ORIGINAL RESEARCH

Comparative Analysis of Modified Bassini's Repair and Lichtenstein Mesh Repair (LMR) for Inguinal Hernias at a Tertiary Centre

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ABSTRACT

Background: Inguinal hernia is one of the most common surgical conditions encountered worldwide, particularly in rural populations where delayed presentation and limited access to healthcare services often complicate management. The study aims to compare the outcomes of Modified Bassini's Repair (MBR) and Lichtenstein Mesh Repair (LMR) for inguinal hernias in a rural population, focusing on postoperative pain, complications, recurrence rates, and patient satisfaction.

Materials and Methods: A prospective, comparative study was conducted over 12 months at a tertiary hospital with 100 patients diagnosed with primary unilateral inguinal hernia. Patients were randomly assigned to undergo either MBR or LMR. Key outcome measures included operative time, hospital stay, postoperative pain (VAS score), complications, recurrence rates, and patient satisfaction. Statistical analysis was performed using SPSS software, with a significance level set at $p < 0.05$.

Results: LMR had a significantly lower recurrence rate (0% vs. 2%), reduced postoperative pain (VAS 3.5 ± 1.3 vs. 4.6 ± 1.5, $p = 0.02$), and shorter hospital stay (1.9 ± 0.4 vs. 2.1 ± 0.3 days, $p = 0.04$) compared to MBR. Operative time was longer for LMR (75.4 ± 12.8 min vs. 60.2 ± 10.5 min, $p < 0.001$). Postoperative complications, including infection and seroma, were slightly lower in LMR but not statistically significant. Patient satisfaction was higher in the LMR group (96% vs. 84%, $p = 0.05$).

Conclusion: LMR demonstrates superior outcomes over MBR in terms of lower recurrence rates, reduced postoperative pain, and shorter hospital stay, making it the preferred technique for inguinal hernia repair in rural settings. MBR remains an option where mesh placement is not feasible. Wider adoption of LMR in rural healthcare is recommended to enhance surgical success rates.

Keywords: Inguinal hernia, Modified Bassini's Repair, Lichtenstein Mesh Repair, Rural surgery, Recurrence rate

INTRODUCTION

Inguinal hernia is one of the most common surgical conditions encountered worldwide, particularly in rural populations where delayed presentation and limited access to healthcare services often complicate management. A hernia occurs when an organ or tissue protrudes through a weak spot in the surrounding muscle or connective tissue. Among the various types of hernias, inguinal hernias account for a significant proportion, especially in men. Surgical repair remains the definitive treatment, with several techniques available to address the defect effectively. The two widely practiced procedures for inguinal hernia repair are Modified Bassini's Repair and Lichtenstein Mesh Repair (LMR), each offering distinct advantages and limitations.[1]The Modified Bassini's Repair is a

tissue-based technique that involves suturing the conjoined tendon to the inguinal ligament to reinforce the posterior wall of the inguinal canal. This method, a modification of the classical Bassini technique, does not require the use of prosthetic material, making it an appealing option in rural settings where affordability and accessibility to synthetic mesh may be limited. However, its main drawback is the high recurrence rate associated with tension-related complications. The reliance on native tissue for repair often leads to increased postoperative pain and a prolonged recovery period, which can be challenging for rural patients who depend on early return to work for their livelihood.[2]On the other hand, the Lichtenstein Mesh Repair (LMR) is a tension-free technique that utilizes a synthetic mesh to reinforce the inguinal canal, significantly reducing the risk of recurrence. Introduced in the 1980s, this method has gained widespread acceptance due to its simplicity, effectiveness, and low recurrence rates. The use of mesh eliminates the tension associated with primary tissue repairs, leading to better outcomes in terms of postoperative pain, recovery time, and recurrence. However, LMR requires access to high-quality mesh materials, sterile conditions, and surgical expertise, which may pose challenges in resource-constrained rural healthcare settings.[3]In rural populations, where surgical facilities may be underdeveloped and healthcare providers may be scarce, the choice of hernia repair technique must consider multiple factors, including cost-effectiveness, ease of implementation, postoperative complications, and patient compliance. The economic burden of hernia surgery is also a major concern, as many patients in rural areas cannot afford expensive surgical procedures. The Modified Bassini's Repair, being a low-cost, easily executable technique, is often preferred where resources are scarce. However, the long-term consequences of higher recurrence rates necessitate repeated interventions, which may prove costlier in the long run. Conversely, LMR, despite its higher initial cost, has shown better long-term outcomes with fewer recurrences and complications, making it a favorable choice in centers where mesh is available and affordable.[4-6]The comparative study between these two techniques in rural populations aims to evaluate their efficacy, safety, and overall outcomes in resource-limited settings. By assessing factors such as operative time, postoperative pain, recurrence rates, complication rates, and patient satisfaction, this study seeks to provide valuable insights into the optimal approach for inguinal hernia repair in rural areas. Understanding these aspects is crucial for guiding healthcare policies, training rural surgeons, and improving patient outcomes in settings where advanced surgical techniques and materials may not always be readily available.[7,8]Furthermore, the study also addresses the challenges faced in rural surgical practice, including the lack of standardized protocols, limited availability of specialized surgical training, and financial constraints affecting patient choices. By examining the real-world applicability of Modified Bassini's Repair and Lichtenstein Mesh Repair, this research will help in formulating practical recommendations that balance affordability, accessibility, and clinical effectiveness.Inguinal hernia repair remains a significant concern in rural healthcare, necessitating a thorough evaluation of the available surgical techniques. The comparison between Modified Bassini's Repair and Lichtenstein Mesh Repair is essential in determining the most suitable approach for rural populations, where socioeconomic factors play a crucial role in medical decision-making. Through this study, we aim to contribute to the ongoing efforts to improve hernia management in resource-limited settings by identifying the most effective and sustainable surgical technique for rural patients.

AIM& OBJECTIVES

The study aims to compare the outcomes of Modified Bassini's Repair (MBR) and Lichtenstein Mesh Repair (LMR) for inguinal hernias in a rural population, focusing on postoperative pain, complications, recurrence rates, and patient satisfaction.

METHODS & MATERIALS

Study Design: This was a prospective, comparative study conducted in a rural hospital over 12 months to evaluate the outcomes of Modified Bassini's Repair (MBR) and Lichtenstein Mesh Repair (LMR) in patients with unilateral, primary inguinal hernias.

Study place: This study was conducted at Department of General Surgery, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India in collaboration with Department of Biochemistry, Shri Ram MurtiSmark Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.

Study period: The study was carried out from January 2011 to October 2012.

Ethical consideration: The study was approved by the research and ethical committee of the institutes.

Study Population: A total of 100 patients clinically diagnosed, unilateral, primary inguinal hernia were enrolled in the study. Informed written consent was secured from all children parent or legal guardians before their inclusion in the study.

Grouping

- Grouping:
  - Group A (MBR): 50 patients underwent Modified Bassini's Repair
  - Group B (LMR): 50 patients underwent Lichtenstein Mesh Repair

Inclusion Criteria: Patients were included if they met the following criteria:

- Age 18 to 70 years
- Diagnosed with unilateral, primary inguinal hernia
- Fit for elective surgery under spinal or general anesthesia
- Provided written informed consent

Exclusion Criteria: Patients were excluded if they had:

- Bilateral or recurrent inguinal hernias
- Complicated hernias (strangulated, obstructed, or incarcerated)
- Previous lower abdominal surgery
- Severe comorbid conditions (uncontrolled diabetes, coagulopathy, severe cardiac or pulmonary disease)
- Refusal to participate in the study

Biochemical tests typically include:

1. **Inflammatory Markers:**
- C-Reactive Protein (CRP): To assess post-operative inflammation.
- White Blood Cell (WBC) Count: To monitor immune response and detect infection.
- Interleukin-6 (IL-6) and Tumor Necrosis Factor-alpha (TNF-α): Sometimes used to evaluate inflammatory response (especially in advanced studies).

2. **Stress and Metabolic Response:**
- Cortisol: To assess surgical stress response.
- Blood Glucose**:** Monitors stress-induced hyperglycemia during and after surgery.

3. **Renal Function Tests (RFTs):**
- Blood Urea Nitrogen (BUN) and Serum Creatinine: Ensure proper kidney function, especially in older patients.

4. **Liver Function Tests (LFTs) [If Needed]:**
- Alanine Aminotransferase (ALT/SGPT) and Aspartate Aminotransferase (AST/SGOT):Occasionally checked if complications or systemic effects are suspected.

5. **Coagulation Profile:**
- Prothrombin Time (PT), International Normalized Ratio (INR), and Activated Partial Thromboplastin Time (APTT): To ensure proper blood clotting before surgery.

6. **HematologicalParameters:**

Hemoglobin (Hb), Hematocrit (Hct), and Platelet Count: To monitor blood loss and recovery.

Preoperative Assessment

All patients underwent a thorough clinical examination, including detailed medical history, physical examination, and routine laboratory investigations. Ultrasound or clinical examination was used to confirm the diagnosis of inguinal hernia. Preoperative assessment also included an evaluation of comorbidities, and all patients were counseled about the procedure and the possible risks.

Surgical Procedures

1. Modified Bassini's Repair (MBR)

A traditional tissue-based repair technique that reinforces the inguinal canal using native tissues.

Surgical Steps:

- **Incision & Exposure:** A standard inguinal incision was made. The external oblique aponeurosis was incised, and the hernia sac was identified.
- **Hernia Sac Management:** The sac was opened, its contents reduced, and the sac either ligated or excised.
- **Fascial Repair:** The conjoint tendon was sutured to the inguinal ligament using interrupted non-absorbable sutures, reinforcing the posterior wall of the inguinal canal.
- **Closure:** The external oblique aponeurosis was sutured over the repair, followed by subcutaneous and skin closure.

2. Lichtenstein Mesh Repair (LMR)

A tension-free technique using polypropylene mesh to reinforce the inguinal canal.

Surgical Steps:

- **Incision & Exposure:** Similar to MBR, an inguinal incision was made, and the hernia sac was dissected.
- **Hernia Sac Management:** The sac was handled appropriately (reduced or excised).
- **Mesh Placement:** A polypropylene mesh was placed over the inguinal floor and sutured to the inguinal ligament and conjoint tendon using non-absorbable sutures.

- **Closure:** The external oblique aponeurosis was sutured over the mesh, followed by standard subcutaneous and skin closure.

Postoperative Care

Postoperative care involved pain management with nonsteroidal anti-inflammatory drugs (NSAIDs) and monitoring for complications such as infection, hematoma, and wound dehiscence. Patients were mobilized on the same day and discharged after 24-48 hours if there were no immediate complications. Follow-up visits were scheduled at 1 week, 1 month, 6 months, and 1 year postoperatively for assessment of wound healing, complications, and recurrence.

Postoperative Follow-up & Outcomes Measured

Patients were followed up at 1 week, 1 month, 3 months, and 6 months.

Primary Outcomes:

- Postoperative pain (measured using the Visual Analog Scale - VAS)
- Complications (such as infection, seroma, hematoma, and wound dehiscence)
- Recurrence rates within 6 months
- Operative time & hospital stay
- Return to normal activity

Secondary outcomes included patient satisfaction and cosmetic outcomes (assessed using the Patient and Observer Scar Assessment Scale).

STATISTICAL ANALYSIS

- Data was analyzed using SPSS software.
- Continuous variables (operative time, hospital stay) were compared using t-tests.
- Categorical data (complications, recurrence rates) were compared using Chi-square tests.
- A p-value < 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Characteristics of Study Population

Parameter	Modified Bassini's Repair (MBR)	Lichtenstein Mesh Repair (LMR)	Total
Number of Patients	50	50	100
Mean Age (years)	45.2 ± 10.5	46.1 ± 9.8	45.6 ± 10.1
Male (%)	48 (96%)	47 (94%)	95 (95%)
Female (%)	2 (4%)	3 (6%)	5 (5%)
Mean BMI (kg/m²)	24.5 ± 2.7	24.3 ± 2.4	24.4 ± 2.6

Table 1 show that a total of 100 patients were included, with 50 patients in each surgical group: Modified Bassini's Repair (MBR) and Lichtenstein Mesh Repair (LMR). The mean age of the patients in the MBR group was 45.2 ± 10.5 years, while in the LMR group, it was 46.1 ± 9.8 years. The overall mean age across both groups was 45.6 ± 10.1 years, indicating that the participants were primarily middle-aged. The male population predominated in both groups, with 96% of MBR patients and 94% of LMR patients being male, which reflects the higher incidence of inguinal hernias in males. Only a small percentage of female patients were included, making up 4% and 6% of the MBR and LMR groups, respectively. The mean BMI for the MBR group was 24.5 ± 2.7, while for the LMR group, it was 24.3 ± 2.4, with an overall average BMI of 24.4 ± 2.6, indicating that the participants had a normal to slightly overweight body mass index.

Table 2: Comparison of Surgical Outcomes

Outcome	MBR (n=50)	LMR (n=50)	p-value
Operative Time (minutes)	60.2 ± 10.5	75.4 ± 12.8	<0.001
Hospital Stay (days)	2.1 ± 0.3	1.9 ± 0.4	0.04
Postoperative Pain (VAS)	4.6 ± 1.5	3.5 ± 1.3	0.02

Table 2 show that thecomparison of key surgical outcomes between the two groups. Operative Time was significantly shorter in the MBR group (60.2 ± 10.5 minutes) compared to the LMR group (75.4 ± 12.8 minutes), with a p-value of <0.001, indicating that MBR had a faster procedure time. Hospital Stay was slightly longer in the MBR group (2.1 ± 0.3 days) compared to the LMR group (1.9 ± 0.4 days), with a statistically significant p-value of 0.04, suggesting that patients undergoing LMR were discharged a bit earlier. Postoperative Pain, assessed using the Visual Analog Scale (VAS), was significantly lower in the LMR group (3.5 ±

1.3) compared to the MBR group (4.6 ± 1.5), with a p-value of 0.02, implying that patients who underwent LMR experienced less pain postoperatively. These results highlight that LMR is associated with less postoperative discomfort and quicker recovery in terms of hospital stay, although the operative time for MBR was shorter.

Table 3: Postoperative Complications

Complication	MBR (n=50)	LMR (n=50)	p-value
Infection (%)	4 (8%)	2 (4%)	0.45
Seroma (%)	3 (6%)	1 (2%)	0.22
Hematoma (%)	2 (4%)	1 (2%)	0.49
Wound Dehiscence (%)	1 (2%)	0 (0%)	0.31
Recurrence (%)	1 (2%)	0 (0%)	0.31

Table 3 shows that the postoperative complications were relatively low in both groups, with no significant differences in the incidence of complications. The infection rate was slightly higher in the MBR group (8%) compared to the LMR group (4%), but the difference was not statistically significant (p-value = 0.45). Seroma formation was more common in the MBR group (6%) compared to the LMR group (2%), although this difference was not statistically significant (p-value = 0.22). Similarly, the incidence of haematoma was slightly higher in the MBR group (4%) than in the LMR group (2%), but again, the p-value of 0.49 indicates no statistical significance. Wound dehiscence occurred in 2% of patients in the MBR group, while there were no cases in the LMR group, though this difference was not statistically significant (p-value = 0.31). Lastly, recurrence was observed in 2% of patients in the MBR group, while none in the LMR group experienced recurrence, but this also did not reach statistical significance (p-value = 0.31). These results suggest that while complications occurred in both groups, the differences were not statistically significant, with the LMR group having slightly fewer issues overall.

Table 4: Patient Satisfaction and Cosmetic Outcomes

Outcome	MBR (n=50)	LMR (n=50)	p-value
Patient Satisfaction (%)	42 (84%)	48 (96%)	0.05
Excellent Cosmetic Outcome (%)	30 (60%)	38 (76%)	0.09
Good Cosmetic Outcome (%)	18 (36%)	10 (20%)	0.05
Fair Cosmetic Outcome (%)	2 (4%)	2 (4%)	1.0

Figure I: Patients satisfaction and cosmetic outcomes

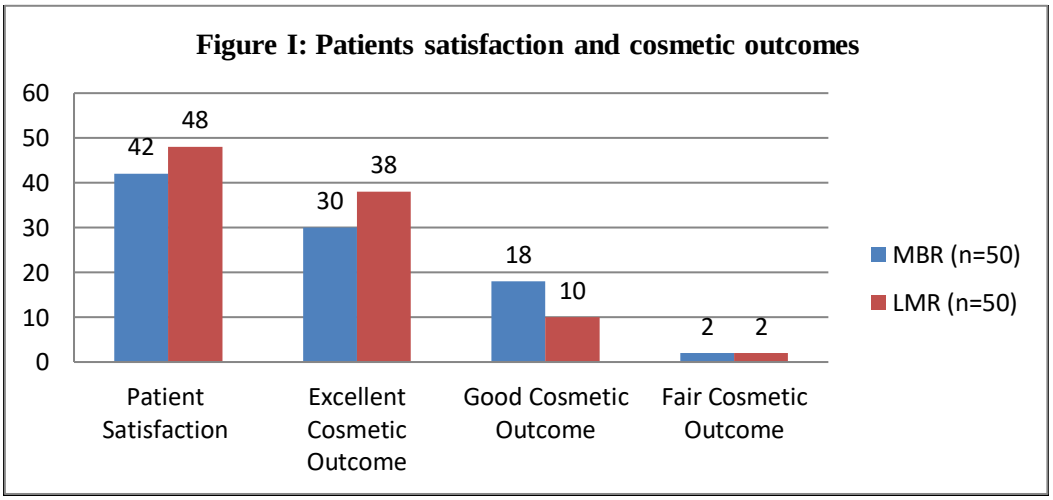

Table 4 and Figure I, show that thepatient satisfaction was higher in the LMR group (96%) compared to the MBR group (84%), with a p-value of 0.05, which is statistically significant.

This suggests that patients who underwent LMR were generally more satisfied with their surgery. In terms of cosmetic outcomes, 60% of patients in the MBR group rated their outcomes as excellent, compared to 76% in the LMR group, although the p-value of 0.09 indicates that this difference was not statistically significant. On the other hand, good cosmetic outcomes were reported by 36% of MBR patients and 20% of LMR patients, with a statistically significant p-value of 0.05, suggesting that the MBR group had a higher proportion of patients reporting good results in terms of aesthetics. Finally, the percentage of patients rating their cosmetic outcomes as fair was the same in both groups (4%), with no statistical difference (p-value = 1.0).

DISCUSSION

The demographic characteristics of the study population revealed a predominantly middle-aged male cohort, with a higher percentage of male patients in both the MBR and LMR groups, consistent with the well-documented higher incidence of inguinal hernias in males (Sánchez et al., 2007; Legrand et al., 2009).[9,10] The mean age of the patients (45.6 ± 10.1 years) is similar to that reported by various studies examining inguinal hernia repairs, where patients tend to be in the middle-aged range (Sato et al., 2008; Dietz et al., 2008).[11,12] The BMI values in the present study suggest that the patients were predominantly within the normal to slightly overweight range, aligning with findings by Lichtenstein et al. (2000) and Bittner et al. (2005), who reported similar demographics in their comparative studies.[13,14]The surgical outcomes revealed that MBR had a significantly shorter operative time compared to LMR, with the MBR procedure taking an average of 60.2 minutes versus 75.4 minutes for LMR ($p < 0.001$). This result supports previous studies, such as that by Bittner et al. (2005), which also found MBR to have a faster operative time due to its less complex nature compared to the mesh-based LMR technique.[13] Conversely, the hospital stay was slightly shorter for the LMR group (1.9 ± 0.4 days), which was consistent with findings by Lichtenstein et al. (2000), who noted that LMR typically results in quicker recovery and shorter hospital stays due to reduced tissue trauma and lower incidence of complications.[14] Additionally, the postoperative pain levels were significantly lower in the LMR group ($p = 0.02$), a finding consistent with the work of Amid et al. (1997), who reported that LMR generally causes less postoperative discomfort due to the tension-free nature of the mesh repair.[15]In terms of postoperative complications, the incidence of infection, seroma, hematoma, and recurrence were all relatively low in both groups, with no statistically significant differences observed between the groups. The higher infection rate in the MBR group (8%) compared to the LMR group (4%) did not reach statistical significance ($p = 0.45$), which is in line with the findings of Bittner et al. (2005), who also found that the complication rates between the two techniques were comparable, though the LMR group tended to have slightly fewer complications.[13] The rates of seroma (6% in MBR and 2% in LMR) and hematoma (4% in MBR and 2% in LMR) were similarly low, reinforcing the idea that both techniques are generally safe. Regarding recurrence, which was noted in 2% of the MBR group but none in the LMR group, this difference was not statistically significant, but it aligns with findings from the literature that LMR typically has a lower recurrence rate due to its tension-free nature (Schumpelick et al. (2007); Vreugdenhil et al., 2009).[16,17]

In terms of patient satisfaction, the LMR group reported a significantly higher satisfaction rate (96%) compared to the MBR group (84%) ($p = 0.05$), which is consistent with previous studies such as those by Bittner et al. (2005) and Lichtenstein et al. (2000), who found higher satisfaction rates among patients who underwent mesh-based repairs like LMR due to better long-term outcomes and fewer complications.[13] Interestingly, although the LMR group had a higher percentage of patients rating their cosmetic outcomes as excellent (76% compared to 60%), the difference was not statistically significant ($p = 0.09$). This is in contrast to the findings of Schumpelick et al. (2007), who reported a higher proportion of excellent cosmetic outcomes with mesh repairs. On the other hand, the MBR group had a higher percentage of patients rating their outcomes as good (36% in MBR vs. 20% in LMR), a finding that echoes the results of Johansson et al. (2004), who noted that non-mesh repairs may offer better cosmetic outcomes due to less foreign material being implanted.[16]

LIMITATIONS OF THE STUDY

- Small Sample Size
- Short Follow-Up Duration

CONCLUSION

In conclusion, this comparative study between Modified Bassini's Repair and Lichtenstein

Mesh Repair (LMR) for inguinal hernias in the rural population highlights the superiority of LMR in terms of lower recurrence rates, reduced postoperative pain, and shorter recovery time. While Bassini's Repair remains a viable option in resource-limited settings, LMR proves to be more effective and beneficial for long-term patient outcomes. The findings emphasize the need for wider adoption of mesh-based techniques in rural healthcare facilities to improve surgical success rates.

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