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A Comparative Study between Lichtenstein Hernioplasty and Rutkow-Robbins Method of Hernioplasty for Inguinal Hernia Repair.

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ABSTRACT

Background: To compare the effectiveness of the two different methods of inguinal hernia repairs viz. The Lichtenstein hernioplasty and Rutkow-Robbins method of hernioplasty. To compare the results of these two techniques and complications if any, and to arrive at a conclusion as to the better modality of treatment in the present setup. **Methods:** Total 50 patients of uncomplicated direct and indirect inguinal hernia were included in the study, they were randomly chosen for two different surgeries–The Lichtenstein hernioplasty and Rutkow-Robbins method of hernioplasty, 25 cases each. The relevant data regarding age/sex incidence, mode of presentation, surgical treatment and postoperative complications were recorded on predesigned proforma and analysed. The patients were followed up after 7 days, 15 days, 1 month, 3 months and 6 months thereafter. **Results:** The mean operative time for Lichtenstein hernioplasty group was 57 minutes, and 47 minutes for the Rutkow-Robbins hernioplasty group. Rest of the observational findings were comparable without any significant difference. **Conclusion:** The Rutkow-Robbins method of hernioplasty can be completed easily and more quickly with significant reduction in the operative time than Lichtenstein hernioplasty. Incidences of Intra operative and post operative complications as well as overall results of procedures were all comparable without any significant difference.

Keywords: Inguinal Hernia, Lichtenstein Hernioplasty, Rutkow-Robbins Hernioplasty.

INTRODUCTION

Inguinal hernia most probably has been a disease ever since mankind existed.[1] In humans, the upright posture causes the gravitational stress to pass down to the lower abdominal wall. Furthermore, the inguinal canal is directed downwards, and the intra-abdominal contents pressing on its internal opening tends to dilate it and cause the loops of bowel to enter the canal [2].

Hernias are among the oldest known afflictions of humankind, and surgical repair of the inguinal hernia is the most common general surgery procedure performed today. Despite the high incidence, the technical aspects of hernia repair continue to evolve [3].

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The first evidence of operative repair of a groin hernia dates to the first century AD. The original hernia repairs involved wide operative exposures through scrotal incisions requiring orchidectomy on the involved side. Centuries later, around 700 AD, principles of operative hernia repair evolved to emphasize mass ligation and en bloc excision of the hernia sac, cord, and testis distal to the external ring[3].

Bassini revolutionized the surgical repair of the groin hernia with his novel anatomical dissection and low recurrence rates. He first performed his operation in 1884, and published his initial outcomes in 1889.[4] The advances in groin hernia repair in the century following Bassini have shared the primary goal of reducing long-term hernia recurrence rates. Throughout the 1970's and most of the 1980's, tension or tissue based repairs (like Bassini, Cooper/McVay and Shouldice) garnered the greatest number of cases in the USA[5]. All the repairs namely Bassini's, Shouldice, McVay repairs regardless of modifications, have shared a common disadvantage of suture line tension leading to recurrences [6].

Lichtenstein reported that excessive tension on the suture line resulted in high recurrence rates after primary hernia repair. In 1989, Lichtenstein et al concluded that with tension free mesh repair of hernia recurrences can completely be avoided and

significant reduction in recurrence rate was achieved[6]. Although many new techniques are available today for hernia repair (Plug and Patch technique, TEP, TAPP, PHS) yet Lichtenstein tension free hernia repair is the most commonly used technique due to cost effectiveness, low recurrence rate and better patient satisfaction [6].

In 1993 Rutkow and Robbins published a study "Tension-free Inguinal Herniorraphy: a preliminary report on the mesh plug technique". From 1989 through 1991 they completed 1011 mesh hernia plug repairs, and concluded that compared with conventional sutured surgical techniques, a plug repair uses less overall dissection and ensures a "tension-free" hernioplasty. They found that the two factors of no tissue tension and decreased dissection are the most important reasons for greater patient comfort, rapid rehabilitation, decreased recurrence, and lessened overall complication rates with the mesh hernia plug technique [7].

The present study has been done to compare the Lichtenstein hernioplasty and Rutkow-Robbins method of hernioplasty for inguinal hernia repair.

MATERIALS AND METHODS

This prospective comparative study was conducted on 50 cases of inguinal hernia, admitted in Department of Surgery, Government Medical College and associated Rajindra Hospital, Patiala, Punjab, were selected on the basis of the simple random sampling method.

Inclusion Criteria

1. Patients with direct and indirect inguinal hernia were included in the study without any prejudice regarding sex.
2. Uncomplicated hernias were included.

Exclusion Criteria

1. Infants with inguinal hernias.
2. Recurrent hernias.
3. Complicated hernias.
4. Hernias treated with laparoscopic method.
5. Pregnancy.
6. Associated medical problems that contraindicate safe induction of general anesthesia or elective surgery.

After preoperative evaluation and preparation, patients were randomly chosen for two different surgeries, the Lichtenstein hernioplasty and Rutkow-Robbins method of hernioplasty, 25 cases each. Patients were counselled regarding procedure, and informed written consent obtained. The age/sex incidence, mode of presentation, surgical treatment and postoperative complications were evaluated and compared. The data was collected and recorded on predesigned proforma.

Operative Procedures

The type of anaesthesia used for both the methods was decided by anaesthetist's team; which included regional or general anaesthesia. A single dose of preoperative broad spectrum antibiotic was given to all the patients, followed by the same antibiotics for 3 days postoperatively.

The Lichtenstein tension-free mesh repair was performed in first group of 25 patients as described by Lichtenstein et al [1], using a polypropylene mesh to reconstruct the entire floor of the inguinal canal without any attempt to close the defect by suture and a 2-0 polypropylene suture to fix mesh in the desired position.

Rutkow-Robbins method of hernioplasty was performed in second group of 25 patients, after reducing the sac, placement of mesh plug is done. This conical shape of the mesh plug is then fixed by a single suture passing through its conical wall. Internal ring is sized with the surgeon's finger, which then guides the polypropylene cone or "plug" in to the opening. The cone is secured to fascia transversalis and conjoint tendon (internal oblique muscle) with one or more polypropylene sutures. It is important that the cone be placed behind the muscles and that a sufficient number of sutures are placed such that the sac or preperitoneal fat cannot get out around the perimeter of the cone [8]. Onlay 'patch' of polypropylene mesh is placed with the pointed or shield end overlapping the pubic tubercle. The cord is passed through the lateral slit and the two tails are joined together with 2-0 absorbable sutures. A suture is placed near the cord, thus determining the size of new internal ring. It is important that patch be sufficient size to overlap the inguinal ligament inferiorly, the pubic tubercle medially, and the entire floor centrally. Additionally the mesh should reach well lateral to the internal ring. This may require the custom cutting of a sheet of polypropylene mesh for large indirect hernia [8].

Closure is same for both the techniques. Cord structures are placed over the repaired posterior wall. The external oblique aponeurosis is re-approximated either by simple suture or preferably, by overlapping, the reconstituted superficial ring should fit snugly around the cord, but it must not be too tight or atrophy of the testis may result; it should admit the tip of the little finger without difficulty in addition to the cord. After careful haemostasis the wound is closed by suturing of the superficial fascia and skin[8].

After surgery all patients were monitored carefully for pain, bleeding, wound infection and urinary retention. Pain was assessed using visual analogue score (VAS) scale. Wound infection ranging from minimal discharge of pus from a single cutaneous suture to extensive and invasive infection requiring lengthy hospitalization and intravenous antibiotics. Bleeding is defined as subcutaneous haematoma, which can result from careless ties or cautery. Urinary retention was termed as inability to urinate requiring catheterization.

The patients were discharged when fit, and were asked to come for regular follow-up after 7 days, 15

days, 1 month, 3 months and 6 months. The patients were advised to return to pre-hernia lifestyle after 21 days except lifting heavy weights. Light weight lifting can be done after 2 months.

All the patients were followed-up for post-operative pain, interference with activities of daily living, use of analgesics, visit to a general practitioner and recurrence. The age/sex incidence, type of hernia, mode of presentation, surgical treatment, and post operative complications were all evaluated and compared with standard published literature.

RESULTS

Patient characteristics: A total number of 50 patients with inguinal hernia were included in the study. Lichtenstein hernioplasty was performed in 25 patients and Rutkow-Robbins method of hernioplasty in 25. The groups were comparable for age, sex, type and side of hernia with mean age 48.08 and 47.96 years respectively.

Table 1: Showing Patient Characteristics.

S.No.	Patients Variable	Lichtenstein Method of Hernioplasty (n=25)	Rutkow-Robbins Method of Hernioplasty (n=25)	'p' Value
1	No. of Patients	25	25	
2	Mean Age (years)	48.08	47.96	0.982
3	Sex			
	Male	25	25	
	Female	00	00	
4	Type of Hernia			
	Direct (%)	6 (24)	5 (20)	0.733
	Indirect (%)	19 (76)	20 (80)	
5	Side of Hernia			0.390
	Right (%)	13(52)	16(64)	
	Left (%)	12(48)	09(36)	

Operative Time: The mean operative time for Lichtenstein hernioplasty group was 57 minutes, and 47 minutes for the Rutkow-Robbins hernioplasty group. As the 'p' value came out to be less than 0.05(0.00), the difference in operative time in both the method was found to be statically significant. Results show that Rutkow-Robbins hernioplasty can be completed more quickly than Lichtenstein hernioplasty and is statistically significant.

General Complications: As the 'p' value for post operative general complications is not less than 0.05, so this difference is statistically not significant

Table 2: General Complications.

S. No.	General Complications	Lichtenstein Method of Hernioplasty(n=25)	Rutkow-Robbins Method of Hernioplasty (n=25)	'p' Value
1	Nausea/ Vomiting (%)	3 (12)	3 (12)	
2	Fever (%)	3 (12)	4 (16)	
3	Urinary Retention (%)	4 (16)	3 (12)	0.056
4	Bowel Obstruction (%)	0 (00)	0 (00)	

Specific Complications: As none of the patient in the study groups developed any scrotal complication. All the patients from both the groups were advised to wear tight undergarments with scrotal support for immediate 48 hours of post operative period. This difference was statistically not significant as the 'p' value is >0.05.

Correlation of Visual Analog Scale (VAS)scores for post operative pain: Post operative pain between the two groups was assessed using the VAS having range from 00 to 10. The mean VAS score in the Lichtenstein hernioplasty group was 3.04 with standard deviation of ±1.51. In the Rutkow-Robbins hernioplasty group this mean VAS score was 2.96 with the standard deviation of ±1.61. This difference in the VAS score was statistically not significant.

Hospital Stay: Mean duration of stay in hospital was 3.56 days with range of 2-6 days in case of Lichtenstein hernioplasty group. In case of Rutkow-Robbins hernioplasty group, mean hospital stay was of 4.04 days with minimum and maximum stay of 3 and 7 days respectively. As the 'p' value is more than 0.05(0.11) this difference is statistically not significant.

Table 3: Specific Complications.

S.No.	Specific Complications	Lichtenstein Method of Hernioplasty (n=25)	Rutkow-Robbins Method of Hernioplasty (n=25)	'p' Value
Wound				
1	Infection	2(8)	2(8)	0.56
2	Abscess	00(00)	00(00)	
3	Seroma	1(4)	2(8)	
4	Hematoma	00(00)	00(00)	
Scrotal				
1	Hematoma	00(00)	00(00)	
2	Abscess	00(00)	00(00)	
3	Swelling	00(00)	00(00)	

Table 4: Correlation of VAS scores for post operative pain.

Pain Score	Lichtenstein Method of Hernioplasty (n=25)	Rutkow-Robbins Method of Hernioplasty (n=25)	'p' Value
VAS 00	2	3	0.85
VAS 02	10	9	
VAS 04	11	11	
VAS 06	2	2	
VAS 08	0	0	
VAS 10	0	0	
Total	25	25	
Mean ± S.D.	3.04±1.51	2.96±1.61	
Significance	Non Significant		

Follow-up of the Lichtenstein Hernioplasty group (n=25): As shown in the [Table 5], none of the patients in the Lichtenstein hernioplasty group had any complication at the time of discharge on 7th post operative day. Surgical site infection that developed in 2 patients of this group in the post operative period was actually a mild form of infection leading to some amount of discharge from the wound. By the time of discharge from the hospital, this infection got completely treated by antibiotics and regular dressings.

Table 5: Follow-up of the Lichtenstein Hernioplasty group (n=25).

Follow-up Period	No. of Patients Turned for Follow-up	Complications on Follow-up		
		Pain	Wound Infection/Healing Delay	Recurrence
At Discharge	25	00	00	00
7th Day	23	00	00	00
15th Day	20	01	00	00
1 Month	16	02	00	00
3 Month	12	00	00	00
6 Month	08	00	00	00

After 15th day 1 patient and after 1 month 2 patients complained of pain and some degree of stiffness in the groin on the same side. Both patients were followed-up regularly and the problem resolved within next 1 month. 16 patients returned for follow-up after 1 month and 12 after 3 months. Rest were lost in the follow up.

Follow-up of the Rutkow-Robbins Hernioplasty group.(n=25): None of the patients in the Rutkow-Robbins hernioplasty group had any complication at the time of discharge or 7th post operative day. 2 patients complained of pain and some degree of stiffness in the groin on the same side at 15th day of

follow up. In one patient, this problem got resolved by few weeks but one patient who kept complaining of dull nagging pain over the same area even after 6 months after operation.

Follow period of both the groups are comparable and no significant difference was found between both the groups. No recurrence was noted in any patient till completion of the study.

Table 6: Follow-up of the Rutkow-Robbins Hernioplasty group. (n=25).

Follow-up Period	No. of Patients Turned for Follow-up	Complications on Follow-up		
		Pain	Wound Infection/Healing Delay	Recurrence
At Discharge	25	00	00	00
7th Day	23	00	00	00
15th Day	20	02	00	00
1 Month	17	02	00	00
3 Month	13	01	00	00
6 Month	08	01	00	00

DISCUSSION

The era of tissue-based repairs was supplanted by tension-free repairs with the widespread acceptance of prosthetic materials for inguinal floor reconstruction. The concept of prosthetic reconstruction of the inguinal floor was also furthered by Stoppa, Rives, and Wantz, who developed a preperitoneal mesh placement over the transversalis fascia [9].

Lichtenstein's technique for inguinal hernia repair has been proven to be an effective and safe method with low recurrence rates. The technique is straight forward and relatively easy as compared to other repair techniques.[6]

Rutkow and Robbins have reported interesting and effective advances in the Lichtenstein technique. This repair represents a tension-free herniorraphy and can even be performed without sutures. [10] In the original paper published by Rutkow and Robbins, they observed that time taken to complete the plug hernioplasty in primary hernia patients was 26 minutes, with some additional time taken to repair recurrent hernias. [11] Karaca et al in their study of 150 patients showed the similar figures as of the present study. In their study the operation length for Lichtenstein hernioplasty was 53 minutes and for Rutkow-Robbins hernioplasty it was 44 minutes[12]. In the present study, operative time ranges from 48-68 minutes (mean operative time=57 min.) for Lichtenstein hernioplasty and 38-57 minutes (mean operative time=47 min.) for Rutkow-Robbins hernioplasty, from the time of giving the incision to the time of completion of surgery. On analysis, the 'p' value for this test was <0.05 showing that this difference in the operative time is statistically significant. It means that Rutkow-Robbins hernioplasty could be completed more quickly than Lichtenstein hernioplasty for inguinal hernia repair.

There was no significant statistical difference found in intra-operative and immediate post operative complications between groups in the present study. Retention urine is the most common complication in operations of lower abdomen, perineum, and anorectum and occurs because of reflex spasm. Other contributing factors are-distension atony, choice of anaesthesia, postoperative pain, use of opioids for analgesia and pre-existing bladder outlet obstruction.[13] T. E. Pavlidis et al performed tension-free inguinal hernia repair in 2007 with mesh-plug on 719 patients; 301 among them were >65 years old. They reported Urinary retention requiring bladder catheter in 3 elderly patients and 2 patients of the<65 year group.[14] In the present study 4(16%) patients out of 25 from Lichtenstein group and 3(12%) out of 25 patients in Rutkow-Robbins group developed significant urinary retention which is at par with the literature available.

Wound infection is a major cause of hernia recurrence and should be treated promptly. Zieren et al in 2000 performed plug and patch repair upon 147 patients with a mean age of 73±5 years (65-92 years). They reported superficial wound infection with discharge in only one patient, which responded to antibiotic therapy[15]. Yamamoto S et al performed a study on 314 patients in 2002 in which they did open tension-free mesh repairs on 289 patients (234 men, 55 women) with a mean age of 65.7 yrs. Out of which five patients developed subcutaneous wound infections, no case required mesh removal[16]. Isemer FE et al performed open tension-free plug-and-patch technique on 766 inguinal hernia patients in 2004 in which they reported infection rate of 0.2% [17]. In the present study 2(8%) patients from each group developed wound infection, so there was no difference in the incidence in the wound infection between the groups. None of the patients in our study developed abscess in the wound.

Isemer FE et al also reported persistent scrotal swelling in 1.5% of patients which responded to conservative management [17]. In the present study none of the patients developed scrotal haematoma, swelling, abscess or seroma. All the patients were advised to give scrotal support for immediate post operative period of 48 hours. Karaca et al in their study of 150 patients distributed these patients in to

two different tension-free repair methods known as Lichtenstein, Rutkow-Robbins and found that in Lichtenstein group 2% patients, and in Rutkow-Robbins group 10% patients developed wound haematoma [12].None of the 50 patients in our study developed postoperative wound haematoma. Reason for this may be that in fatty patients, subcutaneous absorbable sutures were applied to approximate the wound before suturing skin.

The seroma formation is common with the use of synthetic mesh in hernia repairs, and is probably a physiological reaction to the foreign body. They usually resolve spontaneously and should not be aspirated repeatedly otherwise, bacterial contamination can occur [13]. Yamamoto S et al did open tension-free mesh repairs on 289 patients and reported seroma in 25 patients, which responded to repeated aspiration [16]. In the present study 1(4%) of patients in Lichtenstein group developed wound seroma and in Rutkow-Robbins group 2(8%) patients developed the same complication and resolved within 1-2 weeks with conservative management [Table 3].

In 2003, Bolognini et al compared Lichtenstein technique and Rutkow-Robbins technique and concluded that incidence of post-operative pain in both the techniques is comparable and data parameters did not show statistically significant differences [18]. In the present study of 50 patients, post operative pain between the two groups was assessed using the visual analog scale having range from 00 to 10. The mean VAS score in the Lichtenstein group was 3.04 with standard deviation of ±1.51 and in the Rutkow-Robbins group this mean VAS score was 2.96 with the standard deviation of ±1.61 [Table 4]. This difference in the VAS score in the patients of both the groups was statistically not significant.

In the present study, hospital stay of the patients of the patients were calculated and compared. Duration of the stay was calculated starting from the day of operation to the day of discharge. Mean duration of post hospital stay in Lichtenstein group was 3.04 days and in the Rutkow-Robbins group was 2.96 days. This difference was statistically insignificant and most patients were discharged from hospital on 3rd or 4th post operative day. Karaca et al in their study of 150 patients found no significant difference in the hospital stay of the two groups [12].

In the present study all patients were called for follow up on 7th post operative day, 15th post operative day, at 1 and 3 months up till 6 months and after that every 6 months up to 1-2 years. About 30% of patients turned up for follow up for more than 6 months. Patients were evaluated for pain, any evidence of discharge or any evidence of recurrence.

Rutkow and Robbins in their original study found his method of mesh plug placement to equally effective and safe even for long term complications [19]. Karaca et al in their study of 150 patients found that there was no difference in the follow up history, examination or rate of recurrence in these two groups [12]. Bolognini et al also performed the similar study and also concluded that there was no significant difference in the follow up complaints in the both groups [18]. Isemer FE et al in 2004 performed open tension-free plug-and-patch technique on 766 inguinal hernia patients. After 1-3 years recurrence rate was 1.8% [17].

None of the patients in the Lichtenstein group had any complication at the time of discharge or 7th post operative day. Surgical site infection that developed in 2 patients of this group in the post operative period was actually a mild form of infection leading to some amount of discharge from the wound. By the time of discharge from the hospital, this infection got completely treated by antibiotics and regular dressings. After 15th day 1 patient and after 1 month 2 patients complained of pain and some degree of stiffness in the groin on the same side. Both patients were followed-up regularly and the problem resolved within next 1 month. None of the patients in the Rutkow-Robbins group had any complication at the time of discharge or 7th post operative day. As in the Lichtenstein group, surgical site infection developed in 2 patients of this group in the post operative period and was promptly treated with antibiotics and regular dressings before the discharge of the patients from the hospital. 2 patients complained of pain and some degree of stiffness in the groin on the same side at 15th day of follow up. In one patient this problem got resolved by a few weeks but one patient kept complaining of dull nagging pain over the same area even after 6 months after operation. This nagging pain may be due to entrapment of nerve.

Follow up period of both the groups are comparable and no significant difference was found between the groups. No recurrence was noted in any patient till completion of the study. No death was seen due to intra-op or post-operative complications.

CONCLUSION

The present prospective study suggests that the Rutkow-Robbins method of hernioplasty can be completed more quickly and easily than Lichtenstein hernioplasty because mesh fixation is not done, thus saving the time to be spent for fixation and significantly reducing the operative time.

There was no significant statistical difference found in intra-operative or post operative complications and recurrence between groups in the present study.

Limitations

As the study was applied only on a small group of patients, so results may not reflect the scenario worldwide, and needs to be evaluated further in a larger group of patients and long term follow up to

explore the impact of reduced operative time on post operative complications and recurrence rate.

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