



SELF GRIPPING MESH IN LAPAROSCOPIC TRANSABDOMINAL PREPERITONEAL MESH REPAIR (TAPP): EFFICACY AND OUTCOME.

Dr. Ashish Dagwar^{1*}, Dr. Rajendra Anantprasad Ganeriwal², Dr. Milind Bhojram Lanjewar³

^{1*} Associate Professor at Dept. of General Surgery, Dr Rajendra Gode Medical College, Amravati and Consultant at Galaxy Surgical & Laparoscopy Hospital, Amravati, Email id – drashishdagwar@gmail.com

² Assistant Professor at Dept. of General Surgery, Dr Rajendra Gode Medical College Amravati, Email id- rageneriwal@yahoo.in

³ Junior Resident at Dept. of General Surgery, Dr. Panjabrao Alias Bhausaheb Deshmukh Memorial Medical College, Amravati Email id- milindlanjewar7@gmail.com

***Corresponding Author:** Dr. Ashish Dagwar

*Dept. of General Surgery, Dr Rajendra Gode Medical College, Amravati and Consultant at Galaxy Surgical & Laparoscopy Hospital, Amravati, Email: drashishdagwar@gmail.com

ABSTRACT:

Background: Inguinal hernia is a prevalent condition worldwide, with an incidence of 10-15%. Among groin hernias, approximately 75% are inguinal hernias. Recent advancements in laparoscopic techniques, especially endoscopic repairs, have demonstrated improved quality of life, shorter hospital stays, and quicker recovery times. The development of self-gripping mesh has enabled sutureless mesh fixation, aiming to minimize chronic postoperative pain and reduce operative time.

Objective: This study evaluates the efficacy and surgical outcomes of self-gripping mesh in laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair at a tertiary care hospital.

Materials and Methods: In the present study, a total of 70 patients were included who were presented with inguinal swelling and fit for surgery. Observational parameters included operative duration, postoperative pain, wound complications, and recurrence. We performed follow-up assessments on postoperative day 1, day 7, at 1 month, and at 6 months.

Results: According to the present study finding, around 84% of patients reported being pain-free by 7 days, and by 1 month, nearly all patients (100%) were free from pain. The mean operative time was 32.5± 8.5 minutes. The use of self-gripping mesh significantly reduced the time required for mesh fixation compared to conventional suture techniques.

Conclusion: The present study highlighted that, self-gripping mesh is a safe, efficient, and effective option for laparoscopic TAPP inguinal hernia repair. It offers several advantages, including reduced postoperative chronic pain, enhanced general health, improved quality of life, and lower costs associated with fixation devices and pain management. Furthermore, it minimizes the use of tackers, glue, or sutures, contributing to a simpler and faster surgical procedure.

Keywords: Inguinal hernia; Transabdominal preperitoneal; Mesh; Chronic pain; Endoscopic repairs.

Introduction:

Inguinal hernia repair is among the most frequently performed surgical procedures globally, accounting for approximately 10–15% of all surgical interventions, second only to appendectomy. [1,2] Inguinal hernias represent 75% of abdominal wall hernias worldwide, with over 20 million repairs conducted annually. The incidence of these procedures varies between countries, ranging from 100 to 300 per 100,000 individuals annually. [3,4]

A transabdominal preperitoneal approach (TAPP) has emerged as an effective alternative to open hernia repair, particularly when performed by experienced surgeons. [5,6,7] Some previous studies highlighted that, laparoscopic techniques as a preferable option for recurrent and bilateral hernias due to their minimally invasive nature.

Historically, the Lichtenstein open approach, featuring anterior placement of a mesh, was considered the gold standard for inguinal hernia repairs.[5] This technique is cost-effective, facilitates outpatient procedures, and permits the use of local anesthesia while achieving satisfactory outcomes in terms of recurrence rates.[8,9] However, it involves open dissection of the groin and anterior mesh positioning, which can prolong recovery and lead to a higher incidence of groin pain in the early postoperative period and chronic pain syndromes, collectively termed chronic post-herniorrhaphy inguinal pain (CPIP).[7]

In contrast, laparoscopic repair offers posterior placement of the mesh with gentle dissection, minimizing tissue trauma and enabling minimally invasive mesh fixation. In TAPP procedures, mesh fixation has traditionally relied on titanium tacks, although their excessive use has been associated with increased acute postoperative pain. To address this, many surgeons have transitioned to absorbable stitches, sutures, or fibrin glue for mesh fixation. [10,11] Some advocate for no fixation, relying on peritoneal pressure to secure the mesh, thereby potentially reducing pain and complications.[12]

Despite advancements, mesh-related complications such as nerve damage, tissue ischemia, and prolonged postoperative pain persist, largely influenced by the method of mesh fixation.[9] Sutures, commonly employed for anchoring the mesh, may induce significant tissue tension and nerve entrapment, contributing to chronic pain even with absorbable materials. [9,10]

To reduce these challenges, a novel self-gripping mesh, ProGrip, has been developed. This isoelastic, large-pore, lightweight polypropylene mesh features resorbable microgrips for sutureless fixation, promoting healthy tissue integration while reducing operative time and chronic groin pain. ProGrip mesh eliminates the need for sutures, reducing tissue tension and nerve entrapment, thereby offering a promising alternative to conventional fixation techniques. This study aims to evaluate the advantages of ProGrip mesh in minimizing chronic postoperative groin pain and operative time, contributing to improved patient outcomes in inguinal hernia repair.

Methodology:

The present investigation was carried out at a tertiary care hospital after obtaining institutional ethics committee approval and written informed consent form. The investigation included 70 individuals who had inguinal edema and had visited the emergency room or surgical outpatient department between January 2023 and December 2023.

Patient Selection and Assessment

The inclusion criteria for this study included patients who expressed willingness to participate and were assessed as fit for anesthesia. On the other hand, the exclusion criteria comprised patients who were unwilling to participate, pediatric patients, and those deemed unfit for anesthesia. Additionally, cases involving strangulated, obstructed, or irreducible hernias, concurrent femoral hernias, a history of prior pelvic surgery or prostatectomy, and individuals with bleeding disorders were excluded from the study.

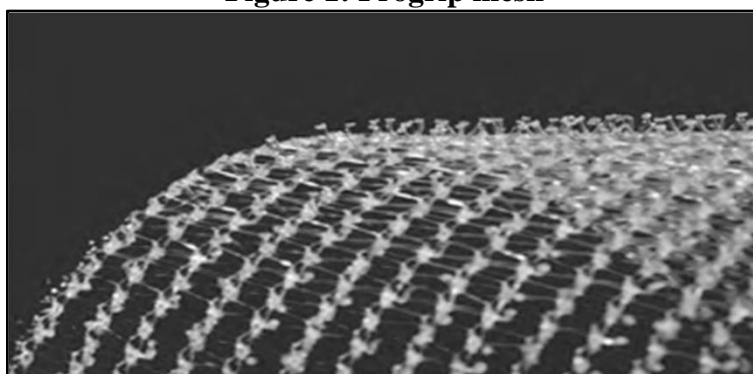
These selected patients had a complete evaluation during admission, which included a thorough clinical examination, tests for diagnosis and a complete medical history. Furthermore, imaging examinations including chest and abdominal radiography, abdominal and pelvic ultrasonography, and

where necessary, computed tomography (CT) scans, routine hematological tests were conducted, such as complete blood counts (CBCs) and urine analyses.

Surgical Technique

The procedure involved laparoscopic repair using a self-fixating Progrid mesh, as shown in Figure 1. This mesh, composed of polyester and polylactic acid microgrips, ensures immediate fixation without requiring sutures, thereby minimizing nerve damage. The mesh density reduces from 75 g/m² at implantation to 38 g/m² after absorption.

Figure 1: Progrid mesh



Operative Steps:

1. Port Placement:

1. A 10–12 mm trocar was inserted via an infraumbilical incision, and the abdomen was insufflated.
2. A 10 mm 30° scope was introduced for visualization of the peritoneal cavity.
3. Two additional trocars (5 mm and 12 mm) were placed laterally at the umbilical level along the midclavicular line, as represented in Figure 2.

2. Diagnostic Laparoscopy:

1. Comprehensive inspection of the abdominal cavity was conducted to identify hernia defects and rule out other pathologies or surgical contraindications.
2. Hernia defects were classified as direct or indirect.

3. Peritoneal Flap Creation:

1. The peritoneal flap was raised using laparoscopic scissors, extending from the anterior superior iliac spine to the medial umbilical ligament.
2. The incision was positioned superiorly to encompass the potential spaces of direct and indirect hernia defects.

4. Hernia Sac Reduction:

1. Structures such as the pubic symphysis, Cooper's ligament, iliopubic tract, and triangle of doom were identified to ensure safe dissection.
2. Gentle traction or electrocautery was applied for reduction, especially in cases involving long indirect sacs

5. Mesh Placement:

1. A 15×10 cm Progrid mesh was rolled, with the gripping surface protected by plastic, and introduced into the preperitoneal space via the infraumbilical trocar.
2. The mesh was unrolled and spread to cover the dissected pocket entirely.
3. Proper positioning of the mesh ensured complete exclusion from the peritoneal cavity.

6. Closure:

1. The peritoneal flap was lifted and secured with 2-0 Vicryl sutures.

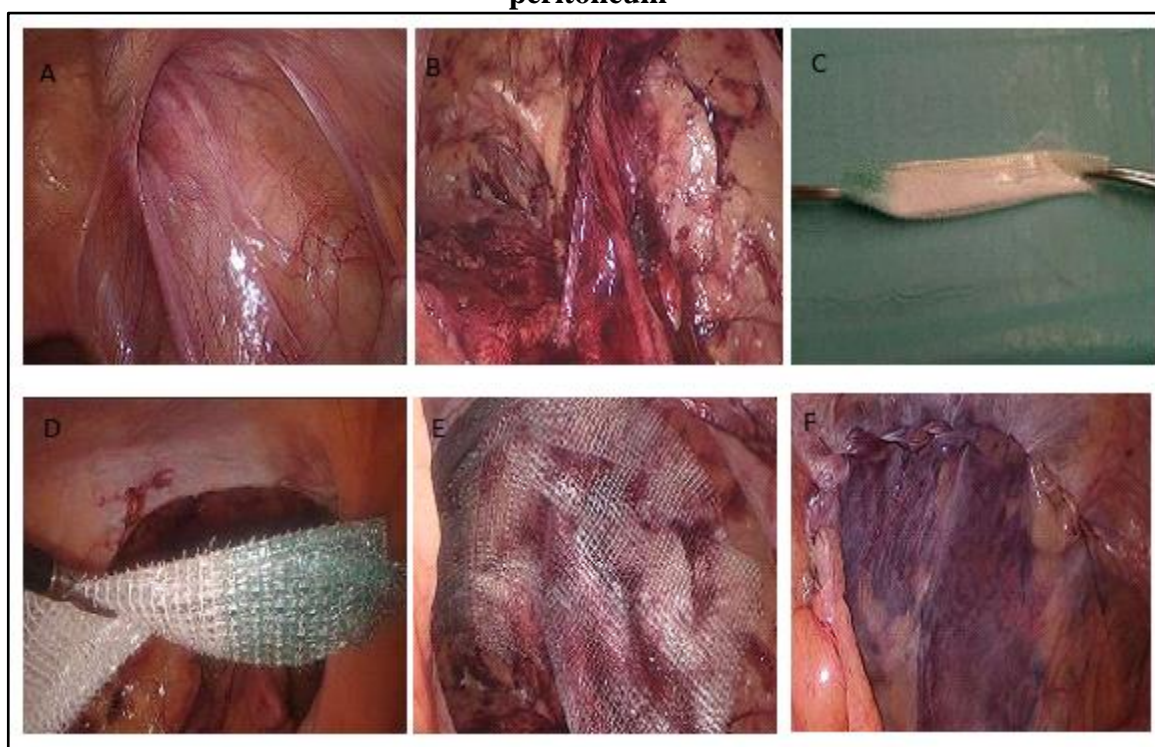
Follow-Up and Outcome Assessment

The postoperative assessments were conducted on day 1, day 7, one month and six months after surgery. The primary outcome measures included the duration of surgery, recurrence of hernia, and pain intensity at each follow-up interval. Pain assessment was standardized using validated scales. This structured protocol ensured a thorough evaluation of the efficacy and safety of the self-fixating mesh in laparoscopic inguinal hernia repair.

Statistical analysis:

Data were entered into Microsoft Excel, and informed consent was obtained from all patients included in the study. A detailed history and general examination were conducted for all participants, and records were meticulously maintained. Statistical analysis was performed using SPSS software at the conclusion of the study. The results were presented as frequencies and percentages.

Figure 2: (A) Showing the right groin with hernia; (B) Situation after termination of dissection; (C) Image of folded self- fixating mesh; (D) Implantation of mesh; (E) Mesh implanted in terminal position after fixation to abdominal wall; (F) Suture of parietal peritoneum



RESULTS:

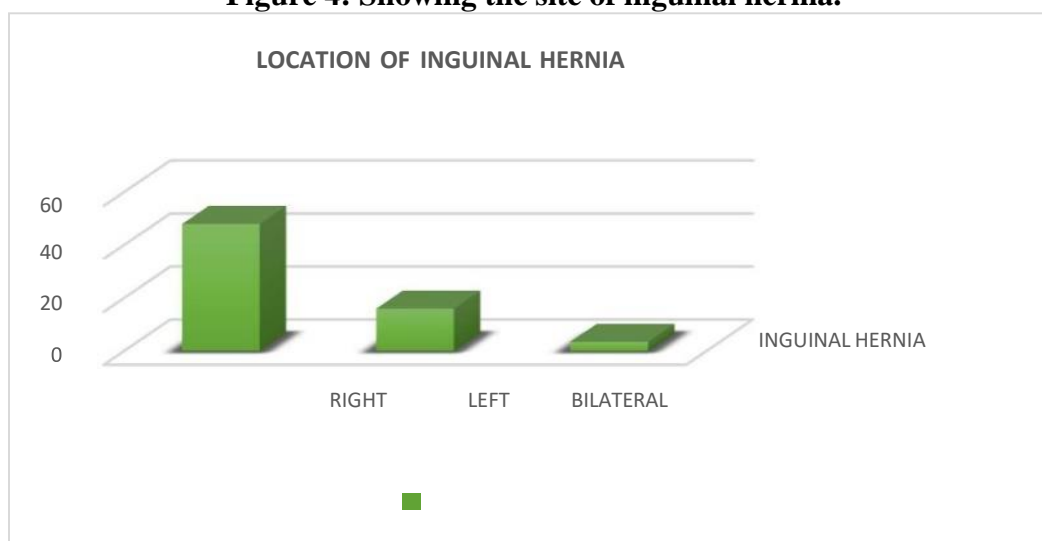
In our study of 70 patients, the highest number of the cases were noted in the age group 40-50 (40%) and only 7% patients were presented in age group 20-30 (7%), as noted in Figure 3.

Figure 3: Showing the age wise distribution of study participants.



Direct type of hernia was observed in 37% of patients and indirect hernia were observed in 62% of patients. Sixty-eight percent of the 70 patients had a right-sided inguinal hernia, twenty-two percent had a left-sided one, and ten percent had a bilateral one, as noted in Figure 4.

Figure 4: Showing the site of inguinal hernia.



VAS scores showed that out of 70 patients, 27% had no or slight pain on the day of surgery and 84% and this number increased to 90% on day seven after surgery. Overall, none of the patients reported severe pain during the entire follow-up, as shown in Table 1.

Table 1: Showing the pain VAS score.

VISUAL ANALOG SCALE	Day 1	Day 7	1 month	6 months
No/ slight pain (<30)	18(27%)	58(84%)	70(100%)	70 (100%)
Moderate pain(30-60)	52(73%)	12(16%)	0	0
Severe pain(>60)	0	0	0	0
PAIN VAS SCORE	32 ± 10.6	17.8 ± 7.3	4.4 ± 5.2	0.67 ± 2.5

Table 2: Postoperative complications and their results in this study:

Postoperative complications	Results
Wound infection (%)	0
Seroma formation (%)	2
Hematoma formation (%)	0
Chronic pain (%)	0
Testicular problems (%)	0
Recurrence rate (%)	0

Following the intervention, 6 months later, there was no recurrence of hernia, no systemic complications, or no death, as noted in Table 2.

DISCUSSION:

Worldwide, inguinal hernia repair is one of the most frequently performed surgical procedures. Despite accounting for approximately 75% of all hernia cases and affecting 3.6% of the general population, the optimal surgical technique for hernia repair is yet to be determined. The ideal hernia repair technique should be straightforward, easy to implement, and align with critical objectives such as minimizing surgical costs, reducing hospital stays, ensuring a swift return to daily activities and work, and lowering recurrence rates.[12] While the incorporation of mesh in hernia repair has significantly reduced recurrence rates to below 5%, the potential for chronic postoperative pain remains a critical challenge. This has raised concerns about how surgical techniques and materials influence postoperative outcomes, including pain and the resumption of daily activities, prompting several investigations into these aspects.

A study by Yilmaz et al. (2013) involving 60 cases demonstrated that patients who underwent repair with Progrid™ self-fixating mesh experienced faster recovery and reduced postoperative pain compared to those repaired with Prolene grafts.[13] Similarly, Chastan et al. (2008), in their analysis of 52 cases followed up over two years, reported an absence of chronic pain and recurrence in patients treated with Progrid™ mesh. Based on these findings, they suggested that this technique could potentially serve as a gold standard for hernia repair (5).

The current study evaluated several key parameters, including patient age, hernia location, postoperative pain (measured using a visual analog scale), operative time, recurrence rates, and wound complications. The findings revealed that 84% of patients were free from pain by postoperative day seven, with nearly all patients (100%) pain-free within one month. The mean operative time was 32.5 ± 8.5 minutes, reflecting the efficiency of self-gripping mesh fixation compared to conventional suture-based techniques. The reduced time required for mesh fixation not only shortened the overall surgical duration but also contributed to improved long-term outcomes.

Moreover, the incidence of wound infections and recurrences was notably low in this study, further supporting the safety and reliability of self-fixating mesh. These advantages, combined with the cost-effectiveness and ease of the procedure, highlight the utility of self-gripping mesh as a recommended approach for both open and laparoscopic inguinal hernia repairs. The findings of the present study comparable with previous research, emphasizing that, inguinal hernia repair using self-fixating mesh is a safe, efficient, and economically viable method when performed by skilled surgeons.[14,15] The reduced operative time, minimal postoperative pain, and favorable long-term outcomes position self-fixating mesh as a valuable technique in the surgical management of inguinal hernias.[16,17] Therefore, its adoption as a standard practice for both open and laparoscopic hernia repairs is strongly supported by the evidence.

CONCLUSION:

The study's conclusions show that self-adhesive mesh is a safe, easy, quick, and efficient technique for laparoscopic transabdominal preperitoneal hernia repair. It improves the overall health and quality of life of patients and lessens persistent postoperative pain. Additionally, it lowers the expenses related to surgical time, pain management, and fixation devices. It lessens the need for sutures, adhesive, and tackers.

References:

1. Primatesta P, Goldacre MJ. Inguinal hernia repair: Incidence of elective and emergency surgery, readmission and mortality. *Int. J Epidemiol.* 1996; 25:835-9.
2. Patino JF. A history of the treatment of hernia. In Nyhus LM, Condon RE, eds. *Hernia* 4th ed, Philadelphia: JB
3. Lippincott, Schumpelick V, Zimmer M. *Atlas of hernia surgery* (eds) (1990). Decker, New York, 1995, 3-15.
4. Lau WY. History of treatment of groin hernia. *World J Surg.* 2002; 26(6):748-59.
5. Agresta F, Torchiario M, Tordin C. Laparoscopic transabdominal inguinal hernia repair in community hospital settings: A general surgeon's last 10 years experience. *Hernia* 2014;18:745-50.
6. Simons MP, Aufenacker T, Bay-Nielsen M, Bouillot JL, Campanelli G, Conze J, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia* 2009;13:343-403.
7. Demetrashvili Z, Querqadze V, Kamkamidze G, Topchishvili G, Lagvilava L, Chartholani T, et al. Comparison of Lichtenstein and laparoscopic transabdominal preperitoneal repair of recurrent inguinal hernias. *Int Surg* 2011;96:233-8.
8. Li J, Ji Z, Li Y. Comparison of mesh-plug and Lichtenstein for inguinal hernia repair: A meta-analysis of randomized controlled trials. *Hernia* 2012;16:541-8.
9. Birk D, Hess S, Garcia-Pardo C. Low recurrence rate and low chronic pain associated with inguinal hernia repair by laparoscopic placement of Parietex ProGrip™ mesh: Clinical outcomes of 220 hernias with mean follow-up at 23 months. *Hernia* 2013;17:313-20.
10. Belyansky I, Tsirlina VB, Klima DA, Walters AL, Lincourt AE, Heniford TB. Prospective, comparative study of postoperative quality of life in TEP, TAPP, and modified Lichtenstein repairs. *Ann Surg* 2011; 254:709–714.
11. Novik B, Hagedorn S, Mörk UB, Dahlin K, Skullman S, Dalenbäck J. Fibrin glue for securing the mesh in laparoscopic totally extraperitoneal inguinal hernia repair: a study with a 40-month prospective follow-up period. *Surg Endosc* 2006; 20:462–467.
12. Taylor C, Layani L, Liew V, Ghosn M, Crampton N, White S. Laparoscopic inguinal hernia repair without mesh fixation, early results of a large randomised clinical trial. *Surg Endosc* 2008; 22:757–762.
13. Dynamic implant for inguinal hernia repair in porcine experimental model. A feasibility study. *Hernia* 2009; 13: S1-332.
14. Ferrarese A, Bindi M, Rivelli M, Solej M, Enrico S, Martino V. Self-gripping mesh versus fibrin glue fixation in laparoscopic inguinal hernia repair: a randomized prospective clinical trial in young and elderly patients. *Open Med (Wars)*. 2016 Nov 26;11(1):497-508.
15. Doden K, Yoshimura T, Iwaki Y, Kato H, Kawaguchi M, Watanabe T. Laparoscopic transabdominal preperitoneal obturator hernioplasty with self-gripping mesh: A case report with operative video. *International Journal of Surgery Case Reports*. 2021;89106657
16. Kirov KG, Mihaylov DM, Arnaudov SS. Is the self-adhesive mesh a solution for chronic postoperative inguinal pain after TAPP: A single centre preliminary experience? *J Minim Access Surg.* 2024 Apr 1;20(2):216-221
17. Sankar T, Ahmad S, C S, Ananthasayanam JR. Assessment of Clinical Outcomes of Sutured Versus Sutureless Self-Gripping Polyester Mesh in Patients With Uncomplicated Indirect Inguinal Hernia in a Tertiary Care Hospital. *Cureus.* 2024 Aug 14;16(8):e66896.