the soft tissue down through the inguinal ligament just lateral to the pubic spine. The terminal fibers of the femoral branch were blocked by infiltrating subcutaneously just below the middle third of the inguinal ligament with 3 to 5 cc of the local anesthetic.

Abdominal field block:

Skin wheals were raised along the terminations of the ribs from T7 through T11. Local anesthetic was then infiltrated connecting the skin wheals and deep to the costal margins. The wall of anesthetic went from the T11 tip of the rib centrally along the costal margin to the xiphoid process, to the umbilicus.

Inguinal region:

Following blocking of the ilioinguinal and iliohypogastric nerves, a 3- to 4-inch, 22-gauge needle was inserted through the same area as the initial insertion and advanced on a line between the anterior superior iliac spine and the umbilicus. Approximately 20 cc of local anesthetic was infiltrated into the soft tissue as the needle was advanced. This would block the terminal branches of T12 and T11 as they coursed toward the midline of the body. In a similar manner a 3-inch block needle was inserted between the anterior superior iliac spine and the pubic spine, again infiltrating 20ml of local anesthetic in the soft tissue. Infiltration of 2 to 3cc of local anesthetic around the cord at the internal ring completed the anesthesia.

Evaluation of the two techniques of anesthesia:

Success rates of the two methods of anesthesia were compared. Post-operative pain and time to return to normal activity were evaluated. Post-operative pain was scored and compared during the first 14 post-operative days by four point verbal rank scale (none, mild, moderate and severe). The pain was scored at rest and during mobilization. Pain was scored daily for the first three days, then after the first week and lastly after two weeks. Also, the time of return to normal activity for both groups of patients was studied.

Monitoring lidocaine and bupivacaine toxicity:

C.N.S. monitoring:

Subjective monitoring of signs of C.N.S. toxicity was done. It included restlessness, vertigo, tinitus, slurred speech, culminating in tonic-clonic seizures and finally C.N.S. depression (apnea) [5].

C.V.S. monitoring:

All patients of both groups were monitored to elicit systemic cardiovascular toxicity of the local anesthetic (hypotension, bradycardia, prolongation of the P-R interval and widening of the QRS complex [11] using an Eagle vital signs monitor model J2FF185GPR (Marquette Electronics, CA, USA). They were recorded at the following intervals:

- immediately before surgery
- at 5 minutes interval during surgery
- at 15 minutes interval in the post operative period (6 hours after surgery)

RESULTS

Table (1): ***Frequency distribution of 49 cases of inguinal hernia according to type of hernia, surgical technique, and type of anesthesia.***

Inguinal hernia type	*Surgical technique (Repair)*	*Anesthesia type* Local	Block	*Total*
Primary indirect hernia	Mesh	7	19	26
Primary indirect hernia	Mesh-plug	8	6	14
Primary indirect hernia	Darning	1	-	1
Primary direct hernia	Mesh	2	3	5
Primary direct hernia	Mesh-plug	2	-	2
Bilateral direct hernia	Mesh	1	-	1
Total		21	28	49

Comparison of the two anesthetic techniques:

Amount of local anesthesia used:

In local infiltration anesthesia group, the mean amount needed was 32 ml, while in the block anesthesia group, a mean of 51 ml was needed to produce the proper anesthesia.

Conversion rate to general anesthesia:

Of the 21 cases given local infiltration anesthesia, only one (4.8%) needed conversion to general anesthesia due to moderate pain experienced by the patient during hernial sac dissection. Block anesthesia conversion rate to general anesthesia was 32.1%. The cause of conversion was moderate to severe pain experienced by patients mainly during cord manipulation i.e., success rates were 95.2% and 67.8%, respectively.

Post- operative pain:

Table (2.1): ***Frequency distribution of cases of local infiltration anesthesia during rest according to post-operative rank of pain and day of measurement.***

Day of post-operative pain measurement	*Rank of pain (No. of cases=20)*							
	No Pain		**Mild**		**Moderate**		**Severe**	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1	7	(35)	7	(35)	4	(20)	2	(10)
2	8	(40)	6	(30)	4	(20)	2	(10)
3	10	(50)	6	(30)	3	(15)	1	(5)
7	12	(60)	6	(30)	1	(5)	1	(5)
14	15	(75)	3	(15)	1	(5)	1	(5)

Table (2.2): *Frequency distribution of cases of block anesthesia during rest according to post-operative rank of pain and day of measurement.*

Day of post-operative pain measurement	*Rank of pain (No. of cases=19)*							
	No Pain		**Mild**		**Moderate**		**Severe**	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1	6	(31.6)	6	(31.6)	5	(26.3)	2	(10.5)
2	6	(31.6)	5	(26.3)	4	(21.1)	4	(21.1)
3	9	(47.4)	5	(26.3)	4	(21.1)	1	(5.3)
7	12	(63.2)	4	(21.1)	2	(10.5)	1	(5.3)
14	13	(68.4)	4	(21.1)	1	(5.3)	1	(5.3)

Table (3.1): *Frequency distribution of cases of local infiltration anesthesia during mobilization according to post-operative rank of pain and day of measurement.*

Day of post-operative pain measurement	*Rank of pain (No. of cases=20)*							
	No Pain		**Mild**		**Moderate**		**Severe**	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1	2	(10)	11	(55)	4	(20)	3	(15)
2	4	(20)	10	(50)	4	(20)	2	(10)
3	5	(25)	10	(50)	3	(15)	2	(10)
7	6	(30)	11	(55)	2	(10)	1	(5)
14	11	(55)	6	(30)	2	(10)	1	(5)

Table (3.2): *Frequency distribution of cases of block anesthesia during mobilization according to post-operative rank of pain and day of measurement.*

Day of post-operative pain measurement	*Rank of pain (No. of cases=19)*							
	No Pain		**Mild**		**Moderate**		**Severe**	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1	2	(10.5)	11	(57.9)	3	(15.8)	3	(15.8)
2	2	(10.5)	11	(57.9)	3	(15.8)	3	(15.8)
3	4	(21.1)	10	(52.6)	3	(15.8)	2	(10.5)
7	5	(26.3)	10	(52.6)	2	(10.5)	2	(10.5)
14	10	(52.6)	6	(31.6)	2	(10.5)	1	(5.3)

Time of return to normal activity:

Table (4): ***Frequency distribution of patients returned to full activity within two weeks, as regards type of anesthesia and work.***

Type of work	*Type of anesthesia*						*P- value*
	Block anesthesia			Local infiltration			
	Total	No.	%	Total	No.	%	
Office workers or pension age group	5	4	80.0	8	7	87.5	0.67 (Insig.)*
Manual workers	14	5	35.7	12	5	41.7	0.93 (Insig.)
Total	19	9	47.4	20	12	60	0.43(Insig.)

* Insig. = Insignificant (There is statistically insignificant difference between the two types of anesthesia)

For every day measurement of post-operative pain, P-value was calculated, to show the statistical difference between local infiltration anesthesia and block one. At rest, P-values were 0.97, 0.79, 0.88, 0.70 and 0.93 for the post-operative days 1, 2, 3, 7, and 14, respectively, i.e., the difference was not statistically significant for any of the days. The same results were obtained during mobilization, where P-values were 0.99, 0.79. 0.99, 0.93 and 0.99, respectively.

DISCUSSION

Many studies has been made to evaluate wound infiltration and nerve block as a method to control post-operative pain after inguinal hernia repair [5,3,12], but little is known about the usage of nerve block as the sole method of anesthesia. Wound infiltration or instillation with 0.25% bupivacaine provided pain relief comparable with ilioinguinal or iliohypogastric nerve block [3,12]. Although some authors found nerve block of no value as a method of anesthesia rather than just a method to control post-operative pain (analgesia versus anesthesia)[4]. In our study using unmonitored local anesthesia (without local anesthetic plasma level assay), the success rate was significantly higher using local infiltration anesthesia versus block anesthesia in inguinal hernia repair which does conforms with the previous findings (95.23 % versus 67.85%). Our results did not conflict with the previous studies that prove the role of block anesthesia to control post-operative pain as the role and effect of such methods as an analgesic may differ from its effect as an anesthetic. Another point in favor of local infiltration method is that the amount of local anesthetic needed was much lower than that used for block anesthesia (55 versus 40ml xylocaine, marcaine & adrenaline). It has been found that, sticking to the recommended maximum dose for the local anesthetic agents in case of block anesthesia did not produce the proper anesthetic effect needed for the procedure and still no single case of toxicity was noticed. This confirms the previous study for the much higher toxicity threshold for lignocaine which may reach five times the usual recommended maximum for infiltration [7].

Optimizing post-operative pain control is the key to further advancement in the field of ambulatory anesthesia [9]. It can provide both inter-operative and post-operative analgesia facilitating a rapid and smooth recovery. As has been previously mentioned concerning the role of local infiltration and nerve block in post-operative pain control, both methods have been shown to improve post-operative pain scores and analgesic requirements compared with placebo in patients undergoing inguinal herniorrhaphy [5,3,12]. In another study spinal anesthesia was shown to decreases post-operative pain than general anesthesia. However, this decrease has less pronounced than that with local anesthesia injected into the operative site especially with movement associated pain and pain caused by the pressure on the wound [13].

The present study showed statistically insignificant difference between local infiltration and block anesthesia concerning post-operative pain control, time of return to activity and type of work whether manual or office work.

Concerning the time to return to normal activity, our results are comparable to previous study [8], but what is new in our study is the use of block anesthesia and comparing it with the local infiltration anesthesia group.

CONCLUSION

Local infiltration anesthesia is more reliable, easier to perform by the surgeon and less anesthesia volume could be used than in case of block anesthesia. Although both methods showed comparable results, concerning post-operative control of pain and time of return to normal activity.

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