## **Original Research Article**

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# A clinical study of inguinal hernia with special reference to laparoscopic trans-abdominal pre peritoneal repair

Suraj Singh<sup>1</sup>, Rajkumar Prakash<sup>2</sup>\*, Vasundhara Singh<sup>3</sup>

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## \*Correspondence:

Dr. Rajkumar Prakash,

E-mail: prakash.manipur@gmail.com

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## **ABSTRACT**

**Background:** Hernia may be generally defined as the protrusion of an abdominal viscus outside the abdominal cavity through a natural or acquired defect. Latin meaning of the word "hernia" is tear or rupture. A Clinical study on inguinal hernia is undertaken to assess the incidence of inguinal hernia in relation to age, gender and occupation, the different types and modes of clinical presentation of patients, the management of patients with special consideration to laparoscopic (TAPP) repair, to evaluate the operating time, pre-operative and post-operative complications, duration of hospital stay, time taken for recovery, recurrence rate and limitations with respect to laparoscopic TAPP repair.

**Methods:** This is a prospective study of 54 cases of inguinal hernia admitted and underwent surgery for inguinal hernia in Department of General Surgery in Guwahati Medical College and Hospital during the study period of August 2014 to July 2015.

**Results:** The highest number of cases presenting with inguinal hernia were over 45 years and it was more common in males which constituted 96.3 percent of cases. It is more common on right side and indirect hernia is more common than direct hernia. The major possible risk factors are smoking and strenuous work. The commonest presenting mode was swelling followed by swelling with pain. The mean time taken for TAPP was 91.85±15.85 minutes and the median time was 87.50 minutes. There were no intra operative (neurovascular, visceral) complications in any of the patient and there was no conversion to open surgery. There was no mortality in present study and none of the patient had any testicular complication.

**Conclusions:** Laparoscopic hernia repair is associated with steep learning curve for surgeons and is more costly both to patients and health care system in the present scenario. Laparoscopic TAPP hernia repair is found to have encouraging results which is a safe and viable option for repair of inguinal hernia with less postoperative pain and discomfort, improved cosmesis, less post-operative complications and early return to work.

Keywords: Inguinal hernia, Laproscopic hernia repair, TAPP

## INTRODUCTION

The earliest record of inguinal hernia dates back to around 1500 BC in ancient Egypt. The history of hernia is the history of surgery. "Hernia" may be generally

defined as the protrusion of an abdominal viscus outside the abdominal cavity through a natural or acquired defect. Latin meaning of the word "hernia" is tear or rupture. Greek meaning of hernia is an offshoot, a bud or bulge. "A protrusion of any viscus from its proper cavity is

<sup>&</sup>lt;sup>1</sup>Department of Surgery, Dr. Baba Saheb Ambedkar Medical College and Hospital, Rohini, Delhi, India

<sup>&</sup>lt;sup>2</sup>Department of Surgery, Deep Chand Bandhu Bandhu Hospital, Kokiwala Bagh, Ashok Vihar Phase, Delhi, India

<sup>&</sup>lt;sup>3</sup>Department of Surgery, Kasturba Hospital, Near Jama Masjid, Daryaganj, Delhi, India

denominated a hernia. The protruded parts are generally contained in a bag by a membrane with which the cavity is naturally invested." Inguinal hernias are among the most common inflictions in humans encountered by a surgeon. As Sir Astley Paston Cooper stated "no disease of human body, belonging to the province of surgeon, requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than hernia in all its varieties." A thorough knowledge is a must for a surgeon.

75% of abdominal wall hernias occur in the groin.<sup>3,4</sup> Indirect hernia outnumber direct hernia by about 2:1. Femoral hernia constitutes a small proportion of groin hernias. Males are more commonly affected. Lifetime risk for inguinal hernia is around 27% for men and around 3% for women.<sup>5</sup> Inguinal hernia repair is one of the most common operations in general surgery.

In the middle ages, before 19<sup>th</sup> century, results of inguinal hernia repairs were poor. In the last decades of the 19th century along with the rapid development of anatomy, surgical asepsis and anesthesia, refinements in the techniques of hernia repair have occurred. Bassini introduced his landmark technique on tissue repair for hernia surgery in 1887.<sup>6</sup>

The modern age of hernia repair began with the introduction of synthetic mesh by Usher in 1958 to reinforce a previous sutured repair. Open pre-peritoneal mesh repair introduced by Stoppa significantly reduced the recurrence rate. <sup>6,8</sup> Ger reported the first instance of laparoscopic hernia repair by approximating the internal ring by stainless steel clips in 1982. <sup>9</sup> The novel approach of laparoscopic trans-abdominal pre peritoneal mesh repair introduced by Arregui and Dion in the early 1990s was a revolutionary concept in hernia repair. <sup>10,11</sup>

Laparoscopic technique has the advantage of less postoperative pain and lesser duration of hospital stay and more cosmesis. However, laparoscopic repair carry a learning curve, mainly due to unfamiliarity with the preperitoneal anatomy, use of general anesthesia, more operative time during the learning curve, cost and some serious though infrequent complications.

The results of mesh repair, both open and laparoscopic are encouraging. Success of any hernia surgery depends on its ability to prevent recurrence and to minimize complications. It is to be tailored according to the nature of hernia, patient characteristics and the preference of the surgeon and the patient. Sir John Bruce of Edinburgh said: "The final words on hernia repair will probably never be written". A Clinical study on inguinal hernia is undertaken to assess the incidence of inguinal hernia in relation to age, gender and occupation, the different types and modes of clinical presentation of patients. the management of patients with special consideration to laparoscopic (TAPP) repair and to evaluate the operating time, peri-operative and post-operative complications,

duration of hospital stay, time taken for recovery, recurrence rate and limitations with respect to laparoscopic TAPP repair.

#### **METHODS**

This is a prospective study of 54 cases of inguinal hernia admitted and underwent surgery for inguinal hernia in Department of General Surgery in Guwahati Medical College and Hospital during the study period of August 2014 to July 2015. Ethical approval for the study was obtained from the GMCH ethical clearance committee. Patients were included in the study after taking informed written consent. Patients were given the option of undergoing open or laparoscopic repair. Those who opted for laparoscopic repair were included in the study and underwent laparoscopic TAPP repair. To keep a proper record a proforma was planned which was completed in each case.

#### Inclusion criteria

- Patient aged 15 years and above giving written valid consent
- Patients with unilateral or bilateral inguinal hernia
- Patients with recurrent inguinal hernia following open repair
- Patients medically fit to undergo the procedure under GA.

## Exclusion criteria

- Children less than 15 years of age
- Patients not willing to participate
- Patients with complicated inguinal hernia and who require emergency exploration for complications of hernia like, bowel obstruction, strangulation, gangrene etc.
- Pregnant females, uncorrectable coagulopathy and patients unfit for general anesthesia
- Also patients who had undergone lower abdominal surgery previously. Patients with failed laparoscopic repair of inguinal hernia.

## Preoperative assessment

All the patients included in the study are evaluated by a thorough history taking and physical examination. In addition to routine blood and urine investigations. Other investigations are also done if required. PFT and radiographic procedures like USG and 2D ECHO are recommended if it is indicated for certain patients.

- Stop alcohol/smoking at least for some weeks prior to operation
- Improvement of nutritional status, correction of anaemia
- Treatment of respiratory infection, if any
- Grossly overweight patients are advised to reduce weight before the operation

 Particular attention should be paid to medication use as the elderly are frequently receiving multiple drugs, creating an increased risk of drug interaction.

## Preoperative check-list of the patient

- The type of surgery and anesthesia is explained to the patient. To see that the patient has consented for surgery including, conversion to open method, if necessary
- To identify correctly, side of hernia and also to note if contralateral hernia is suspected
- Patient is nil by mouth for at least 6 hours before surgery
- A prophylactic preoperative dose of injection Ceftriaxone given IV 30 min before surgery which is repeated postoperatively BD for 24 hours
- To see that, the patient is shaved from Xiphoid to Groin and mid-thigh
- Morning dose of antihypertensive medication to be taken with minimal amount of water.

#### *Intraoperative*

Patients are routinely catheterized before operation. Operative time, and intraoperative complications, if any are noted.

#### Post-operative

Feeding is resumed soon after full regain of consciousness. Catheter is removed after 24 hours. After the surgery, a standard analgesic regimen was administered (injection Diclofenac sodium 75 mg IM BD for 24 hours followed by tablet Aceclofenac 50 mg on demand) for pain relief. Postoperative pain is assessed at regular intervals using VAS scale.

Presences of any surgical infections were noted and patients are assessed for discharge considering diet, ambulation and requirement of oral analgesics, if any.

## Discharge

The patients were discharged when fit and asked to come for regular follow up after 7 days, 1 month, 3 months, 6 month and 1 year postoperatively. Oral analgesic and Tab Cefuroxime 500 mg BD PO are continued for 5 days. All patients received similar instructions to return to normal activity, when they felt comfortable and were requested to keep a diary of the date of resumption of full daily activities.

All the patients were encouraged to return to pre hernia lifestyle except lifting heavy weights (till 4 weeks). All were followed up for chronic pain, interference with activities of daily living, use of analgesics, recurrence, seromas or any other complications. Those with problems were followed up for a longer period as far as possible.

All the data was entered in the proforma and analysis was done manually.

#### Factors studied

#### Operative time

The anesthetist in charge of each case noted the operation time from the skin incision to the application of the last stitch. All time measurements were approximated to the nearest multiple of 5 minutes.

## Post-operative pain

A visual analogue scale (VAS) pain scoring system was used to monitor the postoperative pain at 24 hours. The patients were asked to complete VAS score from 0 (no pain) to 10 (intolerable pain). Pain intensity was measured with a visual analogue scale (VAS).

#### Intraoperative complications

Bladder injury, bowel injury, vascular injury, injury to vas, surgical emphysema etc. if any, are noted.

## Post-operative complications

Seroma/ haematoma, urinary retention, wound infection, subcutaneous emphysema, pneumoscrotum, neuralgia, testicular pain/swelling, mesh rejection and early recurrence if any, were noted. Seroma was defined as clinical presence of palpable fluid collection over the groin in the absence of bruising.

#### Post-operative hospital stay

Total number of nights spent in the hospital after operation was defined as hospital stay. Return to daily activity in days and follow up at 7 days, 1 month, 3 month, 6 month and 1 year.

#### Recurrence

Defined as the presence of a swelling at the operated site with an impulse on coughing.

## Chronic pain

Defined as any discomfort /pain in the groin area at least 3 months after surgery and debilitating enough to interfere with daily activity requiring medical attention, in the absence of recurrence of hernia on the side of pain.

## **RESULTS**

## Age distribution

In our study, 28 cases (51.85%) were in (45-65 years) age group followed by 17 cases (31.48%) in (15-44 years)

group and 9 cases (16.67%) in > 65 age group. The mean age was  $49.48\pm17.00$  years and median age was 54 years. The minimum age was 19 years and maximum age was 75 years.

#### Sex distribution

In our study, there were 52 males (96.30%) and 2 females (3.70%). The male to female ratio was 26:1.

## Clinical presentation: type and side

In our study, there 31 cases (57.41%) were right sided and 21 cases (38.89%) were left sided and 2 cases (3.70%) were bilateral. R: L ratio was (1.48:1). 34 cases (62.96%) were indirect type, 19 cases (35.19%) were of direct type and 1 case (1.85%) was a recurrent hernia.

The right sided indirect inguinal hernia (35.19%, 19 cases) was the most common type followed by left sided indirect inguinal hernia (27.78%, 15 cases). There were 12 cases (22.22%) of right sided direct inguinal hernia, 5 cases (9.26%) of left sided direct inguinal hernia and 2 cases (3.70%) of bilateral direct inguinal hernia. There was one case of recurrent hernia following previous open repair.

#### Mode of clinical presentation

In our study, 36 patients (66.67%) came with presentation of swelling with pain in the groin and 18 patients (33.33%) of them had complaint of swelling alone without pain.

## Possible risk factors/precipitating factors

In our study, 24 cases (44.44%) had history of chronic smoking, 21 cases (38.89%) had occupation involving strenuous activities like farming, manual labour and sports. In 8 cases (14.81%) there was symptoms of prostatism, 5 cases (9.26%) had history of chronic cough (COPD). 4 cases (7.41%) had history of chronic constipation and straining.

#### Types of occupation/ nature of work

In our study, 21 cases (38.89%) had occupation (farmer, labourer, player) involving strenuous work and 21 cases (38.89%) had sedentary (teacher, students, office, businessmen) activities. 6 cases (11.11%) had occupation (tailor, driver) with mild activities.

## Time taken for operation

In our study, the mean operating time is  $91.85\pm15.85$  min (range 70-150 min) and the median operating time is 87.50 min. There were two bilateral cases which took 140 mins and 150 mins respectively.

#### Post-operative pain

The average VAS score at 24 hours postoperative period was 2.70±1.54 (range 0-6) median = 2.50. One case of recurrent inguinal hernia following open surgery previously experienced less post-operative pain than the previous open surgery. In our study, 36 cases out of 54 cases (66.67%) experienced mild pain post-operatively at 24 hours. Moderate pain occurred in 18 cases (33.33%) at 24 hours post-operative period. None of them had severe pain.

#### Chronic pain

In our study, at 1 week follow up 27 cases (50.94%) had mild pain, 12 cases (22.64%) had moderate pain and 14 cases (26.42%) had no pain. At 1 month, 13 cases (26%) had mild pain and 3 cases (6%) continued to have moderate pain while 34 cases (68%) had no pain. By 3 months, 1 out of 38 (2.63%) patients who came for follow up had mild pain while 37 cases (97.37%) didn't have any pain. At 6 months, 1 out of 20 (5%) patients who came for follow had mild pain while 19 cases (95%) didn't have any pain. At 1 year, one patient who came for follow up had no pain. The incidence of chronic pain in our study is 5% (1 out of 20 cases) at 6 months.

#### **Complications**

In our study, there were no major intra-operative (neurovascular, visceral) or cord related complications. There were no conversions to open surgery and no mortality during our study.

The overall complication rate of our study is 21.66%. The most common postoperative complication was seroma (3 cases, 5.56%) followed by hematoma (2 cases, 3.70%), wound infection (2 cases, 3.70%) and chronic groin pain (1 case, 5%). Initially 2 cases (3.7%) had transient pneumo-scrotum immediate postoperatively which later resolved in a few hours. Patients were routinely catheterized before surgery and removed after 24 hours. So urinary retention was not assessed.

The early transient groin pain lasting for 3 weeks responded to oral analgesics. I case of chronic groin pain was managed conservatively with analgesics and gradually subsided. There were no recurrences and no umbilical port site hernias were observed during the period of our study. There were no post-operative testicular complications.

## Hospital stay and ambulation

In our study, the mean postoperative stay was 2.86 + 0.86 days (range 1-5 days) and the median total hospital stay was 2 days. The mean time taken for ambulation was  $10.24 \pm 2.62$  hours (range 8-24 hours), and median time taken for ambulation was 10 hours.

#### Return to work

In our study, all the patients were given similar advice at discharge and encouraged to return to work as early as possible and requested to note down the progress in their activities. Heavy work/ straining were advised after 4 weeks post-operatively. The mean time for return to work was  $8.93\pm2.66$  days (range 3-15 days) and median was 9 days.

#### Follow up and dropouts

The mean follow up duration was  $3.57\pm2.43$  months (range 1 week - 12 months). Median = 3 months. In our study there were no recurrences during the limited period of follow up of the patients.

All patients attended the 1st week follow up. Accordingly the follow up rates are 100% at 1<sup>st</sup> month, 92.68% at 3rd month, 83.33% at 6th month and 50% at 1 year.

#### **DISCUSSION**

## Age at presentation

In our study, 28 cases (51.85%) were in (45-65 years) age group followed by 17 cases (31.48%) in (15-44 years) group and 9 cases (16.67%) in > 65 age group and comparable to the studies of Ira M Rutkow, Everhart JE and Abramson JH. <sup>12-14</sup> In a study by Gurjar et al the age distribution show that incidence of hernia is increase with advancing of age and rate is more after age of 45 years. <sup>15</sup>

Table 1: Age at presentation.

Age (Years)	Present study (54 cases)	Rutkow IM <sup>12</sup> (82 cases)	Everhart JE <sup>13</sup> (5316 cases)	Abramson JH <sup>14</sup> (637 cases)
15 - 44	31.48% (17)	31.71% (26)	26.65 % (1417)	37.40 % (238)
45 - 64	51.85% (28)	36.59% (30)	34.20 % (1818)	43.0 % (274)
> 65	16.67% (9)	31.71% (26)	39.15 % (2081)	19.60 % (125)

Table 2: Sex distribution.

Sex	Present study	M Kurzer <sup>16</sup>	Gurjar <sup>15</sup>	Ira M. Rutkow <sup>17</sup>
Male	96.30%	97%	97.33%	90%
Female	3.70%	3%	2.26%	10%

#### Sex distribution

In our study, there were 52 males and 2 females, which is comparable with other studies (Table 2).

## Side and clinical types

Table 3: Comparison of type of clinical presentation.

Туре	Present study	Rutkow IM <sup>12</sup>	M. Sangwan <sup>18</sup>
Right - indirect	19 (35.19%)	36 (36%)	72 (28.92%)
Right - direct	12 (22.22%)	15 (15%)	67 (26.91%)
Left - indirect	15 (27.78%)	28 (28%)	53 (21.29%)
Left - direct	5 (9.26%)	13 (13%)	37 (14.86%)
Bilateral	2 (3.70%)	2 (2%)	20 (8.03%)
Pantaloon	0	6 (6%)	0
Others	1 (1.85%)	0	0
Total	54 (100.00%)	100 (100%)	249 (100%)

In our study, there 31 cases (57.41%) were right sided and 21 cases (38.89%) were left sided and 2 cases (3.70%) were bilateral. R: L ratio was (1.48:1). 34 cases (62.96%) were indirect type, 19 cases (35.19%) were of direct type, and 1 case (1.85%) was a recurrent hernia. The above findings were comparable with the studies of Rutkow IM and Sangwan M (Table 3 and 4)<sup>12,18</sup>

Table 4: Comparison of clinical types of inguinal hernia.

Туре	Present study	Ira M Rutkow <sup>12</sup>	M. Sangwan <sup>18</sup>
Indirect	62.96%	64%	50.21%
Direct	31.48%	28%	41.77%
Bilateral	3.70%	2%	8.03%
Others	1.85%	6%	0
Total	100%	100%	100%

## **Occupation**

In our study, 21 cases (38.89%) had occupation (farmer, labourer, player) involving strenuous work and 21 cases (38.89%) had sedentary (teacher, students, businessmen)

activities. In a study by Fatima et. Al19, out of 433 patients of inguinal hernia, it was found that 312 patients (72%) had occupations involving strenuous physical activity.

As our study included only those who underwent TAPP repair, there are more cases from the sedentary working class who could afford the cost and wants to take the advantages of TAPP repair. The educated class can better understand the benefits of this method. This may be the reason for difference seen with other studies.

#### Mode of presentation

In our study, all the patients came with presentation of swelling and 66.67% of them had pain/ discomfort in the groin along with swelling. In a study by Mike SL, 93% presented with swelling in the groin and 83% with discomfort / pain.  $^{20}$ 

## Possible risk factors/precipitating factors

The possible risk factors/precipitating factors associated with hernia in this study are smoking, strenuous work, COPD, prostatism and constipation (Table 5).

Table 5: Possible risk factors and precipitating factors.

Risk factors	Frequency (No. of patients)	Percentage
Smoking	24	44.44%
Strenuous work	21	38.89%
Prostatism	8	14.81%
COPD	5	9.26%
Constipation	4	7.41%

In a study by Mike SL and others, the precipitating factors were COPD in 10%, BPH in 5%, constipation in 5% and strenuous activity in 24%. <sup>20</sup>

In a study by Fatima et al, out of 433 patients of Inguinal hernia, it was found that 312 patients (72%) had occupations involving strenous physical activity, 66% of inguinal hernia patients were found to had constipation and 26% were having family history significant.<sup>19</sup>

In a study by Lau H et al, family history is an important predictor for the development of inguinal hernias and indicates that genetic factors play a role for disease manifestation at least in a subgroup of hernia patients. Junge K et al also suggested family history as an important predictor for hernia recurrence. <sup>21,22</sup>

As the sample size of our study is small, it would be unwise to establish the risk factors associated with inguinal hernia, so only the incidence of possible risk factors in our study is evaluated. Time taken for surgery

In our study the mean operating time is 91.85±15.85 min (range 70-150 min) and the median operating time is 87.50 min. There were two bilateral cases which took 140 mins and 150 mins respectively. Comparison with different studies is shown in Table 6.

Table 6: Comparison of time taken for surgery.

Study (TAPP repair)	Time taken (minutes)
Heikkinen, et al <sup>26</sup>	62
Leibl BJ et al <sup>27</sup>	66
Paganini et al <sup>28</sup>	67
Herniamed <sup>29</sup> registry	52.62 + 23.58
Hermanied Tegistry	(n = 10,887)
Present study	91.85±15.85

Eklund et al, Ferzli et al and Grant et al, suggest that increasing experience with the technique decreases the operation times and time taken decreases after 30-50 cases. 24-26

The mean operative time in our study was more as compared to other studies probably due to manual suturing used in cases where patient couldn't afford tackers. Moreover there were two bilateral cases which took longer times to operate. Cases where manual suturing was done instead of tackers took more time for operation than cases where tackers were used.

## **Complications**

**Table 7: Comparison of complication rate following TAPP.** 

Herniamed <sup>29</sup> study	Present study
Intra-operative complications 152 (1.40%)	Intra-operative complications 0 (0.00%)
Bleeding 108 (0.99 %)	Bleeding 0 (0.00 %)
Injuries (total) 77 (0.71 %)	Injuries (total) 0 (0.00 %)
Vascular 34 (0.31 %)	Vascular 0 (0.00 %)
Bladder 15 (0.14 %)	Bladder 0 (0.00 %)
Bowel 14 (0.13 %)	Bowel 0(0.00 %)
Nerve 0 (0.00%)	Nerve 0 (0.00%)
Post-operative	Post-operative
complications	complications
432 (3.97 %)	7 (12.96 %)
Bleeding 89 (0.82 %)	Hematoma 2 (3.70 %)
Seroma 333 (3.06 %)	Seroma 3 (5.56 %)
Infection 4 (0.04 %)	Infection 2 (3.70 %)

#### Pain

In our study at 1 week follow up, 28 cases (51.85%) had mild pain, 12 cases (22.22%) had moderate pain and 14

cases (25.93%) had no pain. At 1 month, 13 cases (26%) had mild pain and 3 cases (6%) continued to have moderate pain while 34 cases (68%) had no pain. By 3 months, 1 out of 38 patients (2.63%) who came for follow up had mild pain while 37 patients (97.37%) didn't have any pain. At 6 months, 1 out of 20 patients (5%) who came for follow up had mild pain and 19 cases (95%) didn't have any pain. At 1 year, one patient who came for follow up had no pain. The incidence of chronic pain in our study is 5% (1 case) at 6 months and it is comparable with other studies (Table 9).

Table 8: Comparison of complication rates of TAPP repair.

Study (TAPP repair)	Complication rates
Hamaza Y et al <sup>30</sup>	25% (5/25)
Douek et al <sup>31</sup>	11% (13/122)
SCUR trial <sup>32</sup>	31%
MRC trial <sup>33</sup>	29.9%
VA trial <sup>34</sup>	39%
Present study	21.66%

In our study, there were no major intra-operative (neurovascular, visceral) or cord related complications. There were no conversion to open surgery and no mortality during our study. None of the patients had any testicular complications. The most common post-operative complication was seroma in 3 cases (5.56%) followed by hematoma in 2 cases (3.7%), port site infection in 2 cases (3.70%) and chronic groin pain in 1 case (5%). The overall complication rate of our study is 21.66% and is comparable to other studies as shown in Table 7 and 8.

Table 9: Comparison of chronic pain following TAPP repair.

Study (TAPP repair)	Chronic pain (percentage)
McCormack et al <sup>35</sup>	13.8%.
Kroninger, et al <sup>36</sup>	15% ( 52 months)
MRC <sup>33</sup> trial	28.7%
SMIL1 $^{37}$ trial (n = 518)	10.4%
VA <sup>34</sup> trial	9.8%
Present study	5.00%

Table 10: Comparison of post-operative hospital stay.

Study (TAPP repair)	Hospital stay
Trial NCT 00687375 (at AIIMS, New Delhi) <sup>38</sup>	3.7 days
Yassar Hamaza, et al <sup>30</sup>	1 days
F. Ko"ckerling <sup>29</sup> (n = 10,887) (Herniamed registry)	1.93±2.22 days
Present study	$2.06 \pm 0.86 \text{ days}$

#### Post-operative hospital stay

In our study, the mean postoperative stay was 2.06±0.86 days (range 1-5 days) and the median total hospital stay was 2 days. The mean time taken for ambulation was 10.24±2.62 hours (range 8-24 hours), and median time taken for ambulation was 10 hours and it is comparable with other studies as shown in Table 10.

#### Return to work

In our study, all the patients were given similar advice at discharge and encouraged to return to work as early as possible and requested to note down the progress in their activities. Heavy work/ straining was advised after 4 weeks post-operatively. The mean time for return to work was  $8.93 \pm 2.66$  days (range 3-15 days) and median was 9 days. It is comparable to other studies as shown in Table 11

Table 11: Comparison of return to work following TAPP repair.

Study (TAPP repair)	Return to work (days)
Heikkinen et al <sup>26</sup>	14
Paganini et al <sup>28</sup>	15
Hamaza Y et al <sup>30</sup>	14.87
$MRC trial^{33} (n = 487)$	10
SCUR trial <sup>32</sup>	15
VA trial $^{34}$ (n = 989)	4
Present study	8.93±2.66

#### Recurrence

In our study, there were no recurrences during the limited period of follow up of the patients. The mean follow up duration was  $3.57\pm2.53$  months (range 1 weeks - 12 months).

Recurrences of inguinal hernia continue to occur up to 10 years after conventional hernia repair. It is therefore likely that recurrence rates are generally underestimated, because most studies are either not prospective or do not include long-term follow up. Staarink39 et al suggested that, follow up of recurrence rates up to 10 years needs to be assessed to determine whether endoscopic repair is favorable in the long term. Paul40 et al reported that recurrence rates are influenced not only by surgical expertise and method of repair, but also by the length and method of follow up.

No recurrences or umbilical port site hernia were observed in the follow up cases during the limited duration (mean follow up duration =  $3.57\pm2.43$ ) of our study period. However long term follow up of the cases will be necessary to reveal the real recurrence rate. Comparison with different studies is shown in Table 12.

Table 12: Comparison of recurrence rates following TAPP repair.

Study (TAPP repair)	Recurrence rate
Liem et al $^{20}$ (n = 487)	4.9% (4 years)
Yassar Hamaza et al $^{30}$ ( n = 50)	1 (4%)
SMIL1 trial $^{37}$ (n = 518)	1.2%
$VA trial^{34} (n = 989)$	10.1%
Present study	0%
riesent study	$(3.57\pm2.43 \text{ months})$

#### **CONCLUSION**

All cases of inguinal hernia are not suitable for laparoscopic hernia repair as it is contraindicated in strangulated hernia, irreducible hernia, and patients having severe co-morbid conditions which are not suitable for general anesthesia. Laparoscopic hernia repair is associated with steep learning curve for surgeons and is more costly both to patients and health care system in the present scenario.

Laparoscopic TAPP hernia repair is found to have encouraging results which is a safe and viable option for repair of inguinal hernia with less postoperative pain and discomfort, improved cosmesis, less post-operative complications and early return to work. Repair of recurrent hernias would be easier, and bilateral hernia could be treated concurrently. Complications in laparoscopic hernia repair can be minimized by following strict operative protocols.

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institutional ethics committee

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