Original Article

Modified Kugel Versus Lichtenstein Operation for Inguinal Hernia Repair: A Prospective Randomized Study

Muhammad Azeem, Zia Ullha, Saifullah Gorya, Azhar Bashir, Muhammad Arshad Cheema

ABSTRACT

Objectives: The purpose of this prospective randomized clinical study was to compare the outcome regarding pain and recurrence following Lichtenstein repair with Modified Kugel repair of inguinal hernias. **Study Design:** This was a prospective randomized clinical study **Materials and Methods:** Patients with inguinal hernia who were treated during Sep. 2010 to May 2012 using Preperitoneal Modified Kugel approach (PP group, *n*: 89) and the Anterior Lichtenstein approach (AL group *n*:87). The operation time, hospital stay, postoperative complications and recurrence after surgery were assessed and compared statistically in both groups. **Results:** A total of 176 patients (173 men and 03 women) randomized to either group PP or group AL. No significant differences were observed regarding seroma and infection in both groups, however postoperative hematoma and operative time were higher in AL Group without any statistical significance ($p< 0.098$).The rate of recurrence and pain were significantly high with in AL group versus PP Group during period of follow up time (23.34 +/- 1.07 months Vs 23.01 +/- 0.13 months in group PP and AL respectively). The operative time in Preperitoneal Modified Kugel Repair (PP Group) was 45.16 +/- 10.14 minutes and 52.34 +/- 07.04 minutes for Anterior Lichtenstein Repair (AL Group). **Conclusion:** Modified Kugel Repair of Inguinal Hernia is minimal invasive method and as safe as Anterior approach with less recurrence and pain than Lichtenstein operation. **Key words:** Modified Kugel Repair, Inguinal Hernia, Lichtenstein Repair.

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INTRODUCTION

Although many methods have been described for the repair of inguinal hernia since Bassini reported his method in 1887. Practice of conventional hernia repair (i.e., Bassini, McVay, and Shouldice techniques) has been decreased as recent experience has led to routine use of polypropylene mesh during hernia repair surgery.[1-4] Laparoscopic and Lichtenstein hernia operations are tension-free repairs in which a mesh is used to support the weakened abdominal wall; it seems to allow faster return to work and yield better long-term results than traditional hernia operation.[3,5,6] Laparoscopic repair has been criticized because of its technical complexity, the need for general anesthesia, the possibility of serious complications, and the high cost.[7-10] A novel alternative method for laparoscopic hernia repair has been described by Dr. Kugel[11] that combines the advantages of various repair techniques currently practiced while eliminating most of the disadvantages of endoscopic repair. Kugel's patch repair is a minimally invasive preperitoneal mesh repair method. As Kugel mesh patch is quite expensive here in Pakistan, so authors use 8x11 polypropylene mesh in perperitoneal area and two point fixation with tacker as done in TEPP through Kugel approach. Authors named this

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procedure as modified Kugel repair as polypropylene mesh was used instead of Kugelmesh patch in this preperitoneal repair of inguinal hernia. We searched the literature and encountered no randomized, prospective studies comparing this method with the Lichtenstein repair. Therefore, we planned a prospective, randomized clinical study to compare the modified Kugel and Lichtenstein tension free hernia repair methods.

The purpose of this study was to compare the outcomes of a modified Kugel repair with Lichtenstein inguinal hernia repair in regard of chronic pain and recurrence, and discuss indications and technique in detail of modified Kugel repair.

MATERIALS & METHODS

Patients with inguinal hernia who underwent Preperitoneal Modified Kugel repair (PP Group, *n:* 89) and anterior Lichtenstein approach (AL Group *n*:87) were evaluated between Sep 2010 to May 2012 prospectively at North Surgical Unit of Mayo Hospital, King Edward Medical University. Patients with recurrent hernia, BMI more than 40 and type IV hernia were excluded from the study. The type of anesthesia, spinal or general anesthesia was chosen according to either the doctor or patients preference or anesthesiologists opinion. The demographics of both groups shown in Table 1.

Table 1: Demographic and characteristics of PP Group (Preperitoneal Modified Kugel Repair) & AL Group (Anterior Lichtenstein Repair)

	PP Group	AL Group	*p* value
Number of cases	89	87	
Mean (SD) Age (years)	49.4 (12.06)	50.01 (13.22)	0.384
Sex Ratio (Male : Female)	89:1	87:2	1.00
Mean (SD) BMI (kg/m2) 24.9 (2.02)	25.01 (2.9)	0.447	
ASA I II II	 61 19 09	 57 23 07	 0.657
Employment Light Heavy Non or retired Missing	 42 29 13 05	 39 33 11 04	 0.315
Presence of Hernia: Weeks Months Years Missing	 17 43 22 07	 21 48 16 02	 0.843

ASA: American Society of Anesthesiologist, BMI: Body Mass Index, SD: Standard Deviation

Table 2: Type of Hernia in Pre-Preitoneal Modified Kugel (PP) and Anterior Lichtenstein (AL) Group

Hernia Type	Preperitineal repair n: 89	Anterior repair n: 87
Type-I	11	09
Type-II	62	63
Type-III	16	15
Total	89	87

All patients were given one dose of 2nd generation of cephalosoprine intravenously prior to start of operation at time of anesthesia induction after test dose. Further, according to protocol of study, patients of both group have been given 5 mg medazolam and 75 mg diclofenace sodium half hour before shifting of patient to operation room for operation.

Methods

All patients in Preperitoneal modified Kugel repair Group (PP) were operated with same

incision and approach as described by Dr. Kugel i.e. using preperitoneal space except we did not use Kugel mesh patch as used by Dr. Kugel in his repair. In modified Kugel repair, 8-11 mesh of polypropylene was used instead of mesh patch of Kugel.

All patients with modified Kugel repair, incision site was marked before start of operation with indelible marker. The horizontal incision three centimeter was made- one third lateral and two third medial of a point about 1.5 centimeter above the deep inguinal ring. The abdominal incision was made by muscle splitting approach until the fascia transversalis and peritoneum reached. The transversalis fascia incised vertically and enter into the preperitoneal space. By blunt dissection, preperitoneal space is created by dissecting away the adhesion of peritoneum with anterior abdominal wall. By identifying the inferior epigastric artery- a key point in orientation of preperitoneal space, the indirect hernial sac is easly separated from cord content after its identification. The pseudosac of direct hernia was dissected from peritoneum and prepertoneal located fat tissue. The cord structures were carefully paritalized by dissecting it away from the peritoneum so that mesh can easily lay down on the peritoneum in preperitoneal space. Once the dissection is completed, the mesh spread into the preperitoneal space and two point fixation done medial to deep ring with anterior abdominal wall and pubic tubercle by leaving 3 cm mesh fring beyond fixation behind/along the reteroperitoneal area. The fixation of mesh done with tacker similarly as done in TEPP procedure, but here approach is through Kugel incision. After the mesh is fixed with tacker, the mesh spread on the peritoneum behind the iliopectineal diaphragm coving the deep inguinal ring, femoral ring and also cover the obturator foramen [11]

As this is minimal access approach, head light was used to see into the preperitoneal space to access the anatomical structure and dissection. Melliable retractor with illumination is needed for more convenient access.

After mesh laid down in preperitoneal space, the transversalis fascia is closed by taking one bite from mesh near the fascia. Muscles does not need any approximation, except the external oblique sheath should be sutured with absorbable suture. After subcutaneous interrupted absorbable suture, the skin closed with sub cuticle absorbable suture. Pressure bandage applied after infiltrating the wound with 0.25% 10 ml bupvicain local anesthetic.

Anterior Lichtinstein repair were done by dissecting the inguinal canal and dissecting out cord contents from sac and from nerves in the region. After the dissection is completed and hernial sac is reduced or herniotomy done, mesh according to space tailored and laid down posterior to cord contents and fixed lower down with iliopubic track and above to conjoin tendon and medially to pubic tubercle. External oblique sheath closed and wound closed in layers.

Operation time was noted from the start of skin incision to closure. Surgical finding and postoperative complications were recorded for each patient. Patients were followed up for up to two years for recurrence or operation related complication.

Aims & Objectives

The aim of this study was to know that modified Kugel hernioplasty has less pain and recurrence than Lichtinstein repair and the feasibility is comparable. The first endpoint was to note pain score at 02 and 04 months time. The second outcome measure was recurrence rate during follow-up at two year.

Statistical Analysis

The chi-squared test used for statistical significance comparing gender, type of hernia, anesthesia and complication. The independent *t*–test applied for comparing age, duration of operation and recurrence. A value of $P<0.005$ accepted as statistically significant.

RESULTS

From Sep. 2010 to May 2012, a total of 176 patients (173 men, 3 women) were prospectively randomized to undergo either modified Kugel or Lichtenstein hernioplasty. Two patients lost follow and excluded from study. A total of 174 (171 men and 3 women) patients were analyzed. There was no difference between two groups in the sex or age (Table-1). The use of spinal and general anesthesia were not significant different in two groups. The type II hernia and indirect henias

were more common in both group. The operation time, hospital stay and period of follow up did not differ significantly between the two groups.

Complications and morbidity are shown in Table II with no significant difference in regard of hematoma, seroma formation. However, urinary retention was statistically significant, 01 versus 5 ($p< 0.05$) modified Kugel and Lichtinstein group respectively. There was also significant less infection in PP Group compare with AL Group one versus 03 cases with $p < 0.09$. Recurrence and pain were quite significant high in Lichtinstein group 9 and 3 respectively as shown in Table II. In this study we looked variable of recurrence and pain in both groups and incidental finding which turn out to be statistically significant was retention of urine.

At 2 months and 4 months , the patients who underwent the modified kugle repair reported less pain (mean VAS score 0.3 versus 0.9, $p< 0.005$ compare to AL Group as shown in Fig-1.

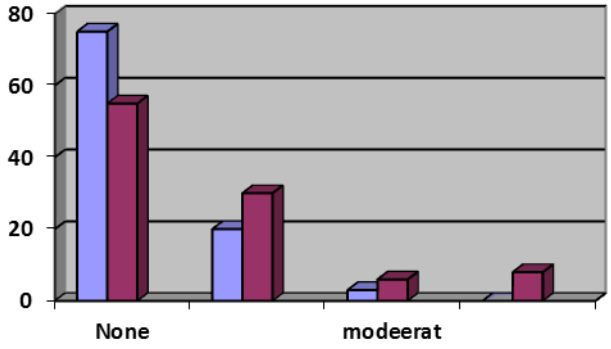

Figure 1: Chronic Pian Distribution Blue depict: modified kugel repair, and blue showed Lichtinstein repair

Table II: Post-operative Morbidity and Perioperative Outcome of PP Group and AL Group

	PP Group n: 88	AL Group n: 86	P Value
Complications	05	21	<0.005
Wound infections	01	03	<0.09
Severe pain	01	09	<0.05
Seroma	05	11	
Hematoma	02	03	
Peritoneal Inj/bowel Obstruction	01	00	
Urinary retention	01	05	<0.05
Recurrence	00	03	<0.05
Hospital Stay (hours)			
Follow up (Months)	24 to 36 hours	24 to 48 hours	
Operative time (Minutes)	23.10 +/- 6.44	23.8 +/- 7.30	
	45.16 +/- 10.14	52.34 +/- 07.06	

PP: Pre-Preitoneal modified Kugel Repair, AL: Anterior Lichtinstein Repair

The patients reporting chronic pain was 09 of 86 (10.4%) in LA Group and one of 88 (01.10%) patients in PP group with (< p 0.005). Chronic pain define as pain at follow up visit at 2 month. The pain intensity distribution is detailed in Fig-1.

The complications like seroma and hematoma were treated conservatively. AL Group have three recurrences while modified repair non at the end of follow-up at mean period of 23.10 months of study. One recurrence were occurred at 2 months and other at 17 months and 21 months. Recurrence was statistically significant high in AL group 3 versus non in PP group with $p < 0.005$. This early recurrence was due to technical failure and offered preperitoneal repair. So the study showed that modified kugel repair has less pain and no recurrence versus Lichtinstein repair where all these variable were statistically significantly high.

DISCUSSION

This prospective randomized trial comparing the modified Kugel henioplasty with Lichtinstein repair of inguinal hernia showed some significant advantages for preperitoneal approach .The modified Kugel procedure was performed in less

time however, of not statistical significant. At two months and four months follow up for pain, the PP group has smaller proportion of patients with chronic pain than in AL Group. In author view that chronic pain is incapacitating and worse than recurrence problem of the patient.[2-4, 9,11] Chronic pain is described as neuropathic and because of nerve damage during dissection in Anterior Lichtenstein (AL) approach.[15]

Only one patient in Pre-Peritoneal (PP) Modified Kugel group suffered with chronic pain versus nine patients in AL group statistically significant with $p < 0.05$. This figure is relatively high compared to some other publication data.[8-10] Although similar results have been reported from studies with comparable designs.[7,11,12] In the present study the chronic pain of 10.46% in Lichtenstein group (AL) is almost eight time the rate found in modified Kugel group (PP). The pain was described as neuropathic due to nerve damage during dissection in anterior Lichtenstein hernioplasty. In pre-peritoneal approach, nerves do not come in field during dissection, and that's reason of less cases of chronic pain seen in this study.

Furthermore no statistical significant difference in the type of complications in regard of hematoma, seroma and infection were seen in both groups. One specific complication, urine retention was not accounted in the present study in-spite of its significant high value noted in Lichtenstein repair as compared to modified Kugel repair as shown in Table-II. All such patients were treated with passing nelyton catheter and removed after evacuation . This high incidence of urine retention in our study of Lichtenstein approach is comparable with other data.[5,10,11-15] However, other study[17,19] does not support such high incidence. On other hand, urine retention in modified Kugel repair of present study is comparable with all published available data [6-8, 13].The incidence is quite low than other anterior approach hernioplasty.

The recurrence rate of hernia in present study is zero versus three in Lichtenstein repair. As this study is limited in its follow up to less than 2 years, its too early to comment about the recurrence. However, Lichtenstein repair had three recurrence which is quite significant in comparison of PP group in same period of follow up i.e. 3.48% with $p< 0.05$. However, the recurrence of Lichtenstein group is comparable with international data.[7-10.15,17] The zero recurrence rate of modified Kugel repair in the present study is comparable with recurrence rate of 0 to 1.6% in other published data.[9,12-13] However, Schroder et al[13] reported a recurrence rate of 7.7 in Kugel repair which is not seen in this study. As seen most failure occur in Kugel repair in first 36 cases, may be due to learning curve. In contrast, acceptable recurrence rate have been reported in numerous studies with long-term follow-up, with the recurrence rate varying from 0% to 0.8%.[4,14-17] As pre-peritoneal space is ideal for hernia repair with it good outcome, approach to this area need thorough good knowledge of the space and practical experience to use this space for henioplasty We therefore established learning workshops before study was begun for modified Kugel repair. As we did not use Kugel mesh patch due to it cost and availability, by using ordinary polyprolylene mesh with two point fixation, our study showed comparable result. The original Kugel mesh Patch do have impression on bladder causing frequency of urine which is not seen in our study. This may be due to light weight polypropylene mesh instead of Kugel patch-heavy one.

There is only one previous study known to the author who compared the two hernia repair techniques i.e. Kugel and Lichtenstein repair, and its outcome, that by Dofru et al[16] who found similar results with regard to operating time and complications.

In present study, chronic pain and recurrence rate were statistically significant low in modified Kugel repair as compare to Lichtenstein henioplasty. The other parameter apart from urinary retention were comparable in both groups.

CONCLUSION

Modified Kugel repair of inguinal hernia is a feasible alternative for the standard Lichtenstein procedure with less chronic pain and recurrence. The superiority of the approach will demonstrated if education of surgeons focuses on the preperitoneal space as it has emphasized the inguinal canal.

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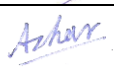
Dr. Azhar Bashir	4th Author	
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