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Original Research Article

Risk factors of conversion of laparoscopic totally extraperitoneal repair of inguinal hernia

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ABSTRACT

Background: Inguinal hernia occurs in 1 to 5% of the general population. The development of laparoscopic inguinal hernia repair techniques as an alternative to conventional open surgery has improved results such as less postoperative pain, shorter hospital stays, and faster recovery. This study was conducted to assess the risk factors of conversion of laparoscopic totally extraperitoneal repair of inguinal hernia.
Method: A total of 200 patients who were scheduled to undergo TEP were enrolled. Complete demographic and clinical details of all the patients was obtained. A Performa was made and detailed intraoperative findings were evaluated. Baseline hemodynamic and biochemical profile was evaluated. Separate assessment of patients was done who were converted to open surgery. Comparison of patients was done among those with and without conversion. Various risk factors were evaluated which were responsible for conversion. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.
Results: Mean age of the patients was 49.2 years. 60.5 percent of the patients were of rural residence. Mean BMI of the patients was 24.8 Kg/m2. Incidence of conversion was 6.5 percent. Geriatric age, obesity, higher ASA grade, larger hernial defects, larger peritoneal tear and previous hernia surgery history was found to be significant risk factors for conversion.
Conclusion: Laparoscopic totally extraperitoneal (TEP) repair of inguinal hernia is an effective technique, but conversion to open surgery occurs in 6.5% of cases. Significant risk factors for conversion include geriatric age, obesity, higher ASA grade, larger hernial defects, larger peritoneal tear, and previous hernia surgery history. Identifying these risk factors can help optimize patient selection and improve outcomes for TEP repair.

Keywords: Laparoscopic, Extraperitoneal, Inguinal hernia

INTRODUCTION

Inguinal hernias affect a significant 1-5% of the global population, accounting for a substantial 75% of all abdominal wall hernias, and their repair is a remarkably common and intricate surgical procedure performed worldwide, necessitating meticulous attention to detail.[1,2] However, inguinal hernia surgery poses substantial and complex challenges due to its high frequency and far-reaching socioeconomic implications of even minor complications, which can have a profound impact on patients' quality of life. The development and refinement of laparoscopic techniques have significantly improved outcomes, including notably less postoperative pain, shorter hospital stays, and faster recovery times, ultimately enhancing patient satisfaction and reducing healthcare costs.[3,4] Furthermore, meta-analyses have consistently shown a lower incidence of chronic pain, a common and debilitating complication of inguinal hernia repair.[5,6] One of the primary reasons for the lower

postoperative pain may be attributed to the lower rate of complications described in the laparoscopic approach, which minimizes tissue trauma and promotes faster healing.[7] Randomized trials have found no discernible difference in recurrence rates between laparoscopic and open approaches, underscoring the efficacy and reliability of both methods.[8,9] Inguinal hernia repair remains one of the most common and essential surgical procedures performed globally, with millions of cases reported annually.[10,11] Since the introduction of laparoscopic techniques in the early 1990s, new surgical methods have been introduced for hernia repair, revolutionizing the field and expanding treatment options. Surgeons have actively adopted minimally invasive techniques for inguinal hernia repair, and the initial cases of two different laparoscopic hernia repair methods-transabdominal preperitoneal repair (TAPP) and totally extraperitoneal repair (TEP)-were reported in 1992 and 1993, respectively, marking a significant milestone in the evolution of hernia repair.[12,13] Numerous clinical trials have compared these two representative methods of laparoscopic inguinal hernia repair, yielding conflicting results, largely due to limited patient numbers and heterogeneous endpoints, highlighting the need for further research.[14,15] This comprehensive and rigorous study aimed to thoroughly assess the risk factors associated with conversion in laparoscopic totally extraperitoneal inguinal hernia repair, providing valuable insights for surgeons and clinicians.

METHODS

The present observational study was conducted at department of general surgery at LN medical college and hospital Bhopal, MP from May 2022 to February 2024 to assess the risk factors of conversion of laparoscopic totally extraperitoneal repair of inguinal hernia. A total of 200 patients who were scheduled to undergo TEP were enrolled based on inclusion and exclusion criteria. An informed consent was taken from the study participants. Ethical clearance was taken from ethical committee of our institution.

Inclusion criteria

It includes patients who provided informed consent, patients aged 18 years or older.

Exclusion criteria

Those unwilling to participate in the study. Patients deemed unsuitable for surgery, anesthesia or further investigations were excluded.

Complete demographic and clinical details of all the patients was obtained. A Performa was made and detailed intraoperative findings were evaluated. Baseline hemodynamic and biochemical profile was evaluated. Separate assessment of patients was done who were converted to open surgery. Comparison of patients was done among those with and without conversion. Various risk factors were evaluated which were responsible for conversion. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

Mean age of the patients was 49.2 years. 60.5 percent of the patients were of rural residence. Mean BMI of the patients was 24.8 Kg/m2, it was also found that 60.5% population reside in rural area and 39.5% population reside in urban area (Table 1).

Table 1: Demographic data.

Variables	Number	Percentage
Mean age (years)	49.2	
Rural residence	121	60.5
Urban residence	79	39.5
Mean BMI (kg/m^2)	24.8	

Table 2: Incidence of conversion.

Conversion	Number	Percentage
Needed	13	6.5
Not needed	187	93.5
Total	200	100

Incidence of conversion was found 6.5 percent whereas not needed in 93.5% study subjects (Table 2).

Table 3: Risk factors of conversion.

Risk factors of conversion	Multivariate analysis (r value)	P value
Geriatric age	1.232	0.001*
Obesity	1.392	0.003*
Higer ASA Grade	2.810	0.000*
Large hernial defects	-1.093	0.000*
Larger peritoneal tear	2.912	0.001*
Previous hernia surgery	2.091	0.003*

*p value is significant if p<0.001.

Geriatric age, obesity, higher ASA grade, larger hernial defects, larger peritoneal tear and previous hernia surgery history was found to be significant risk factors for conversion (Table 3).

DISCUSSION

Inguinal hernia repair stands as one of the most frequently performed surgical procedures globally, with a vast number of cases reported annually.16 The laparoscopic total extraperitoneal (TEP) approach for inguinal hernia repair emerged in the early 1990s, pioneering a minimally invasive technique that has since gained widespread acceptance and popularity. As a result,

the proportion of laparoscopic hernia surgeries has steadily risen, becoming an increasingly preferred method for hernia repair due to its numerous benefits, including reduced postoperative pain, faster recovery times, and improved patient outcomes.[17,18]

Laparoscopic TEP has several benefits including less postoperative pain, early ambulation, and lower recurrence rate.[19,20] However, there are some obstacles that keep laparoscopic TEP from spreading rapidly; these are related to steep learning curve, narrow operative field, and unfamiliar anatomic structure to surgeons.[21]

Laparoscopic TEP surgery can become exceptionally complex and demanding in certain situations, including unexpected bleeding, unusual anatomical configurations, challenging extraperitoneal dissection, and particularly, peritoneal tearing. Surgeons in the early stages of their training may find it difficult to navigate these intricate scenarios effectively. As a result, these technically challenging aspects can lead to extended surgical times, a higher likelihood of converting to an open procedure, and an increased risk of postoperative complications, highlighting the need for advanced training and expertise in laparoscopic TEP repair.[22,23]

Technically challenging situations during laparoscopic hernia repair are caused by various factors, e.g., uncontrolled bleeding, demanding extraperitoneal dissection, and peritoneal tearing.[24] In these cases, operative time would generally increase and laparoscopic approach could be converted to open procedure. Additionally, perioperative major complications could occur. Therefore, extension of operative time, conversion to open procedure or occurrence of major complications can be interpreted as technical difficulty. Accordingly, technically difficult group was defined as the cases which ranked in the 70th percentiles or more in the distribution curve of operative time, or underwent open conversion or major complication.

The laparoscopic approach in inguinal hernia repair is a valid alternative to traditional open repair.[25,26] However, despite the recommendations of international guidelines, the utilization rates are variable: 38% in the USA27, 23% in England and 5.7% in Spain.[28,29] The use rate of laparoscopy for bilateral inguinal hernia repair in Spain in 2019 was 23%.30 This study was conducted to assess the risk factors of conversion of laparoscopic totally extraperitoneal repair of inguinal hernia.

Mean age of the patients was 49.2 years. 60.5 percent of the patients were of rural residence. Mean BMI of the patients was 24.8 Kg/m2. Incidence of conversion was 6.5 percent. Geriatric age, obesity, higher ASA grade, larger hernial defects, larger peritoneal tear and previous hernia surgery history was found to be significant risk factors for conversion. Karabulut M et al investigated the risk factors associated with conversion to open surgery during laparoscopic total extraperitoneal (TEP) repair, comparing outcomes between patients who underwent conversion and those who did not.[30] Multivariate analysis identified significant independent risk factors for conversion, including large hernial defects, large peritoneal tears, previous lower abdominal surgery, previous hernia surgery, and scrotal hernia. The overall conversion rate was 4.05% (n=39), with a median age of 42 years and body mass index of 25.2 kg/m2. Clinical factors associated with conversion included advanced age, high ASA score, large peritoneal tears, Charlson comorbidity index, previous surgery, large hernial defects, scrotal hernia, and defect size of inguinal hernia. Chen L et al examined the risk factors for complications after laparoscopic inguinal hernia repair (LIHR), following patients through telephone and subsequent visits.[31]

Multivariate analysis identified independent risk factors for complications, including body mass index, intraoperative blood loss, intraoperative adhesions, abnormal coagulation function, recurrent hernia, and hypertension. Common complications included seroma, hematoma, urinary retention, and unexplained chronic pain. The study found that these factors increased the risk of complications after LIHR.[32]

The limitations of the study were a single-center study with a relatively small sample size of 200 patients, which may not be representative of the general population. Additionally, the study was retrospective, relying on data from past surgeries, which may be subject to bias. The study also did not control for surgeon experience and technique, which can impact conversion rates. Furthermore, the study only evaluated a limited number of risk factors for conversion, and other potential factors may have been overlooked.

Finally, the study did not assess long-term outcomes or patient satisfaction, which are important considerations in evaluating the effectiveness of TEP repair. These limitations highlight areas for future research to improve our understanding of TEP repair and its outcomes.

CONCLUSION

The study found that the incidence of conversion from laparoscopic totally extraperitoneal (TEP) repair to open surgery in inguinal hernia patients varies based on several factors. Out of 200 patients, 6.5% required conversion, with significant risk factors including geriatric age, obesity, higher ASA grade, larger hernial defects, larger peritoneal tear, and previous hernia surgery history.

By understanding these risk factors, surgeons can better anticipate and prepare for potential conversions, ultimately improving patient outcomes and reducing complications associated with TEP repair. This knowledge can help optimize surgical decision-making and improve the overall effectiveness of this minimally invasive procedure.

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