

Evaluation of Prolene Hernia System (PHS), A Combination of Lichtenstein and Stopa's Repair. An Alternative and Easy Approach for Inguinal Hernia

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ABSTRACT

AIM

Inguinal hernias are a common condition that often requires surgical repair, with various techniques available for treatment. The Prolene Hernia System (PHS) and Lichtenstein hernioplasty are two commonly used methods, each with distinct approaches. This study aims to compare these two techniques to assess key clinical outcomes such as postoperative pain, seroma formation, Foreign Body Sensation (FBS), recurrence rates and infection.

MATERIALS AND METHODS

A total of 51 male patients from the Government Medical College and Hospital, Chandigarh, were randomly assigned to undergo either PHS or Lichtenstein hernioplasty. Outcomes such as postoperative pain, seroma formation, FBS, recurrence rates and infection were monitored over a 3-month follow-up period.

RESULTS

Patients in the PHS group experienced significantly less pain by day 3 post-surgery compared to the Lichtenstein group, although pain levels were similar by day 7. Seroma formation was slightly more frequent in the PHS group 16% compared to the Lichtenstein group 7.7%, but this difference was not statistically significant. FBS was marginally lower in the PHS group 4% than in the Lichtenstein group 7.7%. There were no recurrences or infections in either group during the 3-month follow-up period.

CONCLUSION

The Prolene Hernia System may offer advantages in terms of reduced early post-operative pain and lower foreign body sensation, but both techniques are equally effective in preventing hernia recurrence in the short term. The higher incidence of seroma formation with PHS suggests the need for further investigation. Larger studies with extended follow-up are recommended to determine whether PHS provides significant long-term benefits compared to Lichtenstein hernioplasty.

KEYWORDS

Inguinal hernia, Prolene Hernia System (PHS), Lichtenstein hernioplasty, Seroma formation, Foreign body sensation, Recurrence rate, Postoperative pain, Hernia repair, Hernioplasty, Surgical techniques, Short-term outcomes.

INTRODUCTION

Inguinal hernias are a common condition, especially in men, with around 27% of males and 3% of females expected to develop one during their lifetime^[1,2]. These hernias occur when part of the intestine or fatty tissue pushes through a weak spot in the abdominal wall. Surgery is the only reliable treatment and several techniques have been developed to improve outcomes and reduce complications^[3]. One of the

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most widely accepted methods is the Lichtenstein tension-free hernioplasty, which uses a mesh to cover the hernia defect, offering good long-term results with low recurrence rates [4]. In contrast, the Prolene Hernia System (PHS), introduced in 1998, uses a dual-layer mesh that provides extra support by covering both the front and back of the abdominal wall [5]. This technique aims to improve reinforcement and reduce complications like nerve irritation. Despite its potential advantages, PHS is not as commonly used as the Lichtenstein method and there is limited data comparing the two approaches. This study aims to compare the clinical outcomes of PHS and Lichtenstein hernioplasty, focusing on important factors like pain after surgery, seroma formation, Foreign Body Sensation (FBS) and hernia recurrence. By examining these parameters, we aim to clarify whether PHS offers significant benefits over the Lichtenstein method (Table 1).

Outcome	Lichtenstein hernioplasty	Prolene Hernia System (PHS)	p-value
Mean age (years)	51.23 ± 15.12	59.00 ± 17.43	0.16
Seroma formation (%)	7.7% (2/26)	16.0% (4/25)	0.42
Foreign Body Sensation (FBS) (%)	7.7% (2/26)	4.0% (1/25)	1
VAS Score-day 1 (mean ± SD)	3.08 ± 0.39	3.12 ± 0.33	0.69
VAS Score-day 3 (mean ± SD)	2.19 ± 0.49	1.92 ± 0.28	0.02*
VAS Score-day 7 (mean ± SD)	1.23 ± 0.43	1.08 ± 0.28	0.14
Hospital stay (days, mean ± SD)	2.81 ± 0.63	2.48 ± 0.59	0.06
Recurrence (%)	0%	0%	N/A
Infection (%)	0%	0%	N/A

Table 1. Outcome comparison. Note: VAS=Visual Analogue Scale (used to measure pain). Significant differences (p-value 0.05) are marked with an asterisk (*).

MATERIALS AND METHODS

Inclusion Criteria

- Adult patients (aged 18 years-90 years) diagnosed with an inguinal hernia.
- Patients who provided informed consent to participate.

Exclusion Criteria

- Patients with prior hernia repair.
- Patients with contraindications to general or spinal anesthesia.

Surgical Techniques

The Lichtenstein repair involves placing a polypropylene mesh over the hernia site to reinforce the abdominal wall. In contrast, the PHS technique uses a dual-layer mesh, with one layer placed in the pre-peritoneal space and the other positioned to reinforce the outer wall. The PHS mesh was tailored from the available polypropylene mesh due to high cost of the pre-formed mesh. Both procedures were performed under spinal anesthesia.

RESULT

Outcomes Measured

Primary outcomes: Seroma formation and Foreign Body Sensation (FBS).

Secondary outcomes: Hernia recurrence, postoperative pain measured with the Visual Analogue Scale (VAS) and infection.

Demographics: The average age of participants was 55.04 years, ranging from 19 years-83 years. All 51 participants were male.

Primary Outcomes

Seroma formation: Occurred in 7.7% of Lichtenstein patients and 16% of PHS patients, but the difference was not statistically significant (p=0.42).

Foreign Body Sensation (FBS): FBS was reported by 7.7% of Lichtenstein patients and 4.0% of PHS patients (p=1.00), showing no significant difference.

Secondary Outcomes

- **Postoperative pain:** Patients in the PHS group experienced less pain on day 3 (average VAS score of 1.92) compared to those in the Lichtenstein group (average VAS score of 2.19) (p=0.02). By day 7, both groups reported similar levels of pain.
- **Recurrence rate:** No hernia recurrences were observed in either group at the 3-month follow-up.
- **Infection:** No infections were reported in either of the groups

DISCUSSION

This study compares two widely used techniques for inguinal hernia repair Prolene Hernia System (PHS) and Lichtenstein hernioplasty. We focused on important factors such as pain after surgery, seroma formation, Foreign Body Sensation (FBS) and hernia recurrence. Our findings align with those from other studies but also show some differences worth noting.

Postoperative Pain

Our results indicate that patients who underwent the PHS procedure experienced significantly less pain by day 3 compared to those who had the Lichtenstein hernioplasty. This observation is consistent with previous research, including the study by Kingsnorth et al., which also found lower pain levels in the early postoperative period for patients treated with PHS [6]. The reduced pain is likely due to the PHS technique involving less tension on the tissues and fewer sutures, which reduces nerve irritation. By day 7, however, the pain levels in both groups were similar, which aligns with other studies, such as the work by Nienhuijs et al., where long-term pain outcomes for both techniques were found to be comparable [7,8]. This suggests that while PHS may offer short-term relief, the difference may not last beyond the early recovery period.

Seroma Formation

In our study, although statistically not significant, seroma formation was more common in the PHS group 16% than in the Lichtenstein group 7.7%. This could be due to the more

extensive dissection required for placing the dual-layer mesh in PHS, which can lead to increased fluid accumulation. However, it is worth noting that the meta-analysis done by Sanjay et al., found no significant difference in seroma formation between the two techniques, suggesting that individual surgical practices and patient factors can play a role in this outcome^[9]. Badkur et al., in their study found the incidence of seroma formation to be 9% in PHS group while 11.7% in Lichtenstein group which is contrast to our study however it was statistically insignificant^[10].

Foreign Body Sensation (FBS)

Not much has been reported in the literature about FBS in hernia repair amongst various techniques. It has been thought that the chances of FBS is more with PHS as compared to Lichtenstein repair due to its bilayer system. However, our study found a slightly lower rate of FBS in the PHS group 4% compared to the Lichtenstein group 7.7%. This could be because the PHS method doesn't require fixation sutures, reducing the likelihood of nerve entrapment, which is a common cause of discomfort. Other studies like Nienhuijs et al., and Dalenback et al., reported higher incidence of feeling of mesh or prickling sensation with PHS than Lichtenstein method.

Recurrence Rates

Neither group had any hernia recurrences within the 3-month follow-up period, which indicates that both techniques are effective for short-term hernia repair. This finding is consistent with other research, including study by Dalenback et al., which also report low recurrence rates for both PHS and Lichtenstein methods when performed correctly. Nienhuijs et al., reported lower recurrence rate with PHS 3.3% as compared to Lichtenstein repair 5.6%. The bilayer structure of PHS probably explains the low rate of recurrence. Meta-analysis, such as by Ran et al., and Decker et al., suggest that recurrence rates can vary based on factors like surgeon experience and patient characteristics, but both techniques are considered reliable for preventing hernia recurrence^[11].

Comparison with Other Studies

Overall, our findings align with much of the existing literature. The reduced pain and lower rates of foreign body sensation associated with PHS reflect the results seen in other studies^[12-15]. However, the slightly higher seroma rates seen in PHS are a reminder that no technique is without drawbacks. Some studies suggest that PHS's dual-layer design could offer better long-term support, which might reduce recurrence rates in the future. Nevertheless, the simplicity and consistent results of the Lichtenstein method make it a solid choice, particularly for surgeons with less experience in the PHS technique.

CONCLUSION

The Prolene Hernia System seems to offer some early advantages, particularly in reducing pain during the first few days after surgery and it may also result in fewer cases of foreign body sensation. However, it might lead to a slightly higher rate of seroma formation compared to lichtenstein hernioplasty. Both techniques are effective in preventing hernia recurrence in the short term. Larger studies with longer

follow-up periods are needed to determine whether PHS offers significant long-term benefits in terms of recurrence prevention and overall patient comfort.

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