International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Clinical Outcomes of Use of Self-Gripping Semi-Absorbable Mesh in Inguinal Hernia Repair: A Descriptive Study, General Surgery

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Abstract: ***Background: Lichtenstein tension-free mesh hernioplasty is the most commonly used technique for the open repair of inguinal hernia. The common surgical concern is mesh fixation and post- operative pain. The aim of this study was to report the clinical outcomes using self-gripping semi absorbable mesh. Methods: Sixty (60) patients (inguinal hernias) underwent open Lichtenstein hernia repair with Progrip Covidien mesh. Patient pain as measured by visual analogue scale (VAS) in post op period and subsequently on follow-up. Clinical evaluation, with careful attention to the identification of hernia recurrence and post-operative pain was performed after 1 month, 3 month, 6 month and 1 year. The evaluation of fixation precision, quality of fixation and ease of use was assessed by the primary surgeon. Results: Of 60 cases, 17 (28.3%) had good fixation and 43 (71.7%) had very good fixation accuracy, 9 (15.0%) had good quality of grip and 51 (85.0%) had very good quality of grip, 1 (1.7%) had bad manipulability, 30 (50.0%) had good manipulability and 29 (48.3%) had very good manipulability. Distribution of mean ± SD of post-op hospital stay in the study group was 3.3 ± 0.79 days and the minimum – maximum range of duration of hospital stay was 2 – 5 days. Of 60 cases, 2 (3.3%) had induration and 58 (96.7%) did not have induration, none had incidence of seroma / hematoma. Distribution of mean ± SD of duration to return to work in the study group was 17.20 ± 1.63 days and the minimum – maximum range of duration to return to work was 14 – 24 days. Of 60 cases, none had incidence of recurrence. Distribution of mean pain score at 1-month, 6-month and 12-month post-op follow-ups is significantly higher compared to mean pain score at 1-week post-op follow-up (P-value<0.001 for all). Conclusion: The use of a low-density, macroporous mesh with semi-resorbable self-gripping properties during tension-free repair may be a satisfactory solution to the clinical problems of pain and recurrence following inguinal hernia repair.***

Keywords: Inguinal hernia – Lichtenstein technique, Semi-absorbable mesh, lightweight mesh

1. Introduction

The Lichtenstein tension free mesh hernioplasty technique has become the procedure of choice for open inguinal hernia repair(1). The technique is easy to learn and carries a very low recurrence rate [1-3]. Most commonly used biomaterialis a monofilament polypropylene mesh, published results on other primary mesh materials have also demonstrated safe and efficient results [4]. Some suggest that the use of high density, microporous (or "heavyweight") polypropylene meshes have been reported to stimulate inflammatory reactions, which may be responsible for adverse mesh shrinkage, as scar tissue develops [5, 6]. Low-weight polypropylene mesh might be more appropriate in this respect [7, 8]. Some concern has arisen regarding chronic post hernia repair pain and the suture fixation of the mesh as used in the Lichtenstein procedure [9]. Some authors have recommended the use of light weight macro porous meshes and advocate limiting the extent of fixation and/or the use of non-compressive absorbable devices [10-13]. A low-density, macro porous polypropylene mesh with self-gripping properties was used for tension-free open hernia repair to address concerns over postoperative pain [14, 15]. The aim is to study clinical outcomes with 1-yearfollow- up after open inguinal hernia repair using this innovative mesh.

2. Materials and Methods

This study is a descriptive study conducted between August 2017 and Aug 2019. All patients of inguinal hernia taken up for mesh hernioplasty in a tertiary care hospital were included in the study based on the inclusion and exclusion criteria as defined.

Inclusion Criteria

- All patients with primary unilateral inguinal hernia.
- All patients >18yrs of age
- All patients who give consent for surgery and follow up.

Exclusion Criteria

- Patients with recurrent inguinal hernia.
- Patients who will undergo laparoscopic hernia repair.

3. Results

3.1 Statistical Analysis

Table 1: Age distribution of cases studied.

Age Group (years)	No. of cases	% of cases
30 – 39	4	6.7
40 – 49	8	13.3
50 – 59	25	41.7
60 – 70	23	38.3
Total	**60**	**100.0**

Of 60 cases studied, 4 (6.7%) had age between 30 – 39 years, 8 (13.3%) had age between 40 – 49 years, 25 (41.7%) had age between 50 – 59 years and 23 (38.3%) had age between 60 – 70 years.

Mean ± SD of age of cases studied in the entire study group was 55.7 ± 8.6 years and the minimum – maximum age

range was 30 – 70 years.

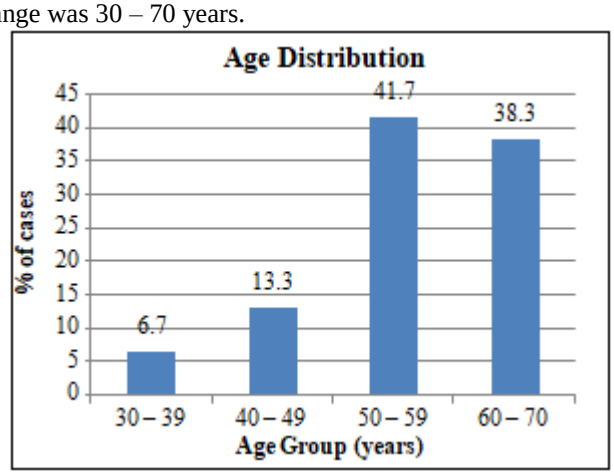

Figure 1: Age distribution of cases studied.

Table 2: Sex distribution of cases studied.

Sex	No. of cases	% of cases
Male	60	100.0
Female	0	0.0
Total	60	100.0

The study included all men.

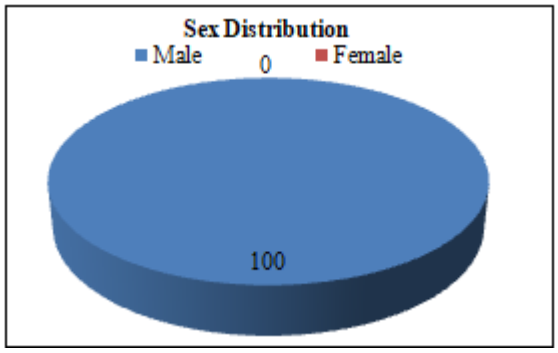

Figure 2: Sex distribution of cases studied

Table 3: Distribution of side involved among the cases studied

Side	No. of cases	% of cases
Right	46	76.7
Left	14	23.3
Total	**60**	**100.0**

Of 60 cases studied, 46 (76.7%) had right side involved and 14 (23.3%) had left side involved in the study group.

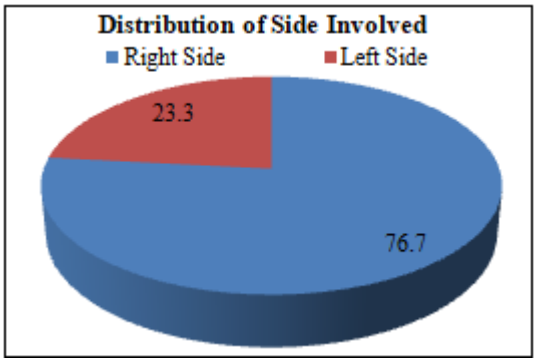

Figure 3: Distribution of side involved among the cases studied.

Intra OP Assessment

By operating surgeon:

Table 4: Distribution of time taken for deployment of mesh among the cases studied.

Time (Mins)	No. of cases	% of cases
5-min	24	40.0
6-min	31	51.7
7-min	4	6.7
>7min	1	1.7
Total	**60**	**100.0**

Of 60 cases studied, 24 (40.0%) had 5-min, 31 (51.7%) had 6-min, 4 (6.7%) had 7-min and 1 (1.7%) had more than 7-min time for deployment of mesh in the study group.

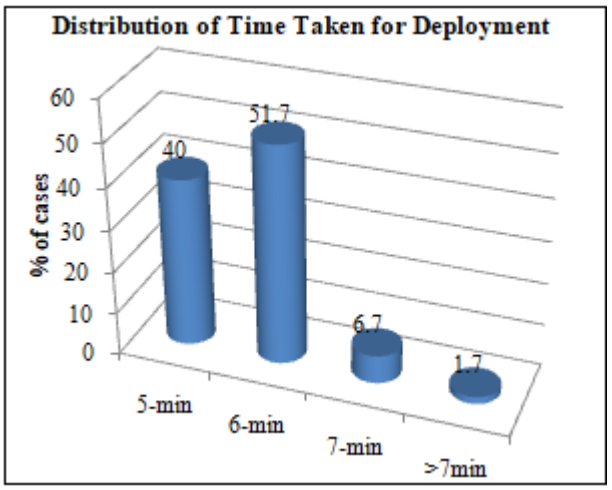

Figure 4: Distribution of time taken for deployment of mesh among the cases studied

Table 5: Distribution of surgeon's perception on fixation accuracy

Fixation accuracy	No. of cases	% of cases
Good	17	28.3
Very Good	43	71.7
Total	**60**	**100.0**

Of 60 cases studied, 17 (28.3%) had good fixation accuracy and 43 (71.7%) had very good fixation accuracy in the study group.

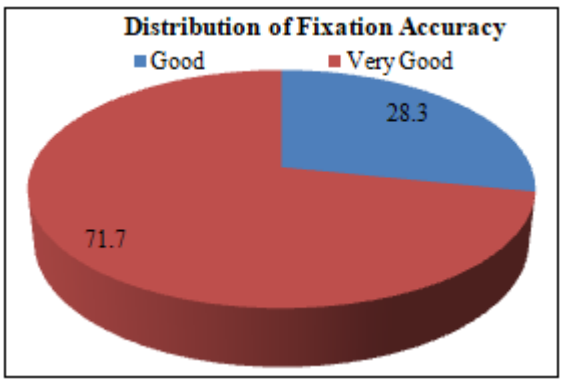

Figure 5: Distribution of surgeon's perception on fixation accuracy

Table 6: Distribution of surgeon's perception on quality of grip

Quality of grip	No. of cases	% of cases
Good	9	15.0
Very Good	51	85.0
Total	60	100.0

Of 60 cases studied, 9 (15.0%) had good fixation accuracy and 51 (85.0%) had very good fixation accuracy in the study group.

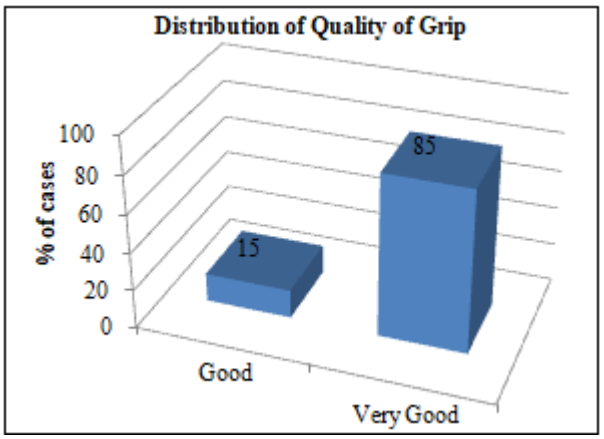

Figure 6: Distribution of surgeon's perception on quality of grip

Table 7: Distribution of surgeon's perception on manipulability

Manipulability	No. of cases	% of cases
Bad	1	1.7
Good	30	50.0
Very Good	29	48.3
Total	**60**	**100.0**

Of 60 cases studied, 1 (1.7%) had bad fixation accuracy, 30 (50.0%) had good fixation accuracy and 29 (48.3%) had very good manipulability in the study group.

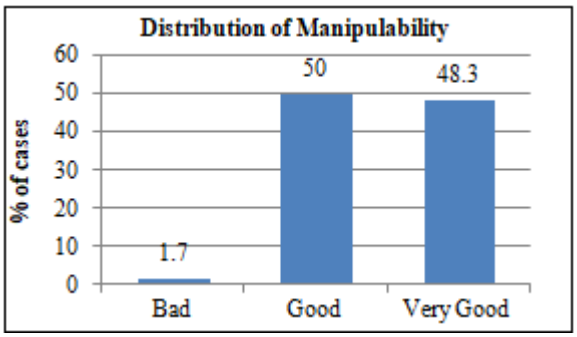

Figure 7: Distribution of surgeon's perception on manipulability

Post OP:

Table 8: Distribution of incidence of induration

Induration	No. of cases	% of cases
Yes	2	3.3
No	58	96.7
Total	60	100.0

Of 60 cases studied, 2 (3.3%) had induration and 58 (96.7%) did not have induration in the study group.

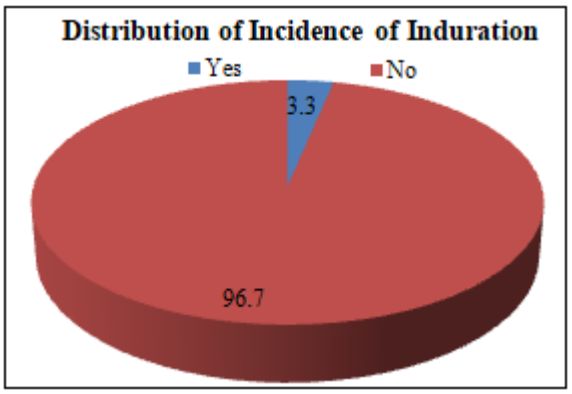

Figure 8: Distribution of incidence of induration

Table 9: Distribution of incidence of seroma / hematoma

Seroma / Hematoma	No. of cases	% of cases
Yes	0	0.0
No	60	100.0
Total	60	100.0

Of 60 cases studied, none had incidence of seroma / hematoma in the study group.

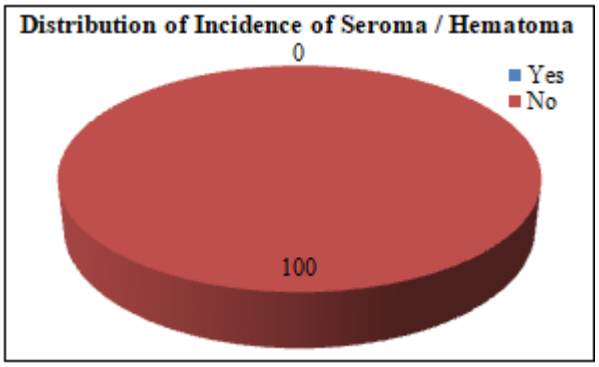

Figure 9: Distribution of incidence of seroma / hematoma

Table 10: Distribution of post-op duration of hospital stay in the study group

Post-op Hospital stay (days)	No. of cases	% of cases
2 – 3 days	36	60.0
4 – 5 days	24	40.0
Total	60	100.0

Of 60 cases studied, 36 (60.0%) had post-op hospital stay between 2 – 3 days and 24 (40.0%) had post-op hospital stay between 4 – 5 days. Distribution of mean ± SD of post-op hospital stay in the study group was 3.3 ± 0.79 days and the minimum – maximum range of duration of hospital stay was 2 – 5 days.

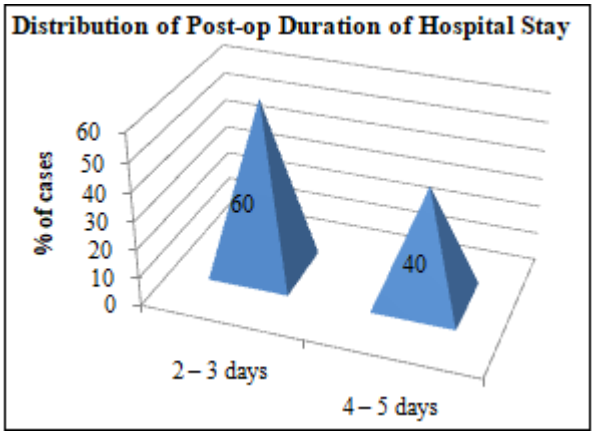

Figure 10: Distribution of post-op duration of hospital stay in the study group

Table 11: Distribution of duration of return to daily activities in the study group

Duration of return to daily activities (days)	No. of cases	% of cases
4 days	22	36.7
5 days	29	48.3
6 days	9	15.0
Total	60	100.0

Of 60 cases studied, 22 (36.7%) had duration of 4-days to return to daily activities, 29 (48.3%) had duration of 5-days to return to daily activities and 9 (15.0%) had duration of 6-days to return to daily activities. Distribution of mean ± SD of duration to return to daily activities in the study group was 4.78 ± 0.69 days and the minimum – maximum range of duration to return to daily activities was 4 – 6 days.

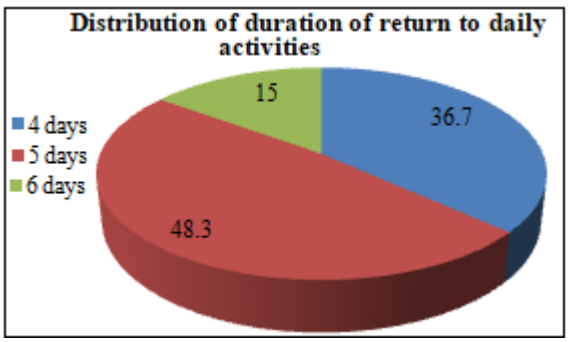

Figure 11: Distribution of duration of return to daily activities in the study group

Table 12: Distribution of duration of return to work in the study group

Duration of return to work (days)	No. of cases	% of cases
14 – 16 days	21	35.0
17 – 19 days	37	61.7
>19 days	2	3.3
Total	60	100.0

Of 60 cases studied, 21 (35.0%) had duration to return to work between 14 – 16 days, 37 (61.7%) had duration to return to work between 17 – 19 days and 2 (3.3%) had duration to return to work more than 19 days. Distribution of mean ± SD of duration to return to work in the study group was 17.20 ± 1.63 days and the minimum – maximum range of duration to return to work was 14 – 24 days.

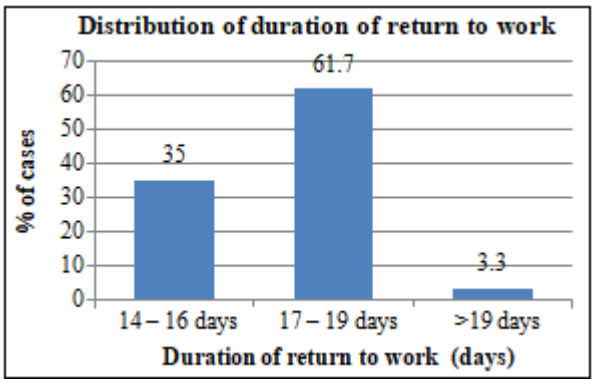

Figure 12: Distribution of duration of return to work in the study group

Table 13: Distribution of incidence of recurrence in the study group

Recurrence	No. of cases	% of cases
Yes	0	0.0
No	60	100.0
Total	60	100.0

Of 60 cases studied, none had incidence of recurrence in the study group.

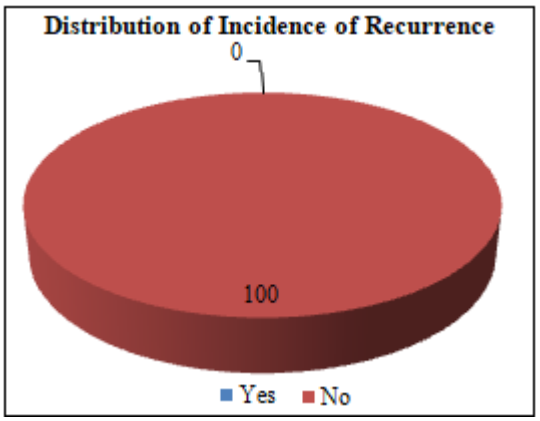

Figure 13: Distribution of incidence of recurrence in the study group

Table 14: Distribution of mean pain score (VAS) at various post-p follow-ups in the study group

	Pain Score (VAS)		
Follow-up	Mean	SD	Min – Max
1 – Week	8.88	0.41	7 – 9
1 – Month	10.00	0.00	10 – 10
6 – Month	10.00	0.00	10 – 10
12 – Month	10.00	0.00	10 – 10
P-value (Pair-wise)			
1 – Week v 1 – Month	0.001***		
1 – Week v 6 – Month	0.001***		
1 – Week v 12 – Month	0.001***		
P-values by repeated measures analysis of variance (RMANOVA). P<0.05 is considered to be statistically significant. ***P-value<0.001 (Highly significant).			

Mean ± SD of pain score at 1-week, 1-month, 6-month and 12-month was 8.88 ± 0.41, 10.00 ± 0.00, 10.00 ± 0.00 and 10.00 ± 0.00.

Distribution of mean pain score at 1-month, 6-month and 12-month post-op follow-ups is significantly higher

compared to mean pain score at 1-week post-op follow-up (P-value<0.001 for all).

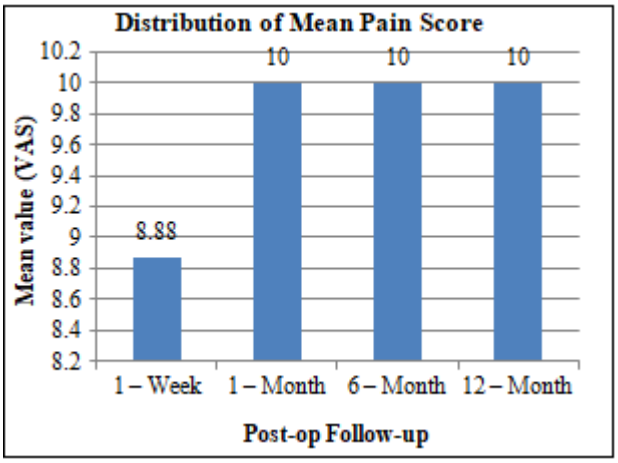

Figure 14: Distribution of mean pain score (VAS) at various post-Op follow-ups in the study group

4. Discussion

The results of this study suggest that satisfactory results can be achieved with regards to patient pain and recurrence using this innovative self-gripping mesh. The ideal outcome in inguinal hernia surgery is to provide a recurrence-free repair and minimise morbidity, disability and both acute and chronic pain. The introduction of meshes helped surgeons to achieve a recurrence rate of less than 5% [7, 8, 16]. Following inguinal hernia repair chronic pain, of neuralgic origin, has emerged as one of the most important negative clinical sequalae. Chronic pain is defined as sustained discomfort/pain after 3 months of hernia repair [17], is not clearly understood. Some data supports the hypothesis that nerve division is of importance for pain relief [18, 19]; however, this point remains controversial [20, 21]. Others suggest that the use of low weight and large pore Polypropylene fabrics may be favourable in this respect [22]. Every surgeon is aware of the risk of nerve entrapment in fixation sutures and many have observed the instant relief from pain following rapid re-operation for immediate severe acute pain. In that scenario, it is often the release of an entrapped nerve that provides relief.

5. Conclusion

This study shows using a self-gripping semi absorbable mesh for inguinal hernia repair results in pain-free post op period and no recurrence. This study also reveals a decrease in operating time, easy manipulability, minimal complications and reduced post op hospital stay using this mesh in hernia repair.

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