

Ventral Hernia Recurrence

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ABSTRACT

Background: Ventral hernias are one of the most common problems confronting general surgeons. The rate of ventral incisional hernia in the long term after laparotomy has been reported to be as high as 20% to 25%. Multiple studies have suggested that laparoscopic repair of ventral hernias carries a lower recurrence rate and shorter hospital stay with quicker recovery. The risk factors for recurrence include factors related to patient's status, underlying disease, surgical technique, prosthetic material and postoperative complications. Perioperative factors appear to have the most significant correlation to incisional hernia formation, with wound infection being the most consistently reported risk factor. Prosthetic mesh improved the recurrence rate (5% to 20%), yet was associated with a higher risk of seroma, hematoma, and tissue necrosis from extensive dissection. Ventral hernia recurrence creates morbidity, prolonged hospitalization, the need for reoperation in most circumstances, occasional mortality, and increased cost to the patient.

Aim of study: This article includes proven mechanisms of ventral hernia recurrence, aiming to improve the preoperative preparation of the patient, current used techniques and postoperative measures.

Methodology: 217 adult patients (age 18-80) underwent a surgical ventral hernia repair during a period of two years in UHC "Mother Teresa", Tirana. Variables that are compared in this study involve: type of mesh material; type of suture material; type of sewing technique and comorbidities.

Results: Overall recurrence of ventral hernia was 8.7%. Recurrence happened in 9.2% of the patients when mesh fixation was done using Prolene sutures and 6% of the patients when PDS was used. We found a higher recurrence when an interrupted suture was used to fix the mesh (12 cases for prolene and 2 cases for PDS), compared to a lower recurrence when continuous suture was used, (2 cases for prolene and 0 for PDS).

Conclusions: Risk factors such as size of the defect, wound infection, obesity, use of steroids and chronic constipation have a great importance and has to be strictly evaluated as they have more chances to lead to a possible recurrence. Other conditions that may lead to a recurrence are chronic pulmonary diseases, diabetes, chronic renal diseases, malnutrition and malignant diseases. Apart from these factors, there are also several technical causes such as type and quality of prosthetic material, weak abdominal wall, material, quality and large distance of sutures during mesh fixation.

Key words: Ventral hernia, recurrence, prosthetic material.

BACKGROUND

Ventral hernias are one of the most common problems confronting general surgeons. The rate of ventral incisional hernia in the long term after laparotomy has been reported to be as high as 20% to 25%. Multiple studies have suggested that laparoscopic repair of ventral hernias carries a lower recurrence rate and shorter hospital stay with quicker recovery.[1-5]

Isolated studies however have argued that the recurrence rate with laparoscopic repair may not be that low over a long-term follow-up, and argued that over a longer term, the recurrence rate with laparoscopic repairs is the same as with open repairs[6] and may actually even be worse.[7] The surgical literature is however lacking data that compare the recurrence rates with the open and laparoscopic techniques over a long-term follow-up.

The risk factors for recurrence include factors related to patient's status, underlying disease, surgical technique and postoperative complications. Surgical technique of wound closure also plays a role. Modified Smead Jones technique[9] (interrupted closure of the abdominal wall using nonabsorbable suture material, with sutures taken in a 'far near-near far' fashion) has been shown to decrease the incidence of early wound dehiscence. Perioperative factors appear to have the most significant correlation to incisional hernia formation, with wound infection being the most consistently reported risk factor. Other perioperative factors include deep abscesses, perioperative gastrointestinal complications and early reoperations.[8,10]

It is essential to understand that incisional hernias generally manifest after considerable delay following the initial surgery. The incidence of hernia development shows a linear curve and therefore there is much more than the technique of wound closure that contributes to the formation of these hernias. For example, patients with an aortic aneurysm or a proven defect of collagen synthesis exhibit an increased incidence of incisional hernias and thus require more extensive reinforcement. The other important aspect, especially in the repair of recurrent hernias, is that repetition of a previously inadequate technique frequently fails.[11]

Ventral hernia repair is a commonly performed operation. In the past 4 decades, the surgical technique for ventral hernioplasty has gone through 3 stages. Before 1960, most were repaired by tissue approximation, which was accompanied by a recurrence rate of 30% to 40%.[12-15] This was noticed in particular with large defects causing the fascia to be under additional tension after closure. It became apparent that a prosthetic material was required to reinforce the repair or bridge the tissue defect. The use of a prosthetic mesh for ventral hernia repair first occurred in the early 1960s, when Usher[16,17] described the usefulness of a knitted polypropylene mesh for repair of complex inguinal hernias and anterior abdominal wall hernias. Prosthetic mesh improved the recurrence rate (5% to 20%), yet was associated with a higher risk of seroma, hematoma, and tissue necrosis from extensive dissection.

Sitzmann and McFadden[18] reported reduction of the recurrence rate to 2.5% when using internal retention sutures with mesh, and the debate about an optimal prosthetic technique of repair commenced. Laparoscopic ventral hernia repair has been recently introduced. The technique is currently popular, but the followup is insufficient to establish a definitive appraisal. But further insight into mechanisms of recurrence may be gained by this new approach and will be included. The high recurrence rate after repair of a ventral hernia has been a concern for all surgeons experienced in this field. Ventral hernia recurrence creates morbidity,

prolonged hospitalization, the need for reoperation in most circumstances, occasional mortality, and increased cost to the patient.[19] A few publications specifying a mechanism of recurrence emphasize further the need for accurate reporting and careful scrutiny of patients requiring reoperation for a ventral hernia.

AIM OF STUDY

Several mechanisms are reported to explain ventral hernia repair failure. This article includes proven mechanisms of ventral hernia recurrence, aiming to improve the preoperative preparation of the patient, current used techniques and postoperative measures.

METHODOLOGY

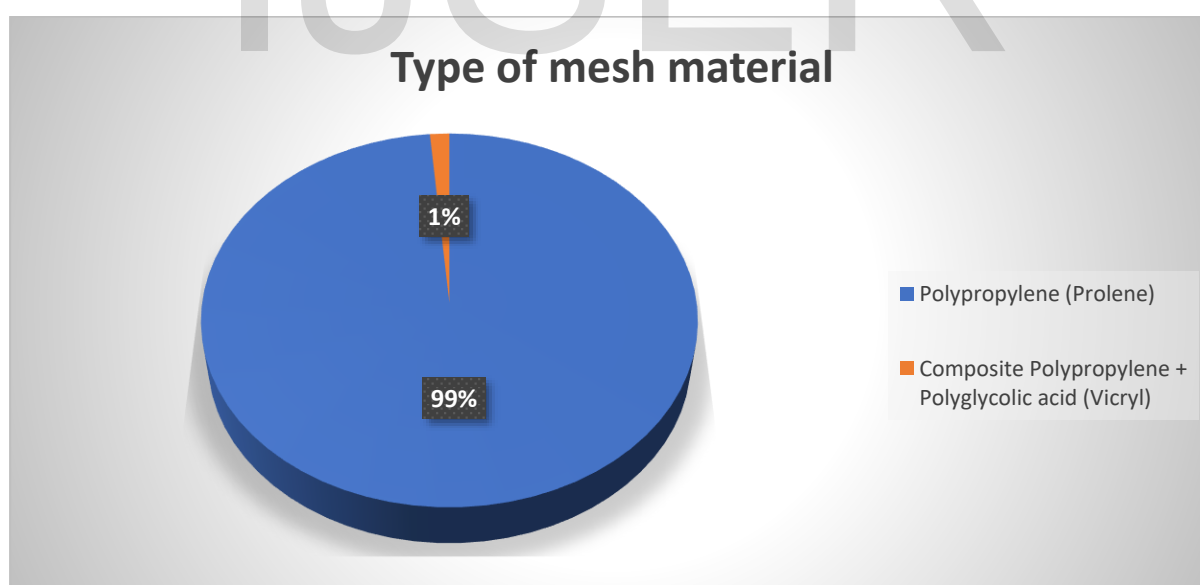
In this study there are included 217 adult patients (age 18-80) which underwent a surgical ventral hernia repair during a period of two years in UHC “Mother Teresa”, Tirana. Variables that are compared in this study involve: type of mesh material; type of suture material; type of sewing technique and comorbidities.

RESULTS

Table 1. Type of mesh material

Mesh material	Patients
Polypropylene (Prolene)	214
Composite Polypropylene + Polyglycolic acid (Vicryl)	3

Chart 1. Type of mesh material

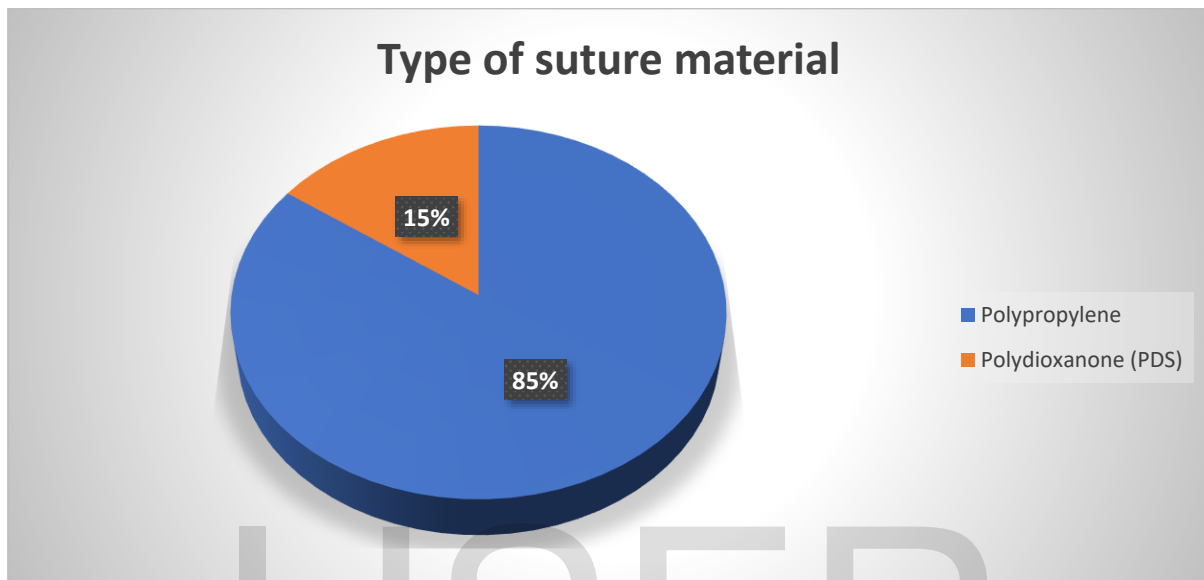


In table 1, is shown the type of mesh used in ventral hernia repair. In 214 patients or 99%, a prolene mesh is used and in only 3 of them or 1%, the defect is repaired using a combined prolene and vicryl mesh.

Table 2. Type of suture material

Suture material	Patients
Polypropylene	184
Polydioxanone (PDS)	33

Chart 2. Type of suture material



From all the patients, in 184 of them or 85% the mesh was fixed using prolene 2.0 sutures and in 33 of them or 15% PDS 2.0 sutures were used.

Table 3. Sewing technique

Sewing technique	Patients
Continuous sutures	12
Interrupted sutures	205

In table and chart 3, is presented the technique of suturing used to fix the mesh. In 205 patients or 94% of them were used interrupted sutures and only in 12 patients or 6%, interrupted sutures were applied.

Chart 3. Sewing technique

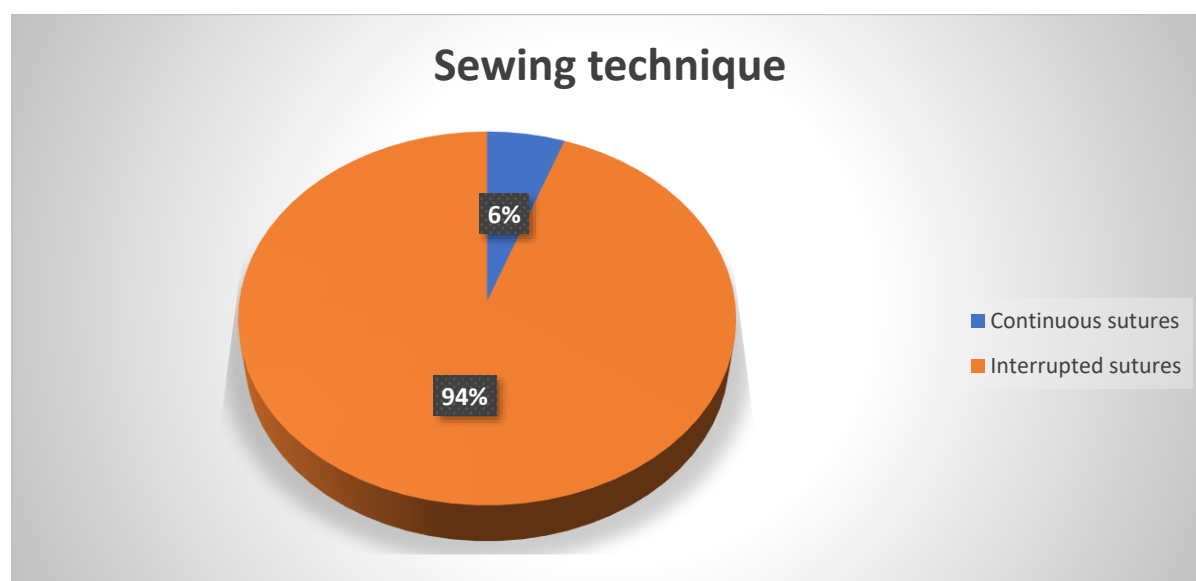
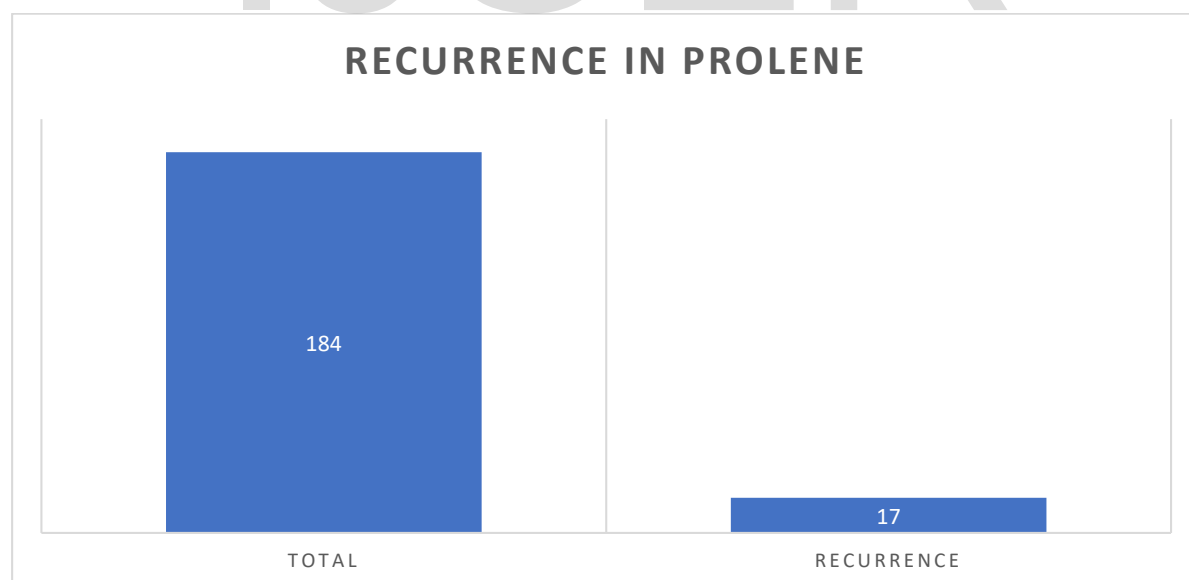


Table 4. Recurrence of hernia in cases of prolene fixation

Recurrence of hernia in cases of prolene fixation	
Total	184
Recurrence	17

Chart 4. Recurrence of hernia in cases of prolene fixation

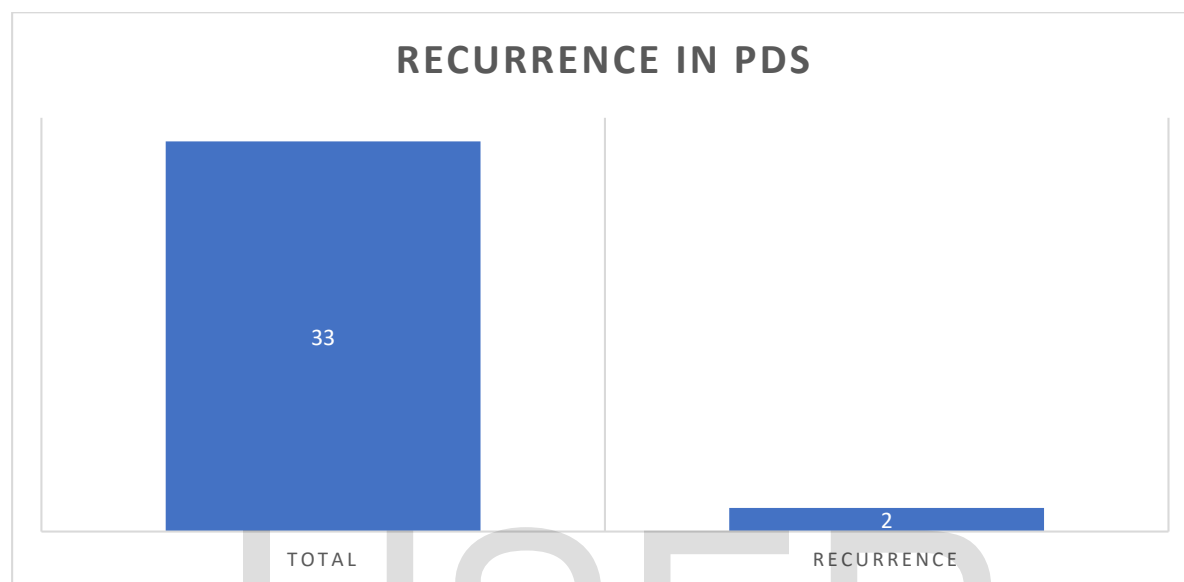


In table and chart 4, is shown that from 184 patients in which prolene was used to fix the mesh, 17 of them had a recurrence of the ventral hernia. Recurrence happened in 9.2% of the patients.

Table 5. Recurrence of hernia in cases of PDS fixation

Recurrence of hernia in cases of PDS fixation	
Total	33
Recurrence	2

Chart 5. Recurrence of hernia in cases of PDS fixation



In table and chart 5, is shown that from 33 patients in which PDS was used to fix the mesh, 2 of them had a recurrence of the ventral hernia. Recurrence happened in 6% of the patients. Overall recurrence was 8.7%.

Regarding to the material of sutures used to fix the mesh, recurrence happened in a higher percentage (9.2%), when prolene was used compared to a lower recurrence (6%), when PDS was used. We can't say this difference is statistically important because the small number of patients in PDS group.

Table 6. Recurrences in continuous and interrupted sutures for Prolene and PDS

Recurrences in continuous and interrupted sutures for Prolene and PDS		
	Prolene	PDS
Continuous	5	0
Interrupted	12	2

From 2 patients who had a hernia recurrence in PDS group, we see in table and chart 6, that in both of them interrupted sutures were used during mesh fixation.

From 17 patients who had a hernia recurrence in Prolene group, in 12 of them, mesh was fixed using interrupted sutures and in 5 of them using continuous prolene sutures. We see that the percentage of recurrence is more than two times higher when interrupted sutures are used

compared to those where continuous sutures are applied making this technique more favourable.

Chart 6. Recurrences in continuous and interrupted sutures for Prolene and PDS

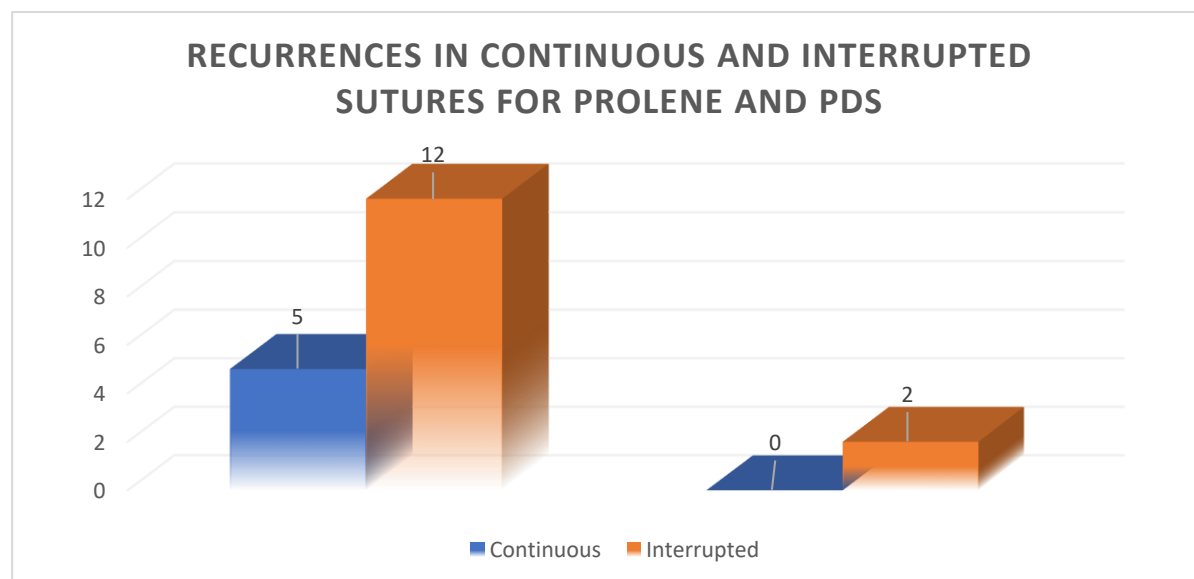
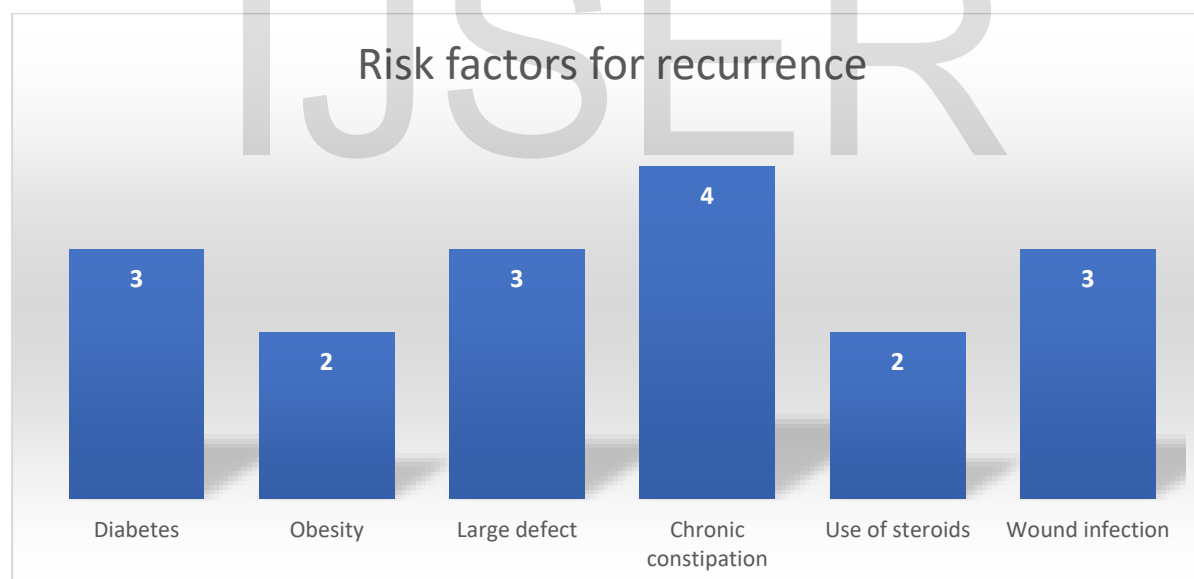


Chart 7. Comorbidities as risk factors for ventral hernia recurrence



In chart 7, we have presented some of the risk factors for hernia recurrence we had in our patients. We see that diabetes (n=3), chronic constipation (n=4), large defect (n=3) and postoperative wound infection are the main risk factors which are found to be the most frequent, followed by obesity (n=2) and use of corticosteroids (n=2). Two of the patients had a recurrence without having any of the risk factors mentioned above. Therefore, these kinds of comorbidities have to be strictly evaluated in the preoperative assessment to avoid complications and future recurrences.

DISCUSSION

Recent advancements came up with the large number of different varieties of mesh material for the repair of hernia. In spite of this, surgeons still using PP material because of its rigidity and comfort. After implantation of this material, the resultant complications are very severe and result in the recurrence of hernia. Therefore, before choosing the material for a particular hernia defect, it is better to look for the properties of a mesh for a given case. Prosthesis used for hernia repairs can be of any type, non-absorbable, composite (combination of absorbable and non-absorbable fibres) or with an absorbable or a non-absorbable barrier.

For intra-abdominal placements, any mesh that will prevent bowel adhesions should be used. It can be either ePTFE surgical mesh or any one of the newly engineered meshes with an absorbable or a nonabsorbable barrier. Non-absorbable or composite mesh is recommended for hernia repair where it will not come in contact with the bowel. Prosthesis with a barrier should be used only for intra-abdominal placement to prevent bowel adhesions since it is increasingly difficult to defend the use of a biomaterial that has no adhesion barriers [20].

When absorbable sutures are inserted into tissue they rapidly degrade, losing strength at the same time as the healing tissue is getting stronger. Several prospective clinical studies have been undertaken to compare absorbable with nonabsorbable sutures used in hernia repair. Baltazar and Johnston [21] compared polyglycolic acid sutures in 46 patients versus Dacron, cotton, or silk sutures in 41 patients. Follow-up was possible in 91 % of the patients over a 9 to 37 month period. Six recurrences occurred in the polyglycolic acid group (14.6%) compared with three (7.7%) in the nonabsorbable group.

In our study we didn't found any statistically important difference between recurrences in ventral hernias where nonabsorbable sutures such as Prolene were used compared to the ones where late absorbable sutures such as polydioxanone were used.

Demiray[22] et al., investigated the mesh shrinkage and tissue reactions against the mesh, both without fixating the meshes we placed on the abdominal wall, and by using continuous and interrupted sutures for fixation. They observed significantly more mesh shrinkage at the end of the 2nd month in the non-fixation group, compared to other groups. Histopathologically as well, the group with no suture fixation showed more inflammatory reactions and fibroblastic activities. In the continuous suture group, even though statistically insignificant, there were more shrinkage compared to the interrupted suture group. One possible reason for this may be the ischemia formed on the sides.

Regarding to our study, recurrence was higher to the patients where interrupted sutures were used in mesh fixation.

Although the definite causes of recurrence after surgery still remains unclear, controllable technical risk factors such as surgical methods, anesthesia techniques, mesh-fixation techniques, surgeon experience and hospital volume have been described as the main risk factors for recurrent inguinal hernia [23]. In addition, uncontrollable patient-related risk factors including sex, hernia anatomy, hernia type and postoperative recovery have been shown to affect the risk of recurrence following inguinal hernia surgery in varying degrees [24].

In our study, patients comorbidities such as diabetes, obesity, chronic constipation, use of steroids and chronic pulmonary disease seemed to be some of the risk factors for ventral hernia recurrence. Evaluation of these factors preoperatively is needed.

CONCLUSIONS

This trial even though it has its limitations, comes to a conclusion that risk factors such as size of the defect, wound infection, obesity, use of steroids and chronic constipation have a great importance and has to be strictly evaluated as they have more chances to lead to a possible recurrence. Other conditions that may lead to a recurrence are chronic pulmonary diseases, diabetes, chronic renal diseases, malnutrition and malignant diseases. Apart from these factors, there are also several technical causes such as type and quality of prosthetic material, weak abdominal wall, material, quality and large distance of sutures during mesh fixation. It's very important to avoid the risk factors mentioned above when it is possible and improve the operatory techniques so that mesh detachment and recurrences to become less possible.

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