



ORIGINAL RESEARCH PAPER

General Surgery

REFLECTED INGUINAL LIGAMENT: A POTENTIAL ANATOMICAL LANDMARK FOR MESH FIXATION IN INGUINAL HERNIA REPAIR.

KEY WORDS: Reflected inguinal ligament, inguinal hernia, hernia anatomy, inguinal hernioplasty, hernia surgery

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ABSTRACT

Introduction: Recurrence of inguinal hernia after surgery secondary to mesh fixation techniques still remains a complication of inguinal hernioplasty. This study focuses on evaluating the reflected inguinal ligament and its potential in surgical application.

Method: A total of 181 patients undergoing inguinal hernia repair at Travancore Medical College, Kollam, Kerala between 2015 to 2020 were included in the study. The reflected inguinal ligament was identified by tracing fibres passing upwards and medially from the pubic tubercle to the rectus sheath. The incidence of the ligament and its shape were documented.

Results: Of the 181 patients, the male to female ratio was 7.6:1. The average age of the study population was 55.1 ± 14.3. 37% had right sided inguinal hernia, 19% had left sided inguinal hernia and 44% had bilateral inguinal hernia. Intraoperatively, the reflected inguinal ligament was identified in all patients with 60% having a triangular shape and rest had rectangular shape. Rectangular shape is more common as age increases.

Discussion: Current literature rarely examines the reflected inguinal ligament in depth. Further ambiguity is caused by various authors using different nomenclature for the ligament. Accepting the limitations such as constrained geographical variation in our study population, the findings of our study in combination with those of existing literature warrants further studies specifically evaluating the reflected inguinal ligament.

Conclusion: The reflected ligament was identified in all of our patients. This study recommends that further studies evaluate the reflected inguinal ligament as a potential landmark to fix the medial end of the mesh during inguinal hernioplasty.

INTRODUCTION

Inguinal hernia is a common problem world-wide¹. The risk of developing inguinal hernia increases with age and is more common in males with a life time risk of approximately 27% for men as compared to 3% for women². While one-third of patients with inguinal hernias have minimal symptoms³, complications such as obstruction or strangulation increases the morbidity of the disease and can be potentially life threatening. Surgical repair of inguinal hernia is one of the most frequently performed operations⁴ and minimises the chance of complications while improving the quality of life.

Surgery can be performed via open or laparoscopic method. For both approaches, use of a synthetic mesh provides effective reinforcement⁵. To fix this mesh in place, various intraoperative methods exist such as sutures, glue or self-gripping tacks. In open surgery, Lichtenstein's technique of hernia repair is the most commonly performed method, which involves fixing the mesh with overlapping of the pubic tubercle medially⁶.

In spite of surgical experience and technical advances, recurrence of inguinal hernia still remains a complication of inguinal hernia repair. Studies have shown that up to 13% of groin hernia surgeries are for recurrence⁷. Method of fixing the mesh is one of the key risk factors attributed to recurrence of hernia⁸.

This study focuses on the reflected part of the inguinal ligament which, as shown in Figure 1, is between the pubic tubercle and rectus sheath. While the anatomy of the inguinal canal has been well documented in literature, there is little information regarding the reflected inguinal ligament⁹. Therefore the potential clinical application of the reflected inguinal ligament as a medial landmark for mesh fixation has not been well evaluated.

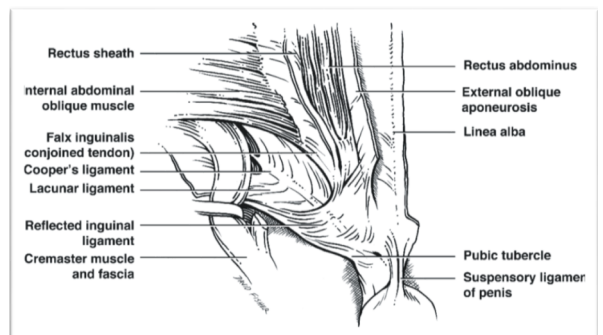


Figure 1: Anatomy of the reflected inguinal ligament⁹

The primary aim of this study is to document the occurrence rate of the reflected inguinal ligament. The study additionally aims to provide an anatomical description of the ligament and to hypothesise the potential use of the ligament in inguinal hernia repairs.

METHOD

A prospective observational study was conducted in the Department of General Surgery at Travancore Medical College, Kollam, Kerala, India from 2015 to 2020. A total of 181 patients were participated in the study adhering to the inclusion and exclusion criteria.

INCLUSION CRITERIA

- Patients undergoing open inguinal hernia repair
- Patients undergoing unilateral or bilateral hernia repair

EXCLUSION CRITERIA

- Patients undergoing laparoscopic hernia repair
- Patients presenting with recurrent hernia
- Patients with preoperative diagnosis of femoral hernia

Surgical procedure

The technique we follow is Lichtenstein tension-free mesh repair. A 4 cm incision is placed 1 cm above and parallel to line joining pubic tubercle to anterior superior iliac spine. After dissecting the Camper's and Scarpa's fascia, the external aponeurosis is split along the line of the fibres, taking care to ligate or cauterize the superficial pudendal and superficial epigastric vessels, to enter the inguinal canal. After protecting the ilioinguinal and iliohypogastric nerves, the hernial sac is separated from the cord. The hernia sac and contents are dealt with appropriately.

Next we examine for presence of the reflected inguinal ligament. From the attachment of the inguinal ligament at pubic tubercle, we examine for any fibres that pass in an upward and medial direction behind the cord and behind the superior crus to blend with the rectus sheath. Along with noting the presence of the reflected inguinal ligament, the shape of the ligament is also acknowledged.

The mesh is then placed with care taken for the medial portion to extend at least 2 cm medial to pubic tubercle. After attaining haemostasis, wound is closed in layers.

RESULTS

Of the 181 patients who underwent hernia repair, males were more commonly affected than females with a ratio of 7.6:1. The average age of the patient population was 55.1 ± 14.3 years. 68 patients (37%) had right sided inguinal hernia, 34 patients (19%) had left sided inguinal hernia and 79 patients (44%) had bilateral inguinal hernia. Figure 2 below shows the occurrence of hernia according to gender in various age groups.

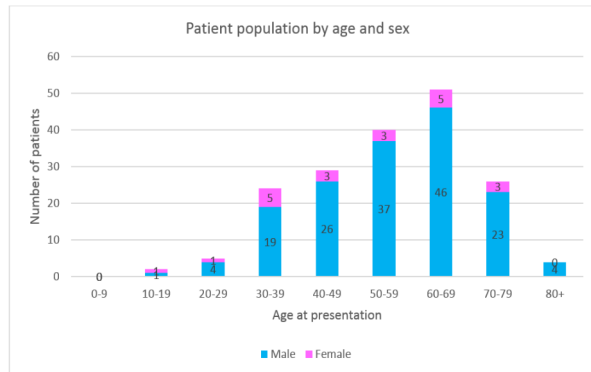


Figure 2: Preoperative patient characteristics

Operative findings

Of the 181 patients in the study, the reflected inguinal ligament was found in all of the patients. As shown in Table 1, 60% had triangular ligament (Figure 3) and 40% had rectangular (Figure 4) shaped ligament. In patients who underwent bilateral inguinal repair, the shape of the ligament was symmetrical on both sides. For 4 cases, the ligament was not easily visible medial to the pubic tubercle. It required dissection near the suprapubic region before the ligament could be identified. For these 4 patients, the dissection required was minimal and not time consuming.

Table 1: Operative findings of patient population

	Variable	Number	%
Type of hernia	Direct	134	74
	Indirect	47	26
Ligament present (%)	Yes	181	100
	No	0	0
Identification	Easy	177	98
	By dissection	4	2
Shape	Triangular	108	60
	Rectangular	73	40

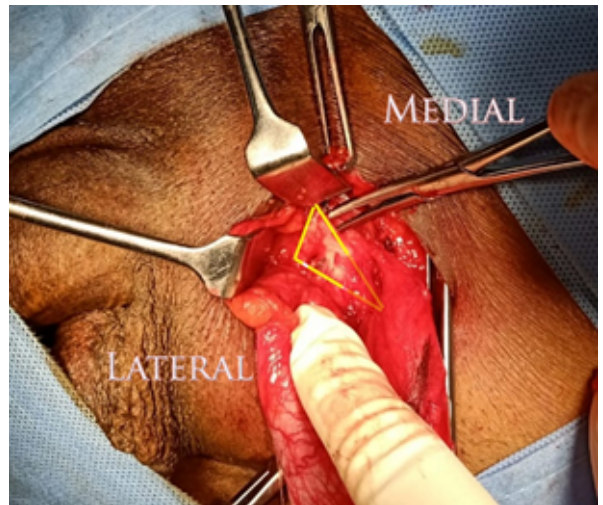


Figure 3: Triangular ligament – as seen on left side

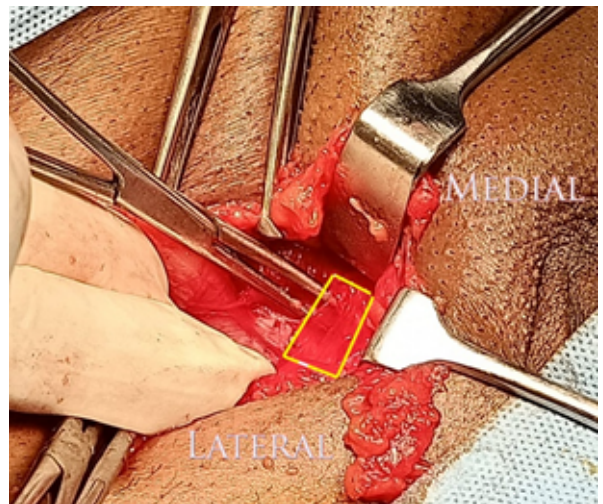


Figure 4: Rectangular ligament – as seen on left side

We found that as the patient population age increases, there is a tendency of the ligament to change its shape from triangular to rectangle as shown in Figure 5. This change in shape as age increases could be due to generalised degeneration or due to stretching of fibres secondary to variations in intraabdominal pressure.

The triangular shape also tends to be more predominant in female population (Table 2). In women, there is 2.5 times the incidence of triangular ligament more than incidence of rectangular ligament whereas in males it is 1.3. However it must be noted that the average age group of female population included in the study was lower at 49 years than the male population at 56 years and therefore the lower age group of the female population could be a more possible factor contributing to higher incidence of triangular ligament in women than gender itself.

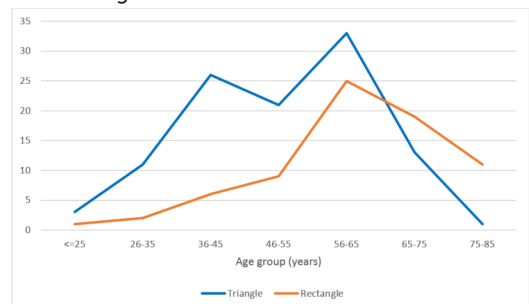


Figure 5: Shape of the ligament varying by age group.

Table 2: Distribution of shape according to gender

	Triangle	Rectangle
Male	93	67
Female	15	6

DISCUSSION

The reflected inguinal ligament is a rarely mentioned and examined anatomical finding in literature. Tubbs et al (2009)⁹ have highlighted that “the reflected ligament is depicted in anatomy texts but further comments about its morphology are almost unanimously omitted”. Further ambiguity about the ligament arises from different authors arbitrarily naming the ligament. Various names include triangular fascia, reflex ligament, Colle’s ligament or posterior crus¹⁰.

Studies have shown that the ligament is 2 to 3 cm wide and triangular shaped. Its fibres join the linea alba and interlace with the equivalent fibres of the opposite side¹¹. Statistical analysis in previous studies have identified no anatomical variation between genders. A study done on cadavers found that the ligament is symmetrical between the right side and left side¹². These findings have been corroborated in the present study.

However, in contrast to the findings of our study, one of the more detailed studies looking at the presence of the ligament in western population have highlighted that the reflected inguinal ligament is frequently lacking¹³. This difference in findings could possibly indicate a role of geographical variation in the occurrence of reflected inguinal ligament.

The role of the reflected inguinal ligament is disputed. While there is no statistical evidence, various authors suggest that the ligament is of little importance. Conversely, others have postulated that the ligament plays a significant role in supporting the inguinal and lacunar ligaments⁷. They have further opined that its absence may result in increased risk of developing inguinal hernia due to decreased support for the adjacent ligaments and that when the ligament is present, it may be of importance in surgical perspective.

The findings in our study shows that the ligament is present in all the patients, it has symmetrical occurrence and therefore, combined with the findings of existing literature, we presume that the ligament forms a bridge between the lateral and anterior abdominal wall, altogether resulting in a supportive suprapubic belt in the natural belt line around the anterior belly. Of surgical importance, further studies should focus on the role of the ligament as a landmark for fixing the medial part of the mesh during inguinal hernia repair and thereby avoid potential complications of current methods such as periostitis of the pubic tubercle.

There were multiple limiting factors in this study. Primarily, our study was limited to the South Indian population. Future studies examining the geographical difference as a factor contributing to the presence of the reflected inguinal ligament may offer an explanation for the variation seen in this study and previous literature. Secondly, all the patients in our study population underwent surgery with the same team. As a result, the surgical technique and experience of the surgeon may contribute to varying interpretation of the structure of the ligament and the ease at which the ligament is dissected. With these confounding factors removed, results may vary.

CONCLUSION

The reflected ligament was identified in all of our patients. Triangular shape of the ligament is seen predominantly in a younger age group and as age advances, the shape turns rectangular probably due to generalised degeneration or due to stretching of the fibres secondary to variations in intraabdominal pressure. There is no disparity of the ligament based on gender or side of abdomen.

Based on our observation, the reflected inguinal ligament may be a potential landmark to fix the medial end of the mesh during inguinal hernioplasty. Further studies are warranted to evaluate the extent of benefit gained from using the reflected inguinal ligament for repair of inguinal hernia.

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