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Comparison of the outcome between open and laparoscopic inguinal mesh repair

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Abstract
The primitiveness of the techniques of surgical repair of inguinal hernia which can be traced back to civilizations of ancient Egypt and Greece, were often worse than the disease itself. Considering these procedures were performed before the advent of the aseptic technique, it is safe to assume that mortality was quite high. For those that did survive the operation, recurrence of the hernia was commonplace. 60 cases of primary inguinal hernia were selected for the study. Permission of ethical committee and informed consent of each patient was taken. The minimum and maximum time taken to return to work in the open repair group were seen to be 14 and 22 days respectively with a mean of 17.37 and a SD of 2.59, whereas in the laparoscopic group the minimum was 3 days and maximum was 8 days, with a mean of 5.67 and a SD of 1.35 (p value was extremely significant at $2.57E^{-25}$).

Keywords: Laparoscopic inguinal mesh repair, surgical repair, inguinal hernia

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

The treatment of inguinal hernias is integral to the history and current status of general surgery; evolution in the treatment of inguinal hernias has paralleled technologic developments in the field. The most significant advances to impact inguinal hernia repair have been the addition of prosthetic materials to conventional repairs and the introduction of laparoscopy to general surgical procedures [1].

The primitiveness of the techniques of surgical repair of inguinal hernia which can be traced back to civilizations of ancient Egypt and Greece, were often worse than the disease itself. Considering these procedures were performed before the advent of the aseptic technique, it is safe to assume that mortality was quite high. For those that did survive the operation, recurrence of the hernia was commonplace [2].

Failure of these early techniques of hernia repair was based on inadequate knowledge of groin anatomy and poor understanding of the natural history of hernia formation. As the anatomy of the human body was described via dissection study, the anatomy of the groin became defined. Results improved, but recurrence rates remained high with prolonged follow-up [3].

Then came the era of tension-free repairs which started challenging the tissue-based repairs with the widespread acceptance of prosthetic materials for inguinal floor reconstruction. These were superior to previous tissue-based repairs in that the weakness of the transversalis fascia could be restored by bridging the defect with mesh, rather than placing tension between tissues to close the defect. Superior results could be achieved, even by nonexpert hernia surgeons.

Further, with the advent of minimally invasive surgery, inguinal hernia repair underwent its most recent transformation. Laparoscopic inguinal hernia repair has added to the armamentarium of the general surgeon, gaining its popularity by providing a technique that lessens postoperative pain and improves recovery. Furthermore, an array of prosthetic materials have and are been introduced to further lower recurrence rates and provide the patient with the utmost quality of life [4].

Irrespective of the approach to hernia repair, be it open or laparoscopic, the current state of surgical treatment of inguinal hernia depends on a sound foundation of the inguinal anatomy.

The application of current technologies to this anatomic knowledge has fostered successful treatment of inguinal hernias with minimal morbidity heretofore unknown to surgical practice. At our institution, inguinal hernia repair is one of the leading surgery performed on a very regular basis. This study aims at studying the efficiency, advantages, disadvantages, limitations, post-operative course and duration of hospital stay involved in open inguinal hernia mesh repair and laparoscopic inguinal hernia mesh repair surgeries and to arrive at a conclusion as to the best modality of treatment after comparison of morbidity of these procedures among them and in relation to standard published material.

Methodology

Inclusion Criteria

1. Elective cases done in M.O.T
2. Inguinal hemioplasty (TAPP or TEP and LICHENSTEINS MESH repair)
3. Patients with age group 15 - 75 years
4. Both unilateral and bilateral hernia cases
5. Primary cases

60 cases of primary inguinal hernia were selected for the study. Permission of ethical committee and informed consent of each patient was taken.

Patients with clinical evidence of inguinal hernia were admitted and were subjected to full history and examination, routine investigations like complete blood count, blood sugar level, serum creatinine, chest X-ray, ECG etc. Additional investigations like abdominal ultrasonography, CT scan of abdomen were done in cases with equivocal findings and suspected of other pathologies. Inclusion and exclusion criteria were defined and strictly adhered to in selecting the cases to be included in the study.

Pre-operative treatment included

- Correction of anemia, if present.
- Weight reduction if obese.
- Improvement of nutritional status.
- Abstinence from smoking/alcohol.
- Advice regarding breathing exercises.

The type of anesthesia used was spinal anesthesia for open cases and general anesthesia for laparoscopic hernia mesh repair.

The patients were randomized according to their serial number to undergo open or laparoscopic hernia mesh repair. All cases with a odd serial number underwent laparoscopic repair (TEP, TAPP) and all cases with an even serial number underwent open mesh repair.

A single dose of preoperative broad spectrum antibiotic was given followed by the same postoperatively. Analgesics like Injection tramadol was given postoperatively for 1 day and oral analgesics were continued thereafter.

Post-operative care and complications

- After surgery all patients were monitored carefully for pain, bleeding, wound infection and urine retention.
- A wound infection was ranged from minimal discharge of serous/pus from a single cutaneous suture to extensive and invasive process requiring hospitalization and intravenous antibiotics.
- Bleeding was defined as subcutaneous hematoma.
- Urinary retention was termed as inability to void requiring catheterization.

The patients were discharged when fit and were asked to come for follow-up after 7 days, then 1 and 3 months postoperatively. The patients were advised to return to their prehernia lifestyle except lifting heavy weights.

In the present study, we have attempted to study the demographic characteristics and distribution of inguinal hernia in this part of the country and to enumerate the advantages and disadvantages of open mesh repair and laparoscopic mesh repair for the treatment of inguinal hernia.

Results

Table 1: Showing distribution of the side of swelling of all patients under study

Side of swelling	All patients	
	No.	%
Right	49	81.67
Left	11	18.33
Total	60	100

In this study, 81.67% of the cases were diagnosed to have a right sided inguinal hernia and the remaining 18.33% had a left sided inguinal hernia. However, not a single case of bilateral inguinal hernia was noted in the study.

Table 2: Showing operation time for both the groups

Duration of operating time (in mins)	Open repair	Laparoscopic repair	P value
Min – Max	30 – 56	67 - 107	8.51E-20**
Mean ± S.D	42.03 ± 6.51	84.97 ± 13.97	

In the open repair group, the minimum time of operation was 30 minutes and maximum was 56 minutes with a mean of 42.03 and a SD of 6.51. In the laparoscopic group, the minimum and maximum operating time was seen to be 67 and 107 minutes respectively with a mean of 84.97 and a SD of 13.97, with the p value being extremely significant ($p = 8.51E^{-20}$).

Table 3: Showing total no. of complications in both the groups

Complications	Open Repair	Laparoscopic Repair	Total
Nil	21 (70%)	27 (90%)	48 (80%)
Yes	9 (30%)	3 (10%)	12 (20%)

Table 4: Showing the time taken by the cases to return to their work

Return to work (in days)	Open repair	Laparoscopic repair	P value
Min – Max	14 - 22	3 - 8	2.57E-25**
Mean ± S.D	17.37 ± 2.59	5.67 ± 1.35	

The minimum and maximum time taken to return to work in the open repair group were seen to be 14 and 22 days respectively with a mean of 17.37 and a SD of 2.59, whereas in the laparoscopic group the minimum was 3 days and maximum was 8 days, with a mean of 5.67 and a SD of 1.35 (p value was extremely significant at $2.57E^{-25}$).

Discussion

In a study done by Mukesh S *et al.* in Northern India, he found out 67% of the total inguinal hernia cases studied occurred on the right side and 30% on the left side [5].

In a study conducted by Muhammad N *et al.* in Pakistan, 74% on the cases presented with a hernia on the right side [6].

In a prospective study of 57 patients of inguinal hernia

conducted by DC Shyam *et al.* in North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Shillong, India, 60% of the inguinal hernias were present on the right side and 31% were on the left [7].

In a study done by Khetri R *et al.* of 40 cases diagnosed with inguinal hernia in a hospital in Odisha, India, he observed that 37 cases had a swelling confined to the inguinal region and 3 cases presented with a Inguinoscrotal swelling [8].

In our study, 70% cases (n=42) presented with a swelling confined to the inguinal region and 30% cases (n=18) presented with a Inguinoscrotal swelling.

Zieran J *et al.* published his study and noted a mean operating time of 61 ± 12 minutes in the laparoscopic group and 36 ± 14 minutes in the open Hernioplasty group [9].

In a study done by Kald A *et al.*, the mean operating time in the laparoscopic group was seen to be 72 ± 30 minutes whereas in the open mesh group it was seen to be 62 ± 25 minutes [10].

In a study done by the MRC Lap Groin Hernia Trial Group, the mean operating time for laparoscopic repair was 58.4 minutes and 43.3 minutes for open repair [11].

Picchio *et al.*, in his study, reported a mean operating time of 49.6 and 33.9 minutes in the laparoscopic and open mesh repair techniques respectively [12].

In our study, the mean operating time in the laparoscopic group was 84.97 ± 13.97 minutes. In the open mesh repair group, the mean operating time was 42.03 ± 6.51 minutes with an extremely significant p value. The operating time of both the procedures are comparable to the above stated studies, hence highlighting the steep learning curve involved in the laparoscopic hernia repair.

Heikkinen *et al.* reported a mean period to return to normal life was 14 days in the laparoscopic group and 21 days in the open group [13].

In a study published by Wilson MS *et al.*, the return to work was shorter in patients receiving laparoscopic repair (median 7 and 10 days, respectively) than Lichtenstein repair (14 and 21 days) [14].

Andersson *et al.*, in his study, reported the mean time to return to work after the procedure to be 8 days in the laparoscopic group and 11 days in the open repair group [15].

In a study done by Stoker DL *et al.*, the mean time for patients to return to their work post procedure was seen to be 14 days in the laparoscopic group and 28 days in the open repair group [16].

In our study, the mean time to return to work in the laparoscopic repair group was seen to be 5.67 ± 1.35 days and 17.37 ± 2.59 days in the open mesh repair group with an extremely significant p value, and is comparable to the above stated studies, suggesting that return to normal daily activities and work is much earlier following a laparoscopic procedure for inguinal hernia repair.

Conclusion

- The mean operating time in the laparoscopic group was 84.97 minutes (SD ±13.97). In the open mesh repair group, the mean operating time was 42.03 minutes (SD ±6.51) with an extremely significant p value (<0.00001).
- The mean time to return to work in the laparoscopic repair group was seen to be 5.67 days (SD ±1.35) and 17.37 days (SD ±2.59) in the open mesh repair group with an extremely significant p value (<0.00001).

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