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Original Research Article

A ligament to identify the inferior limit of dissection in minimally invasive surgery for inguinal hernia

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ABSTRACT

Background: Minimally invasive surgery has recently become the approach of choice for surgeons for inguinal hernia repair. Subsequent to excellent visualisation of the preperitoneal space by high definition and 4K systems during laparoscopy and robotic surgery, as well as increasing use of multi detector CT scans to visualise abdomen, our knowledge of the anatomy of the posterior view of inguinal region has been enhanced. However, recurrence after surgery for groin hernia continues to be an issue during its learning curve especially for laparoscopic repair. One cause for recurrence is the infolding of the mesh after its placement in the preperitoneal space. A reason for this is inadequate dissection of the peritoneal fold especially inferomedially. The peritoneum has to be dissected inferomedially till the point where the vas deferens turns medially. During the course of a randomised study done to compare Transabdominal preperitoneal mesh repair with Totally extraperitoneal mesh repair for Inguinal hernia, a structure was seen passing from the medial aspect of the vas deferens where it turned medially
Methods: Prospective analysis of 106 consecutive patients who underwent laparoscopic inguinal hernia was done to identify the presence of such a ligament.
Results: This study demonstrates the existence of a ligamentous structure from the vas deferens to the posterior lamina of subparietal layer of peritoneal space at the site where the vas turns medially.
Conclusions: Identification and division of this ligament will help to ensure complete dissection of the peritoneum inferiorly as well as creaseless placement of mesh thus preventing recurrence.

Keywords: Minimally invasive surgery, Inguinal hernia repair, Ligament

INTRODUCTION

Minimally invasive surgery (MIS) has recently become the approach of choice for surgeons for inguinal hernia repair.[1] Publications by Daes et al and Felix et al have enhanced our knowledge of the anatomy of the posterior view of inguinal region during MIS.[2,3] Recurrence after MIS surgery for groin hernia continues to be an issue during its learning curve especially for laparoscopic repair. One of the causes for recurrence is the infolding of the mesh after its placement in the preperitoneal space. A reason for this is inadequate dissection of the peritoneal fold especially inferiorly.[4] The reason being that the inferior limit of dissection in MIS groin hernia repair, especially the medial aspect, continues to be ill defined. Various publications have attempted to define it as "crossing of the vas deferens over the external iliac vein".[5] However both the vas deferens and external iliac veins being vertical structures when viewed during MIS, the cross over occurs over a large area and thus becomes an ill-defined zone rather than a single point. Regarding the anatomy of the inguinal region; there are classically nine layers on the abdominal

wall in the groin. This includes; the skin; subcutaneous fat; superficial fasciae (Camper's and Scarpa's), innominate fascia (a thin membrane at inguinal ligament), the inguinal ligament, internal oblique transversalis fascia and preperitoneal space (PPS). The increasing use of computed tomography (CT) has expanded our knowledge of the preperitoneal space considerably. Visualising by CT scans, the paths by which fluid and gas disseminate along various tissue planes in pancreatitis, perforations has augmented this knowledge.[6] The PPS is commonly described as the space between the peritoneum and transversalis fascia (TF). It is also referred to as extraperitoneal, preperitoneal, or retroperitoneal space, emphasizing that it is not limited to the ventral portion of the abdomen. Though the peritoneum is easily identified, the TF is portrayed as a complex entity with a dual laminar structure that covers the muscles that surround the abdominal cavity. The PPS consists of the sub-parietal layer (SPL) which in turn has an anterior and posterior layers.[7,8] Identification of the anatomy of the PPS is important in performing MIS repair of groin hernias. During MIS inguinal hernia repair it is necessary to switch plane of dissection in the PPS from a plane just anterior to the posterior layer of SPL to a plane just posterior to it, when proceeding from medial to lateral. This "switch" which has been described previously, is required for making the space of Bogros and space of Retzius meet together which is turn is required for placement of the mesh.[7] The anatomy of the region with emphasis on PPS is shown in (Figure 1).

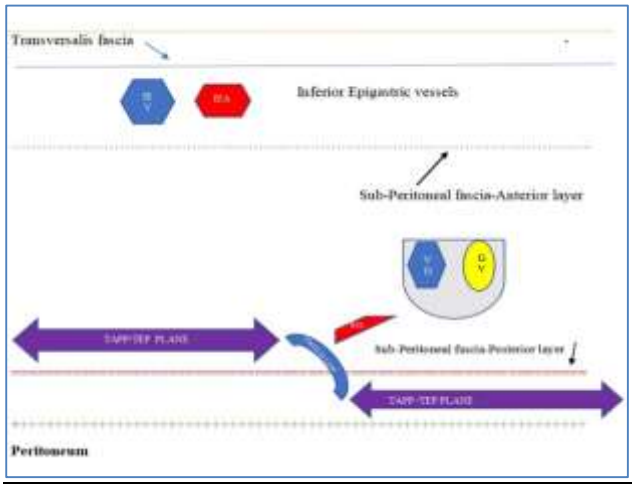

Figure 1: Contemporary knowledge of the anatomy of preperitoneal space during MIS inguinal hernia repair. IEV=inferior epigastric vein, IEA=Inferior epigastric artery GV=gonadal vessels VD=Vas deferens, BC=Believers Church medical college hospital ligament.

The author (SP) had conducted a randomised trial comparing two techniques of laparoscopic inguinal hernia repair i.e., TAPP (transabdominal preperitoneal repair) and TEP (Totally extraperitoneal repair).[9] During the course of the study a ligamentous extension from the vas deferens going inferiorly and medially to the subparietal layer in the PPS at the point the vas deferens turns medially was noted as shown in (Figure 2). It corresponded well to the point where the vas deferens turns medial after its vertical course from the deep inguinal ring. Hence attempt was made to identify the ligament in the subsequent cases. This study was conducted with the express objective of looking for the presence of such a ligament in subsequent cases and its incidence. A Storz 4K laparoscopic cart system was being used.

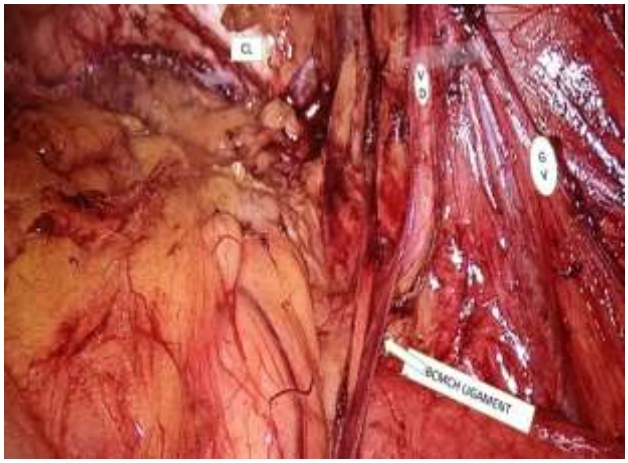

Figure 2: Intraoperative photograph of laparoscopic inguinal hernia repair showing the ligamentious structure connecting the Vas deferens to the posterior layer of subperitoneal fascia medially, CL=Coopers ligament, VD=Vas deferens, GV=Gonadal vessels.

METHODS

This was a prospective cohort study to identify the presence and incidence of the ligament described above. It was done in 106 consecutive patients who underwent laparoscopic inguinal hernia repair by TAPP method in Believers Church medical college hospital, Kerala during the period from from August 2016 to January 2023. A simple random sampling technique was used. All patients who underwent laparoscopic ingunal hernia repair was included. Females were excluded as the ligament was not identified in the observation made during the randomised trial mentioned earlier. Patients who required conversion to open due to various factors like irreducibility were excluded at the commencement of study itself and not included in the data. Attempt was made to obtain the critical view of myopectineal orifice in all cases and steps described by Daes followed.[2] Meticulous dissection was done and hemostasis carefully obtained at every step A 15 by 12 polypropylene mesh was used and peritoneum sutured in place after fixing the mesh with tackers. A gauze piece was placed in the PPS to wipe away any blood if required. There were 3 surgeons involved in the study. Identification of the ligament was documented in Microsoft Excel sheet in binary format as yes or no. Analysis of data was done using calculator associated with the Excel sheet. Since patients' identity was not being disclosed ethical approval was not required.

RESULTS

There were 106 patients in this study. Only males were included in this study. There 94 patients having bilateral inguinal hernia 8 patients having recurrent ingunal hernia and 4 patients having unilateral inguinal hernia. The ligament was identified in 104 patients (98.11%) (Table 1).

Table 1: Distribution of patients and observations made (n=106).

Parameters	N	%
Male	106	
Bilateral inguinal hernia	94	88.68
Recurrent inguinal hernia (after open surgery)	8	7.55
Unilateral inguinal hernia	4	3.77
Ligament identified	104	98.11
Patients with BMI >27.5	7	6.6

The ligament was not identified in 2 cases. These were having recurrent hernia after an open repair and had BMI >27.5.

DISCUSSION

Knowledge of the anatomy of the PPS has improved since laparoscopic and robotic systems with vastly improved vision and mutli slice CT scans were introduced. This has also been aided by improved knowledge of the embryology of the region. In this study of 106 patients who underwent laparoscopic inguinal hernia repair by TAPP, the ligament was identified in the majority of patients (98.1 %). Only males were included in the study as the ligament appears to be related to the vas deferens only and not the round ligament. As stated earlier it is necessary to "switch" from a plane anterior to SPL to a plane posterior to it in the PPS when doing this surgery. The above-described ligament corresponds to this switch region. Division of the same allows identification of the inferior limit of dissection of the peritoneum, complete the dissection of the peritoneum and proper placement of the mesh. It will also help in preventing exposure of the lateral cutaneous femoral nerve (LCFN) by keeping the plane of dissection anterior to the posterior layer of SPL laterally as dissection in wrong plane is this region is known to cause neuralgia by improperly exposing the LCFN.[8]

This ligament thus forms a landmark for identifying the limit of inferior dissection of the peritoneum on the medial aspect in MIS repair of groin hernias. Division of the ligament was required to complete the inferior dissection of the peritoneum and obtain the critical view of myopectineal orifice. Inferior dissection of the peritoneum till this ligament was identified and its division helped in a creaseless smooth placement of the polypropylene mesh. The patients in which it was not identified had recurrent hernia and had BMI>27.5 Probably the fibrosis caused by previous mesh as well the increased fat in preperitoneal space would have contributed to the non-identification of the structure in these cases. Neither bilaterality nor recurrence were important factors in identifying the liagemnt as it was identified. Eponymous structures aid memorisation and reproducibility.[10] We propose to name this ligament as the BCMCH (Believers Medical College Hospital) Ligament after the teaching institution where it was identified. This will aid its recognition and standardise reporting.[11]

Limitations

Limitation of the study is that unless meticulous haemostasis is obtained and excellent visualisation HD/4K or robotic system is there, the ligament may be difficult to identify. Meticulous hemostasis was sometimes be difficult in large hernias, recurrent hernia or when patient was on anticoagulants. However, using a gauze piece may improve the vision.[12] A HD/4K laparoscopic system might not be available in every centre which may impair identification of the ligament.

CONCLUSION

Identification of the ligament will help to identify the inferior limit of dissection of peritoneum in MIS repair of inguinal hernia. Its division will help the peritoneum at this level to be lowered well and help the creaseless snug placement of the mesh against the abdominal wall. This will help in preventing recurrence. It will also help in dissection in proper plane laterally and preventing injury to lateral femoral cutaneous nerve and resultant neuralgia.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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