

MESH HERNIOPLASTY - LAPAROSCOPIC TAPP VERSUS OPEN FOR INGUINAL HERNIA

Brijendra Nigam¹, T.P. Devpura², Manisha Nigam³, Renu Ranwaka⁴

HOW TO CITE THIS ARTICLE:

Brijendra Nigam, T.P. Devpura, Manisha Nigam, Renu Ranwaka. "Mesh hernioplasty - laparoscopic TAPP versus open for inguinal hernia". Journal of Evolution of Medical and Dental Sciences 2013; Vol2, Issue 28, July 15; Page: 5209-5215.

ABSTRACT: INTRODUCTION: Inguinal hernias are treated by several surgical methods. Our main concern is to find a well-accepted method which is cost effective, with minimal complications, with small learning curve and can be attributed to the masses. **OBJECTIVE:** To compare the two tension-free methods of hernia repair: trans-abdominal pre-peritoneal laparoscopic mesh repair and the open Lichtenstein mesh technique in terms of operative time, length of hospital stay and chronic post-operative pain and cost effectiveness. **MATERIALS AND METHODS:** This study was conducted in Department of Surgery Rama Medical College Kanpur during March 2009 to Feb 2013 over a period of 4 years. A total of 264 male patients, aged between 16-60 years, were divided into two groups, A and B. Patients were subjected to Trans-abdominal Pre-Peritoneal (TAPP) laparoscopic and Lichtenstein repairs, respectively. The two groups were compared for operative time, length of hospital stay, chronic groin pain and cost of surgery. Percentages were calculated for categorical data while numerical data were represented as mean \pm SD. Chi square test and t test were used to compare categorical and numerical variables, respectively. Probability ≤ 0.05 ($P \leq 0.05$) was considered significant. **RESULTS:** At one month interval, in group A mild, moderate and severe pain was observed in 31 (26.5%), 12(9.09%) and 3 (2.3%) patients compared to 41 (31.6%), 35 (26.5%) and 12 (9.1%) patients, respectively, in group B. Mean operative duration was significantly longer in group A compared to group B ($P < 0.001$). Mean hospital stay was significantly longer in group B compared to group A ($P < 0.001$) and mean cost of the procedure was significantly high in group A as compared to group B ($P < 0.001$). **CONCLUSION:** Trans-abdominal pre-peritoneal laparoscopic inguinal hernia repair is effective in decreasing the incidence of chronic groin pain and post-operative hospital stay in comparison with to tension free mesh hernioplasty. But due to long Surgical learning curve and high cost of surgery TAPP presently can't be attributed for mass scale surgery.

KEYWORDS: Inguinal hernia, Laparoscopy, chronic pain.

INTRODUCTION: The inguinal hernias surgery is one of the most common operations in general surgery. In India alone about more than 20,00,000 cases are performed each year¹. After Bassini (1889), various new methods for hernia surgery designed with the sole idea to reduce recurrence². Evidence comparing laparoscopic and open hernia repairs has varied with time and with changes in techniques used³. Despite all these advances, the best and cost effective method for inguinal hernia repair has not yet been established⁴. The introduction of different varieties of prosthetic mesh has increased the interest in inguinal hernia surgery⁵.

Some authors have also compared Lichtenstein with Laparoscopic repair. Better outcomes especially in terms of pain, resumption of normal physical activity and low morbidity were reported in laparoscopic repairs, however the recurrence rates were the more and the laparoscopic repair

required more surgical expertise and long learning curve. In addition significantly shorter duration of postoperative analgesia was required in the laparoscopic as compared to the open Lichtenstein approach for inguinal hernia repair^{6,7,8}. There are, however, others who failed to reproduce these results and cost-effectiveness was questioned.⁹With all the above in mind a thorough study needed to be undertaken comparing an open tension-free mesh technique (Lichtenstein) with a Trans-abdominal pre-peritoneal laparoscopic (TAPP) mesh repair to better define the true place of laparoscopic technique in hernia surgery.

MATERIALS AND METHODS: This study was conducted at Department of Surgery Rama Medical College Kanpur during March 2009 to Feb 2013 over a period of 4 years. The objective of the study was to compare the two tension-free methods of hernia repair: trans-abdominal pre-peritoneal laparoscopic repair (TAPP) and open Lichtenstein repair (LR) in terms of operative time, length of hospital stay, chronic post-operative pain and cost.

In this study a total of 264 patients presenting to the outpatient department (OPD) with clinical diagnosis of inguinal hernia were included using 95% confidence interval, 20% and 16% prevalence of LR and TAPP, respectively and 8% margin of error. The hypothesis of the study was that TAPP was superior to LR in terms of operative time, length of hospital stay and post-operative pain. The diagnosis of inguinal hernia was established through history and clinical examination. The patients were selected through non-probability consecutive sampling and were divided into two groups. Patients in group A were subjected to TAPP while the repair option was LR for patients in group B.

The inclusion criteria was patients with primary inguinal hernia (unilateral/bilateral), 16 to 60 years old, American Society of Anaesthesiologists class I (ASA I) and those willing to participate in the study after written informed consent. Patients with irreducible or obstructed hernia, previous lower abdominal surgery, and radio-therapy were excluded from the study. All these were excluded for they would act as confounders and produce bias in the study results.

All the included patients were admitted in ward through Outpatient Department a day before surgery. After admission detailed history, physical examination, investigations & pre anesthetic checkup for surgical fitness were carried out. The patients were explained the risks and benefits of the two procedures and written informed consent was obtained.

The repairs in both the groups were performed by consultant surgeons with a previous experience of more than 100 repairs in both the open and laparoscopic techniques. General anesthesia was used for carrying out the procedures in both the groups in addition to spinal anesthesia in group B. The patients, in both groups, were given a prophylactic dose of Inj. Ceftriaxone intravenously, dose adjusted according to body weight, at the induction as a part of the protocol while two doses of the same were repeated postoperatively at 8 hours and 16 hours.

Laparoscopic repair (TAPP) was performed through a 3 port technique with carbon dioxide used for creation of pneumo-peritoneum through a 10mm infra-umbilical port upto a pressure of 12 mmHg. The other two ports were placed in the lower abdomen according to individual surgeon's choice. The prolene mesh was placed trans-peritoneally in the preperitoneal space.

The open Lichtenstein repair was performed through a skin crease incision in the right inguinal region with length depending on patient's habitus. After dissection of the sac and herniotomy, posterior wall of the canal was reinforced with placement of prolene mesh size 6 x

ORIGINAL ARTICLE

11cm anchored with prolene 2/0 suture. Skin incision in both the procedures was closed with subcuticular prolene 3/0 suture.

Patients were discharged once they were, able to take regular diet, afebrile and had good pain control. A standardized questionnaire was used to record the data.

All the operative details were recorded. The operative times was recorded in minutes for both the procedures and was counted from the incision to the placement of the last suture. Hospital stay was defined as the number of nights spent in hospital postoperatively. Postoperative pain was measured qualitatively (subjectively) using Visual Analogue Scale and was graded into no pain, no discomfort during daily life activities (VSA = 0), mild pain, occasional discomfort but not affecting the quality of life (VSA =1 - 3), moderate pain, pain hampering patient's quality of life including inability to take part in sports (VSA = 4-7), and severe pain, the presence of constant or intermittent pain debilitating the patient or interfering with daily activities (VSA = 8-10). Confounding variables were controlled through strictly following the exclusion criteria.

The patients were followed up in OPD at one and six month's intervals postoperatively. During each follow up visit the patients were asked whether they had any pain at rest in the treated groin and this variable was subjectively quantified using a 10-point visual analogue Scale.

RESULTS: A total of 264 patients were selected for study and were divided into two groups, group A patients underwent TAPP and group B patients were subjected LR. Mean age of patients in group A was 38.64 ± 9.04 years compared to 38.32 ± 13.40 years in group B ($P = 0.854$). There were 132 males in each group A&B.

Table 1: Demographic variables

	Group A	Group B	P Value
	N=132	N = 132	0.84
Age (Years)			
Mean	38.64	38.32	
SD	9.04	13.40	

All patients (132) in group A were operated under general anesthesia while in Lichtenstein repair group, general and spinal anesthesia both was used in 50 (37.88%) and 82 (62.12%) patients respectively.

On follow up of the patients at One month interval, pain occurrence was gauged as mild, moderate and severe based on VSA score. In group A 85 (64.39%) patients did not experience any pain compared to 45 (34.0%) patients in group B. The ratio of severe pain in group A to B was 1:4, with severe pain occurring in 3 (2.3%) patients in group A compared to 12 (9.09 %) patients in group B.

Follow up of patients at Six months interval revealed absence of pain in 119 (90.15%) patients in group in contrast to 87 (65.90%) patients in group B. The frequency of mild, moderate, and severe pain in group A was 12 (9%), 0 (0%), 2 (1%). The corresponding figures in group B were 32 (24.24%), 9 (6.8%), 5 (3.7%), respectively, as shown in Table 2.

ORIGINAL ARTICLE

Table 2: Pain characteristics of patients

	Group A	Group B	P Value< 0.001
	N=132	N=132	
Pain (1 Month)			
None, N(%)	85 (64.39)	45 (34.01)	
Mild, N(%)	31 (23.48)	41 (31.06)	
Moderate, N(%)	12 (9)	35 (26.5)	
Severe, N(%)	3 (2.3)	12(9.1)	
Pain (6 Months)			0.001
None, N(%)	119 (90.15)	87 (65.96)	
Mild, N(%)	12 (9)	32(24.48)	
Moderate, N(%)	0 (0)	9 (6.8)	
Severe, N(%)	2 (1.5)	4 (3.1)	

Mean hospital stay was 1.45 ± 0.72 days in group A compared to 2.61 ± 0.71 days in group B, which proved to be significant on statistical analysis ($P < 0.001$). The mean operative duration was 60.13 ± 14.76 minutes in laparoscopic group as compared to 41.01 ± 9.71 minutes in the Lichtenstein hernia repair group proving to be significant on statistical analysis ($P < 0.001$).

Mean cost of surgical disposables, anesthesia drugs and postoperative drugs excluding Hospital charges, fee of the surgical and anesthetic team and infrastructure and equipment cost in group A was triple as compared to group B proving to be significant on statistical analysis ($P < 0.001$).

DISCUSSION: Inguinal hernia repair is one of the most common surgical procedures with an annual rate of 9000 per million populations in India¹. Many studies have been carried out on the incidence of post operative pain after Laparoscopic and Lichtenstein mesh repair¹¹⁻¹⁴. Chronic groin pain is a common complaint after repair of inguinal hernia. This pain most frequently is due to iatrogenic damage or entrapment of the nerves, in and around the inguinal canal, the most important of which is the ilioinguinal nerve. Other cause of Pain occurring after surgery is due the tension at the suture lines and the tight suturing of fibrous layer tissue causing stimulation of the myelinated (type A) fibers and unmyelinated (type C fibers)^{5,11, 12,13,14}.

Our study concluded the superiority of laparoscopic (TAPP) repair over the open mesh repair in terms of post operative pain occurring after one month and six months intervals follow up. Most of the patients (64.38%) operated Laparoscopically experienced no pain as compared to (34.1%) patients operated by Lichtenstein repair. So there was a net 30% reduction of pain in Laparoscopic procedure. Ratio of mild and moderate pain was considerably lower. Moderate pain was present in (6.8%) patients operated laparoscopically as compared to (20.8%) patients operated through Lichtenstein repair. Severe pain after one month was present in (2.3 %) patients with laparoscopic repair.

Macintyre et al, compared the postoperative pain in both types of repairs. Their study results, in corroboration to our findings, reveal that pain occurrence was significantly less in Laparoscopic versus the Lichtenstein repair.

ORIGINAL ARTICLE

The incidence of pain after inguinal hernia repair is about 10%². Predictive risk factors for chronic postoperative pain are: preoperative pain, repeat surgery, psychological vulnerability, and workers compensation, a surgical approach with risk of nerve damage, moderate or severe intensity of acute postoperative pain, radiation therapy, neurotoxic chemotherapy, depression, neuroticism, and anxiety³. Another finding from our study was that the rate of occurrence of long term severe pain was insignificant in both procedures. This signifies and verifies the fact that early post operative results of minimal access surgeries are encouraging in terms of hospital stay, pain of mild, moderate and severe degree and early return to job and daily life activities. However, as mentioned earlier, both procedures being tension free open re-pair gives almost similar results in terms of long term post operative pain. The pain incidence on long term follow up diminishes to insignificant levels.

Duration of operation in our study was significantly longer in the Laparoscopic group compared to the open group. Various studies report a reduced hospital stay and prolonged operating time for laparoscopic hernia repair. Colack and colleagues compared extra-peritoneal Laparoscopic and open mesh repair. They report mean operating time of (Mean 49.67 ± 14.11 minutes) for laparoscopic versus (Mean 56.64 ± 12.32 minutes, $P = 0.001$), open mesh repair¹¹. Neumayer L et al however found no significant difference in the mean operating time between the two modalities of treatments ($P = 0.1$)¹¹.

Our result is reconfirmed by randomized control trials as by other studies which reveal a significantly longer mean operating time in Laparoscopic hernia repair¹⁵⁻²⁴. In accordance to with our study others have reproduced similar results so far operative duration was considered.

Mean hospital stay in our study was significantly longer in the open Lichtenstein repair group compared to the Laparoscopic group. Tanphibat et al and Erhan Y et al, however found no significant difference in duration of hospital stay between laparoscopic (Mean 2.6 ± 1.2 days) and open repair (Mean 3 ± 1.5 days, $P = 0.1$)¹². In other few studies similar findings to our results were observed revealing a significantly shorter hospital stay in the Laparoscopic preperitoneal arm of hernia repair surgery ($P < 0.001$)^{7,8,9,10,13}.

In general, laparoscopic technique is much superior to the Lichtenstein repair in terms of short term post-operative pain, early return to normal daily activities, cosmetics and patient satisfaction^{14,15,16,17}. However, operation time is prolonged, higher incidence of recurrence and higher cost of this minimally invasive technique^{18,19,20}. The results are expected to improve in future with the in-creased use and development of expertise in this technique.

CONCLUSION: Transabdominal preperitoneal laparoscopic inguinal hernia repair in comparison with Lichtenstein tension free mesh repair of inguinal hernia leads to less frequency of reporting of chronic inguinal region pain after surgery and less post-operative hospital stay. It is a preferred method but requires general anesthesia. However keeping in view the increased recurrence rate in trans-abdominal laparoscopic repair, the role of this procedure should be thoroughly evaluated in future studies. Higher cost of infrastructure, equipment cost and long learning curve when compared with the outcomes limits the generalization of this advance and good procedure to be attributed to the masses.

ACKNOWLEDGEMENTS:

ORIGINAL ARTICLE

1. Prof. R.K. Srivastava, Dean Principal & Head Dept. of Anatomy, Rama Medical College Hospital and Research center for providing guidance and technical support.
2. Ms. Meenakshi and Mr. Harsh for help in preparing manuscript.
3. Hospital and O.T. Staff of Rama Medical college for assisting and help in operations.

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ORIGINAL ARTICLE

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AUTHORS:

1. Brijendra Nigam
2. T.P. Devpura
3. Manisha Nigam
4. Renu Ranwaka

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Surgery, Rama Medical College Hospital & Research Center.
2. Professor, Department of Surgery, Rama Medical College Hospital & Research Center.
3. Assistant Professor, Department of Surgery, Rama Medical College Hospital & Research Center.

4. Professor, Department of Surgery, Rama Medical College Hospital & research Center.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Brijendra Nigam,
Dept of Surgery,
Rama Medical College Hospital & Research Center,
Mandhna, Kanpur.
Email-brijendramanisha@yahoo.com

Date of Submission: 10/07/2013.

Date of Peer Review: 10/07/2013.

Date of Acceptance: 11/07/2013.

Date of Publishing: 15/07/2013