Section: General Surgery

Original Research Article

A RETROSPECTIVE OBSERVATIONAL STUDY OF SAFETY AND EFFICACY OF MODIFIED SHOULDICE'S SURGERY OTHER THAN BERLINER DARN MODIFICATION

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ABSTRACT

Inguinal hernia is a common surgical condition globally, with surgical repair being the definitive treatment. While mesh-based techniques are widely utilized, tissue-based procedures such as the Modified Bassini repair remain relevant, particularly in resource-limited settings. This retrospective observational study evaluated the safety and efficacy of modification of modified shouldice's other than berliner darn in managing primary, uncomplicated, unilateral inguinal hernia. A total of 100 adult patients undergoing the procedure at a tertiary care teaching hospital were included. Demographic characteristics, operative details, postoperative complications, duration of hospital stay, and recurrence rates were analyzed. Patients were followed for a mean of 3.5 ± 0.6 years to assess clinical outcomes. The study population showed male predominance (84%) over females (16%), with a mean age of 52.12 ± 17.2 years. The mean hospital stay was 4.6 ± 1.8 days. Postoperative complications were uncommon and mostly minor, with urinary retention (6%) being the most frequent, followed by postoperative neuralgia (5%), wound infection (3%), and seroma formation (3%). Hernia recurrence occurred in 4% of patients during follow-up. In conclusion, this is a safe and effective method for inguinal hernia repair, demonstrating acceptable complication and recurrence rates. It continues to be a reliable and cost-effective surgical option, particularly suitable for use in resource-limited settings.

INTRODUCTION

Inguinal hernia is among the most frequently encountered surgical conditions globally and constitutes a substantial component of general surgical practice. It results from weakness of the abdominal wall musculature, permitting abdominal contents to protrude through the inguinal canal. Clinically, it typically presents as a inguinal swelling and may be accompanied by discomfort or pain, with potential complications such as incarceration and strangulation if not managed appropriately.[1]

The epidemiological profile of inguinal hernia varies considerably across populations. Worldwide, the burden of hernia cases increased by approximately 36% between 1990 and 2019, surpassing 32.5 million cases. Although age-standardized rates have shown a decline, inguinal hernias remain highly prevalent, particularly in regions such as Andean Latin America, with a consistently higher prevalence among males.[2] Inguinal hernias constitute nearly 75% of all abdominal wall hernias, with a lifetime risk estimated at 27% in men and 3% in women, underscoring their clinical importance.[1] The incidence rises with advancing age and is significantly higher in males due to anatomical factors related to the inguinal region.3 In India, inguinal hernia continues to pose a common health problem, especially in rural and semi-urban areas where delayed presentation and restricted access to healthcare are common.[4-6] Indian studies have reported prevalence rates ranging from 15–20%,

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predominantly affecting middle-aged and elderly men.[3,5]

The pathogenesis of inguinal hernia is multifactorial, involving both congenital and acquired components. Congenital factors include the persistence of the processus vaginalis, predisposing individuals to indirect inguinal hernia. Acquired factors are mainly associated with progressive weakening of the abdominal wall due to aging, abnormalities in collagen metabolism, and repeated episodes of increased intra-abdominal pressure.1 Alterations in collagen structure, particularly a reduction in type I collagen with a relative increase in type III collagen, have been implicated in hernia formation and recurrence.[7] Several risk factors contributing to inguinal hernia development have been identified, including male sex, increasing age, chronic cough, constipation, smoking, heavy physical work, obesity, and conditions associated with raised intra-abdominal pressure such as chronic obstructive pulmonary disease and prostatic enlargement.[8,9]

A wide range of surgical techniques have been described for inguinal hernia repair, broadly categorized into tissue-based and mesh-based procedures. The Bassini repair, introduced in the late 19th century, formed the basis of modern hernia surgery by focusing on reconstruction of the posterior wall of the inguinal canal.[10] Subsequent modifications were developed to enhance repair strength and minimize tension. Although mesh-based techniques, particularly Lichtenstein hernioplasty, have become widely accepted owing to lower recurrence rates, tissue-based repairs continue to retain relevance, especially in circumstances where mesh availability is limited, cost considerations are important, or mesh-related complications are a concern.[11]

Modified Bassini repair remains a practical option in selected patients and institutional settings. Studies evaluating this technique have reported variable outcomes, with recurrence rates ranging from as low as 1–3.7% to as high as 9.6%, largely influenced by surgical technique and duration of follow-up.[12] Nonetheless, issues related to long-term effectiveness and comparison with mesh-based repairs persist, highlighting the need for further evaluation, particularly in resource-constrained environments and teaching hospitals.

The modified Shouldice repair is a well-established tissue-based technique that provides a multilayered reconstruction of the posterior wall of the inguinal canal using native tissues, thereby reducing tension and improving durability. Its principal advantages include avoidance of prosthetic material, making it particularly suitable in contaminated fields, younger patients, and resource-limited settings, while eliminating mesh-related complications such as chronic groin pain, foreign-body sensation, and mesh infection.[11,17,26] The multilayered imbrication of the transversalis fascia offers superior anatomical reinforcement compared with the traditional Bassini repair. However, the modified Shouldice repair is technically demanding, requires meticulous tissue handling and suturing, and is associated with a longer learning curve, which may adversely affect outcomes in non-specialized centers.[17,23]

The Bassini repair, although simple and easily reproducible, is a tension-based technique and has been associated with comparatively higher recurrence rates, particularly in elderly patients and in those with poor tissue quality. Modified Shouldice repair has demonstrated lower recurrence rates, generally ranging from 1% to 4% when performed by experienced surgeons, though higher rates have been reported in general surgical practice.[23,25] The Berliner darn repair, which reinforces the posterior wall using a woven suture technique, offers technical simplicity and shorter operative time; however, reported recurrence rates vary widely, approximately between 2% and 10%, depending on surgeon expertise and patient-related factors.[23,24] These variations highlight the critical role of surgical technique, tissue quality, and institutional experience in determining long-term outcomes of tissue-based inguinal hernia repairs.

In this context, the present study was conducted to assess the efficacy and clinical outcomes of modification of modified shouldice's other than berliner darn, in the management of inguinal hernia. The objectives included evaluation of postoperative complications such as pain, seroma formation, and wound infection, assessment of hospital stay duration and postoperative recovery, and determination of recurrence rates during the follow-up period. Additionally, the study aimed to examine the feasibility of this repair as a cost-effective and dependable surgical option, especially in resource-limited settings.

MATERIALS AND METHODS

Study design and Setting: This is retrospective observational study conducted at Chigateri district Hospital, a tertiary care teaching hospital attached to J. J. M. Medical College. Medical records of patients who presented with a clinically diagnosed inguinal hernia and underwent this repair done by a single surgeon were analysed.

Inclusion criteria

The study population included adult patients more than 20 years, of both sexes, who were diagnosed with primary, uncomplicated, unilateral inguinal hernia, and were treated surgically with above mentioned procedure. Patients who were available for regular follow-up were included.

Exclusion criteria

Patients younger than 20 years, those with complicated or recurrent inguinal hernia, and patients with associated comorbid conditions such as collagen vascular disease, chronic obstructive pulmonary disease, or obstructive uropathy were excluded from the study.

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Preoperative evaluation: A total of 100 patients who fulfilled the inclusion were selected for analysis. All patients underwent detailed preoperative evaluation, including thorough history taking and clinical examination. Routine laboratory investigations were performed in all cases, and imaging studies were obtained when clinically indicated.

Surgical Technique: All operations were carried out under spinal anaesthesia. Patients were kept nil per oral for 6 hours prior to surgery. With the patient positioned supine, the operative site was prepared and draped following strict aseptic precautions. A standard inguinal incision was made and extended through the tissue planes. The external oblique aponeurosis was incised in the direction of its fibres, after which the spermatic cord was identified and adequately mobilized. In cases of direct inguinal hernia, reinforcement of the posterior wall was performed. For indirect hernias, the hernial sac was carefully dissected, its contents reduced, and the excess sac was excised.

The conjoint tendon was approximated to the inguinal ligament using continuous sutures with 2-0 Prolene. Subsequently, the upper and lower flaps of the external oblique aponeurosis were sutured posterior to the spermatic cord with 2-0 Prolene, ensuring sufficient space for the cord structures. Closure of the subcutaneous tissue and skin was performed in layers using standard surgical methods.

Postoperatively, patients were administered appropriate analgesics and antibiotics, and early ambulation was encouraged. Follow-up evaluations were conducted at 1 month, 3 months, and 6 months, and annually thereafter.

Study outcomes: The outcomes assessed included postoperative pain measured using the Visual Analogue Scale (VAS), length of hospital stay, postoperative complications such as wound infection and seroma formation, recurrence during the follow-up period, and the time required for patients to resume work and routine daily activities.

RESULTS

The study comprised 100 patients, with a clear male predominance (84%) compared to females (16%). The mean age of the participants was 52.12 ± 17.2 years, ranging from 21 to 85 years. Most patients were in the age group of 41–50-years (68%), followed by those aged 51–60 years (32%). The average duration of follow-up was 3.5 ± 0.6 years. The mean length of hospital stay was 4.6 ± 1.8 days. During the follow-up period, recurrence was observed in 4% of the patients [Table 1].

Table 1: Demographic and patient characteristics

Variable	Values
Males	84 (84.0)
Females	16 (16.0)
Mean age (years), mean ± SD	52.12 ± 17.2
Mean follow-up duration (years), mean ± SD	3.5 ± 0.6
Mean hospital stays (days), mean ± SD	4.6 ± 1.8

Values were expressed as n (%) unless otherwise stated

Urinary retention was the most common postoperative complication, occurring in 6 patients (6.0%), and was effectively managed with temporary catheterization. Postoperative neuralgia was observed in 5 patients (5.0%) and was treated conservatively using medications or local anesthetic injections. Wound infection and seroma formation were each noted in 3 patients (3.0%) and were managed with appropriate wound care, drainage when indicated, and antibiotic therapy. Superficial hematoma and scrotal edema were seen in 2 patients each (2.0%); these conditions were treated conservatively and resolved without any long-term consequences. Ischemic orchitis was an uncommon complication, reported in 1 patient (1.0%) during the follow-up period. Overall, complications were relatively infrequent, predominantly minor, and were successfully managed without adversely affecting patient outcomes [Table 2].

Table 2: Perioperative and post-operative complications

Complication	n (%)
Urinary retention	6 (6.0)
Wound infection	3 (3.0)
Seroma	3 (3.0)
Hematoma (superficial)	2 (2.0)
Scrotal edema	2 (2.0)
Post-operative neuralgia	5 (5.0)
Recurrence rate	1 (1.0)

DISCUSSION

Inguinal hernia repair continues to be one of the most frequently performed procedures in general surgery, and the choice of an optimal technique remains a subject of debate, particularly in settings with limited resources. This retrospective observational study assessed the safety and

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effectiveness of modification of modified shouldice's other than berliner darn in patients with inguinal hernia. The results indicate that this procedure yields satisfactory clinical outcomes, with low rates of complications and recurrence, supporting its ongoing relevance in present-day surgical practice.

The patient demographics in the present study demonstrated a marked male predominance, with males constituting 84% of the study population. This finding is in agreement with the well-established higher prevalence of inguinal hernia among males, attributed to anatomical factors such as the presence of the spermatic cord and a wider inguinal canal.[3] Similar patterns of male predominance have been documented in multiple Indian and international studies evaluating various inguinal hernia repair techniques.3,13-15 The mean age of patients was 52.12 ± 17.2 years, with most individuals falling within the 41–50-year age group. This distribution corresponds with earlier studies showing an increased incidence of inguinal hernia in middle-aged and elderly populations, likely due to age-related weakening of the abdominal wall and changes in connective tissue integrity.16

The mean follow-up period was 3.5 ± 0.6 years in the current study, and which was sufficient to evaluate both early and late postoperative outcomes, including recurrence. In the current study, a recurrence rate of 4% was observed. Although mesh-based techniques such as Lichtenstein hernioplasty have reported lower recurrence rates of approximately 1–2%, tissue-based repairs remain an important option in selected cases where mesh use is contraindicated, unavailable, or not affordable.[17,18]

Previous studies have emphasized that meticulous surgical technique and adequate reinforcement of the posterior wall are key determinants of success in tissue-based hernia repairs.[19,20] The mean duration of hospital stay in this study was 4.6 ± 1.8 days. Although some reports suggest shorter hospital stays with mesh-based repairs, longer hospitalization following tissue-based procedures is often influenced by institutional practices, patient comorbidities, and socioeconomic factors rather than the surgical method alone.[21]

Postoperative complications observed in this study were few and largely minor. Urinary retention was the most frequent complication, occurring in 6% of patients, which is comparable to reported rates ranging from 0.4% to 22.0% following inguinal hernia repair.[22] Contributing factors may include spinal anesthesia, perioperative fluid administration, and pre-existing prostatic enlargement. All cases were managed conservatively without the need for surgical intervention. Wound infection and seroma formation were each noted in 3% of patients. Comparable findings have been reported by Aziz et al. for modified Bassini repair, while Khatami et al. documented a wound infection rate of 6.8%, and Kumar et al. reported wound infection and seroma rates of 10% and 7.5%, respectively, following open hernia repairs.23-25 The relatively low incidence of surgical site infection in the present study may be attributed to the absence of mesh, as mesh implantation has been associated with a higher risk of chronic infection in certain clinical settings.[26]

Superficial hematoma and scrotal edema were each observed in 2% of patients and resolved with conservative treatment. Ischemic orchitis was an uncommon complication, reported in only one patient (1%) during follow-up. The low incidence of this complication suggests careful handling of spermatic cord structures and strict adherence to standard surgical principles.

Overall, the results of this study indicate that the above mentioned procedure is a safe and effective option for inguinal hernia management in appropriately selected patients. The acceptable recurrence rate, low complication profile, and cost-effectiveness observed in this study support its continued use as a dependable alternative in suitable clinical situations.

Certain limitations must be acknowledged. As a retrospective observational study, it is subject to inherent biases associated with record-based data collection. The lack of a comparative group undergoing mesh-based repair limited direct comparison between surgical techniques. Furthermore, being a single-center study, the findings may not be fully generalizable to other populations or healthcare settings.

CONCLUSION

Modification of modified shouldice's other than berliner darn was shown to be a safe and effective technique for the treatment of inguinal hernia, with acceptable complication and recurrence rates. When performed with appropriate patient selection and meticulous surgical technique, the procedure results in favorable postoperative outcomes and manageable complications become a valuable alternative in selected patients. Its reliability and cost-effectiveness make it particularly well suited for use in resource-limited settings.

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