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A PROSPECTIVE COMPARISON STUDY BETWEEN LECHTENSTEIN OPEN ANTERIOR POLYPROPYLENE ONLAY MESH"OAPOM" AND MODIFIED LECHTENSTEIN (CHASTAN AND BASRAH TECHNIQUE)

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Jasim Dager Saud [1], **Muataz Fathullh Fadhil** [2]

[1] FICMS,CABS, FRCS, FACS, D.MAS. Consultant and Chief Surgeon ,Basrah Teaching Hospital, Basrah, Iraq

[2] Department of surgery, Basrah Teaching Hospital, Basrah, Iraq

Corresponding Author: Jasim Dager Saud
Email: jasim_dager@yahoo.com

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Abstract:

Background: Lichtenstein in the 1980, employed a mesh piece to the inguinal canal`s floor. It showed superior results compared to previous tissue-based repairs. It is gold standard for open hernia repair with recurrence rate at 5 years <4%, with risk of severe chronic pain at 3 years = 6%. The Chastan technique, in 2005, was developed to improve the Lichtenstein technique. He was using different dissection and different mesh implantation (small grips covering whole of one side of mesh to secure immediate fixation around the cord with a self-gripping flap). Here in Basrah in 2016, we try to improve the Lichtenstein technique by using the same dissection of Chastan but differ from Chastan in applying of mesh. We used polypropylene mesh in three techniques.

Aims: A comparative assessment of operative time, early and late postoperative complications of surgery for inguinal hernia repair using lichteinstien, Chastan and Basrah techniques.

Methods: Between December 2016 and December 2019, a total of 150 male adult patients with primary inguinal hernia were included according to inclusion criteria of our study. Patients were divided into 3 groups each group contain 50 patients which undergo Lichteinstien (L), Chastan(C) and Basrah(B) techniques respectively: All patients followed up to two years. The operative time, early and late postoperative complication were compared among three groups.

Result: The 3 groups were similar in terms of age, sex, comorbidities, BMI, ASA classification, types of inguinal hernia (Nyhus classification). There is no significate difference in terms of operative time (p value=0.954),24-h VAS score, length of hospital stays (LOS) and return to work (RTW), (p value=0.607,0.206,0.651 respectively). Seroma formation, chronic pain and recurrence rate were lower in Basrah and Chastan than Lichtenstein.

Conclusion: Basrah and Chastan techniques show better results than Lichtenstein technique in terms of chronic pain, seroma formation and recurrence rate.

Keywords: Inguinal hernia repair,lichtenstein,Chasten, Basrah method

Introduction:

The main advancement in inguinal hernia repair was in the 1980s, Lichtenstein [1] employed a mesh piece to the inguinal canal`s floor, letting for a truly tension-free repair. This technique showed superior results compared to previous tissue-based repairs [2] . There were numerous other advantages of this technique. In addition to being truly tension-free, the mesh could restore the force of the fascia of transversalis, and essentially, the technique had a very short learning curve [3],[4] . The superior results have been widely reproduced regardless of size of hernia and type, and they were attainable among both non expert and expert hernia surgeons [3],[4],[5] and considered now as gold standard for open hernia repair with recurrence rate at 5 years <4% [4] , with risk of sever chronic pain at 3 years = 6% [6],[7],[8] ,however improvement of this technique are required in order to Reduced postoperative pain, Increase reproducibility of the technique and reduced time at surgery and of the technique which developed to improve of Lichtenstein technique is the Chastan technique, it`s tension-free technique described by Philippe Chastan [9] .

Chastan was using different dissection and different mesh implantation, he used Parietex ProGrip™mesh; which has small grips covering whole of one side of mesh to secure immediate fixation. It`s secured around the cord with a self-gripping flap; doesn't require stitches (figure1).

Here in Basrah we try to improve the Lichtenstein technique by using the same dissection of Chastan but we use polypropylene mesh and applying of mesh differs from Chasten technique itself.

Aim Of Study

We use the same polypropylene mesh in Basrah, Chastan and Lichtenstein techniques to identify whether Chastan dissection is better than Lichtenstein dissection or not. The early, late postoperative complications and time of surgery were compared among 3 groups.

Patients And Methods:

A prospective comparison study was performed at the surgical ward at Department of Surgery, Basrah general hospital, after

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local ethical committee approval between December 2016 and December 2019.

Patients with inguinal hernia were evaluated for surgery; male patients 18 years old and above were included, where patients below 18 years old, recurrent, and previous abdominal surgery were excluded from the study because the patients below 18 years, there is no mesh used due to the hernia being congenital, the recurrent hernia carry a high recurrence rate. After obtaining the informed consent from the patients, a total of 150 male adult patients with primary inguinal hernia were included in this study. Patients distributed into three groups, 50 patients undergo Lichtenstein technique (group L), 50 patients undergo Chasten technique (group C),50 patients undergo Basrah technique (group B) , by selection one of three envelope (each envelope contain one procedure either Lichtenstein or Chasten or Basrah repair).

All patients admitted one day before surgery in our hospital where history was taken, and thorough physical examination performed and investigations in form of hematological, biochemical, viral profile and bleeding profile and in some patients' ultrasound of abdomen and pelvis was done while CT scan was done in other few patients. All surgical interventions were done under general or spinal or epidural anesthesia, in agreement with the anesthetist`s opinion or the patient`s preference. One consultant surgeon participated in each procedure as an operating or assisting surgeon. All patients were followed up for 2 years.

Main demographic data, such as sex, age, American society of anesthesiologists (ASA) score, body mass index (BMI), were recorded preoperatively. At the end of the procedure, operation time (divided into time of incision and dissection, time of applying mesh and time of closure) were recorded, and according to Nyhus classification, hernia types are grouped, type 3C and type 4 were excluded.

Surgical procedures:

Preoperative preparation was the same in all techniques, patient with supine position, General or spinal or epidural anesthesia, skin preparation: with povidone iodine from umbilicus to mid-thigh and abdominal draping procedure. Identification of pubic tubercle and anterior superior iliac spine (ASIS). The differences in surgical procedures between the three techniques are shown below in Table I.

Table I. The surgical procedures for the 3 techniques.

Techniques	lichtenstein	Chasten	Basrah
Incision	Parallel to inguinal lig.	Suprapubic	Suprapubic
External oblique aponeurosis opening	Obliquely with fiber	Medially vertical avoiding fibers	Medially vertical avoiding fibers
Ilioinguinal nerve	Difficulty identified	Easily identified	Easily identified
Mesh type	polypropylene	Polypropylene	Polypropylene
Mesh applying	1 stitch at pubic tubercle,2-3 stitches at ing.lig.& 1stitch at conj.tenden	Same	Same
Tail of mesh	Fixed laterally	Fixed superiorly after folding	Fixed superiorly without folding
Closure of Ext. oblique	Obliquely with vicryl 2/0 continuous	Vertical with vicryl 2/0 continuous	Vertical with vicryl 2/0 continuous
Closure of subcutaneous t. &scarp`s F.	Interrupted vicryl 3 or more stitches	Interrupted vicryl 3 or more stitches	Interrupted vicryl 3 or more stitches
Skin closure	Nylon 2/0 subcuticular	Nylon 2/0 subcuticular	Nylon 2/0 subcuticular

The time of surgery (divided into time of incision and dissection, time of applying mesh and time of closure) of each technique were recorded. At the postoperative period, the standardized analgesics were administered to the patients. For the first 24hr, paracetamol 1gm IV/8hr, 3rd generation Cephalosporine 1gm/12hr at night as a second dose (dose of of 1gm cephalosporin IV given preoperatively as prophylactic), IV fluid G/S 1000cc/8hr and patients whose discharge on 1st postoperative day prescribed for oral antibiotic Cefixime 400mg for 5 days with oral analgesia, postoperative pain scores were evaluated at 24hr after surgery by using visual analogue scale (VAS).

Postoperative complications were recorded, return to work and Length Of hospital Stays (LOS), were also recorded. We inspected all patients and do follow up for all patients.

For the classification and definition of SSI, we exactly followed the criteria determine in 1999 by the Centers of control of Disease. We categorized the results as superficial or deep and organ/space SSIs 10 .

Patients were called for follow- up visits at 7 and 30 days after the initial procedure at the

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early visits, stitches were removed and wound was examined for any seroma, hematoma, and surgical site infection (SSI), return to daily activity was evaluated and recorded. Then, they were called at 6,12 and 24 months, all patients followed up for 2 years. At follow up visits, the patients were examined for recurrence, and chronic pain was evaluated. Chronic pain is defined as the pain began after the procedure and did not disappear for at least 3 months after the surgery

Statistical analysis was done by using Statistical Package for the Social Sciences statistics (SPSS) software 20.1, Chi-square test was used for qualitative variables. Students t test was used When comparing the means of quantitative variables. The P value less than 0.05 is agreed as statistically significant.

RESULTS

The study was concluded with 150 patients, 50 patients in L group; 50 patients in C group; 50 patients in B group, from December 2016-December 2019. All patients were males aged 18- 85 years; the mean age of cases was 49.5±15.7. The three groups were similar in terms of age, sex, co-morbidities, BMI, ASA classification. Types of inguinal hernias according to Nyhus classification were also similar among the groups (Table II).

Table II. Characteristics of baseline health status, by method of operation.

Characteristics		L group (n=50)	C group (n=50)	B group (n=50)	P-value
Age(years)		45.8±13.2	46±14.2	46±13.9	0.109
Co-morbidities (no.)		25(0.5%)	22(0.44)	29(0.58)	0.218
ASA score	1	25(0.5)	28(0.56)	24(0.48)	0.098
	2	19(0.38)	17(0.34)	20(0.4)	0.045
	3	6(0.12)	5(0.1)	9(0.18)	0.019
BMI		18.2±5.8	18.7±4.6	18.1±5.3	0.87
Nyhus type	1	17(34%)	16(32%)	18(36%)	0.735
	2	13(26%)	12(24%)	14(28%)	
	3A	10(2%)	11(22%)	11(22%)	
	3B	10(2%)	11(22%)	7(14%)	
	3B	10(2%)	11(22%)	7(14%)	

The mean of operative time (divided into time for incision and dissection, time for applying mesh and time for closure) was shorter in Chasten and Basrah techniques than Lichtenstein but not significantly different (40min, 40min,45min respectively)Table III.

Table III. Operative time for each technique.

Operative time in minutes	Lichtenstein	Chastan	Basrah	P value
Time of incision and dissection	12 minutes	10 minutes	10 minutes	
Time of applying mesh	24 minutes	23 minutes	23 minutes	
Time of closure	9 minutes	7 minutes	7 minutes	
Total time	45 minutes	40 minutes	40 minutes	0.954

The postoperative 24-hour VAS score was not significantly different among the three techniques with a mean score of (1.9±1.2). The (LOS) in days and (RTW), (in days) are not significantly differentTable IV.

Table IV. VAS score, return to work, length of hospital stays according to groups.

	Lichtenstein	Chastan	Basrah	p-value
VAS score	2.74±1.3	1.43±1.2	1.22±1.1	0.607
LOS (days)	1.27±0.34	1.12±0.52	1.04±0.24	0.206
Return to work (days)	9.68±2.31	8.54±2.73	8.23±2.50	0.651

The rate of postoperative complications, early (hematoma and seroma formation, infection, scrotal edema, urine retention). Late (paresthesia, testicular atrophy, chronic pain), were lower in chasten and basrah techniques than Lichtenstein techniques, significantly difference for seroma and chronic painTable V.

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Table V. Postoperative complications, by operative method.

		Lichtenstein	Chasten	Basrah	p-value
Early					
Hematoma		6(0.12)	5(0.1)	5(0.1)	0.115
Seroma	7 Days	2(0.04)	0	0	0.08
	30 days	5(0.1)	0	0	0.004
SSI		1(0.02)	1(0.02)	1(0.02)	0.406
Scrotal swelling		2(0.04)	3(0.06)	2(0.04)	0.543
Urine retention		4(0.08)	5(0.1)	4(0.08)	0.98
Late					
Testicular atrophy		0	0	0	
Paresthesia		3(0.03)	2(0.04)	1(0.02)	0.160
Chronic pain		13(0.26)	4(0.08)	3(0.06)	0.001

The mean recurrence rate was 2%, there were 2 recurrences in Lichtenstein group, 1 recurrence in Chasten group and zero in Basrah group during the 2 years' time followed upTable VI.

Table VI. Recurrence rate by operative method.

	Lichtenstein	Chasten	Basrah	p-value
Recurrence rate	2(4%)	1(2%)	0	0.004

Discussion:

The introduction of polypropylene mesh, an artificial material, was a milestone in repairing hernia. Of the several open surgery techniques used, the Lichtenstein repair using a synthetic implant to support the wall of the inguinal canal posteriorly, is currently accepted as the "gold standard" [10],[11] .

The European Hernia Society (EHS) updated its consensus guidelines on treatment of inguinal hernia. With best available data in adult in 2014 [12] . The highest evidence level (1A) and recommendation grade (A) supports the use of the tension-free hernioplasty (Lichtenstein) for repairing of unilateral, primary, symptomatic inguinal hernias. This

repair is superior to the Shouldice and Bassini and tissue repairing methods [12,13,14] .

The current study compared the difference between the Basrah, Lichtenstien and Chasten techniques for inguinal hernia in terms of incision, dissection, nerve identification, applying and fixation of mesh and closure, Early and late postoperative complications, and the time of each procedure.

The concept of Chasten [9] technique that introduced by Philippe chasten 2005 (French surgeon), is a tension-free technique by conclusion of his study.

It was easy, painless, safe, and effective, with a mean operative time of 20 minutes, a rate of secondary pain of 2%, and 0.5% of long-term recurrence, these results can be favorably compared with those already published. but Chastan was using different dissection and different mesh implantation, he used Parietex ProGrip™mesh; which has small grips covering whole of one side of mesh to secure immediate fixation. it`s secured around the cord with a self-gripping flap; not require stitches. After resorption of the first superior part of mesh, only the lightweight polypropylene fabric (40g/m^2) remains.

The Chastan presumed that pain is reduced in his technique because of the following: the dissection of ilioinguinal nerve placed differently for 15 years ago; chronic pain less than 1%, while before that chronic pain about 2-4%. Avoiding of suture around the mesh, because creating the tension on mesh on inguinal ligament when the patient moving and also to confirm the fact that it`s real tension free mesh, when place the mesh on transversalis fascia, so that when patient pushing; the mesh working with abdominal pressure.

Chastan talks about seroma and hematoma.

Seroma: not depending on mesh, depending on dissection, when do dissection on pubic bone, a way from lymphatic and vessels. There is superficial hematoma in his study.

In our study we try to identify whether the result of chasten study was due to mesh use or due to dissection, so we used a polypropylene mesh in all techniques i.e., Lichtenstein, Chasten and Basrah. The findings of our study showed that Chasten and Basrah techniques have better results than Lichtenstein in terms of VAS score and operation time (not significantly different) with similar rate for LOS and return to work. The present study showed that postoperative complications in terms of seroma and chronic pain were significantly less in Chasten and Basrah techniques than Lichtenstein, other complications were similar.

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The recurrence rate in Chasten and Basrah were less than Lichtenstein with a follow up of 2 years, but significantly different, lower recurrence rate**.**

Conclusion:

The Basrah and Chastan techniques show better results than Lichtenstein technique in terms of chronic pain, seroma formation and recurrence rate; that are significantly lower, with similar rate for LOS, return to work and

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Responsibility for statistical analysis: 1,2
Writing the article: 1,2
Critical review: ١,2
Final approval of the article: 1,2
Each author believes that the manuscript represents honest work and certifies that the article is original, is not under consideration by any other journal, and has not been previously published.
Availability of Data and Material:
The corresponding author is prompt to supply datasets generated during and/or analyzed during the current study on wise request.

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