Synthetic Mesh for Large Ventral Hernia Repair Correlated with Evaluation of Quality-of-life

A 5 years retrospective study

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Ventral hernia mesh repair is considered a standard procedure in most countries and widely accepted as superior to primary suture repair. We conducted a 5 years retrospective observational study on large and giant incizional hernia repair in our Clinics. 176 consecutive patients who had a ventral hernia repair with mesh implant in 2012-2016 were evaluated in terms of demographic characteristics, comorbidities, surgical conditions (defect size, mesh type, positioning of the mesh, length of hospital) and surgical outcomes by means of EuraHS-QoL score pre- and 30 days postoperative to assess quality of life (Qol). Alloplastic substitution with polypropylene, polyester and Dacron mesh has been used in all cases. Polypropylene mesh has been used in most of cases (91%). Most preferred mesh position was intraperitoneal (78%), then retromuscular (15%) and preperitoneal (7%). Immediate postoperative complications appeared in 41 cases (23.3%). Mean hospital length was 14,3 days. We could notice a double pre- and postoperative difference for the pain, with statistical significance (2.71 ± 1.70; p = 0.23) and the same pattern of distribution for restriction of activities and for cosmetic discomfort.

Keywords: synthetic mesh, polipropilene, ventral hernia, quality of life

Incisional hernias more often involve a combination of technical and biological limitations [1]. Throughout the years, many techniques have been described for the repair of a ventral hernia; however, none of them has gained universal acceptance or preference [2]. Nowadays, tension-free closure of the abdominal wall with the use of prosthetic mesh material is the most commonly performed procedure [3].

Despite many advantages, several problems connected with implantation of prosthetic mesh are reported. Currently available synthetic materials lead to many unacceptable complications: adhesions, fistulae, scar formation, recurrence, high infection rates, and chronic pain [3–7].

In general, the rate of recurrence and the pain are the most important for the assessment of the results. Chronic pain affects the quality of life, and is the most important aspect for the patient. According to some studies, chronic pain appears at up to 10-20% of the cases [8]. The causes of the pain probably include a combination of the inflammation associated with the nerve damage of the net, visceral fascia adherence to the mesh net and the fixing points, and the repair [8].

Several hernia-specific quality of life (QoL) scales have been proposed, but none are constructed for preoperative assessment [9].

The European Registry for Abdominal Wall Hernias (EuraHS) proposes a short, 9-question questionnaire applied before and after ventral hernia repair and based on a Numerical Rating Scale for three dimensions: pain at the site of the hernia or the hernia repair, restriction of activities and cosmetic discomfort. The EuraHS-QoL adds the assessment made pre- and postoperatively of cosmetic dimension which is important in ventral hernia repair [10].

Experimental part

Material and method

We have conducted a retrospective observational study on large hernia repair with synthetic mesh performed in the Surgery Clinics II of Emergency County Hospital Timisoara. Electronic medical of 176 consecutive patients who had a ventral hernia repair with alloplastic substitution for large and giant ventral hernia from 2012-2016 have been revised. Hernia size of 10-15 cm was defined as large and more than 15 cm as giant.

Patients demographic, comorbidities, and hernia size and location have been noted. Operative details included: defect size, mesh type, mesh positioning. Follow-up data consisted of length of hospital stay, the incidence of early complications. Data are presented as mean and range.

The questionnaire *EuraHS-QoL* was applied pre- and 30 days postoperative to all patients [13]. All of them agreed to answer the questionnaire. For statistical reasons we have noted each question with in order and as they appear in the questionnaire, irrespectively *1, 2, 3,4, 5, 6, 7, 8, 9*. Mean values and standard deviation were calculated for each question and 95% confidence interval, with p value =0.05 have been used.

Results and discussions

The age limits of the group were between 30-89 y. The peaks of incidence for female patients was the decade 60-69 y and 50-59 y, and for males the decade 70-79 y and 80-89 y (fig. 1).

Comorbidities associated with our group consisted in order in obesity, high blood pressure, diabetus, cardiac and respiratory diseases.

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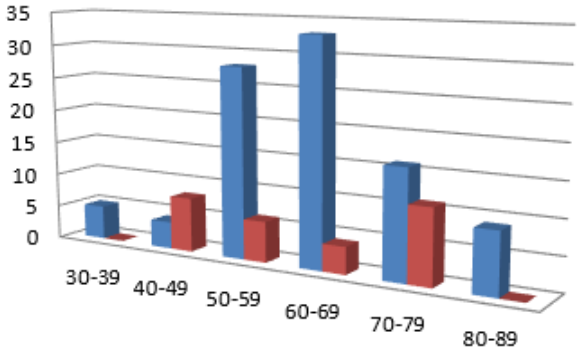

Fig. 1. Distribution of ventral hernia accorging to age and sex.

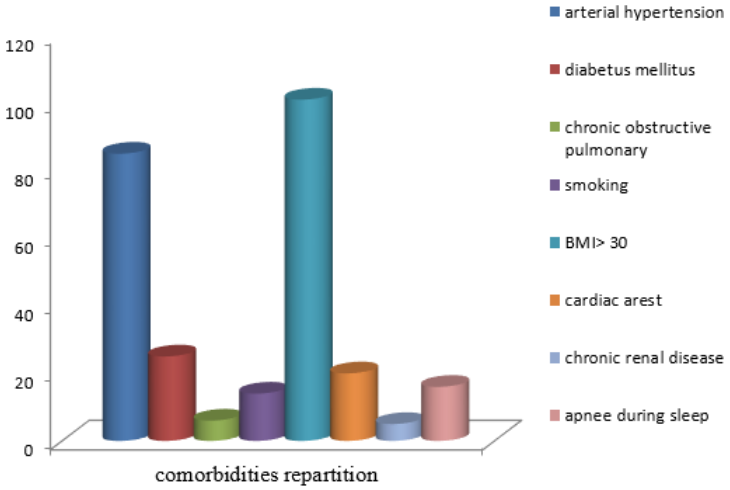

Fig. 2. Comorbitities repartition

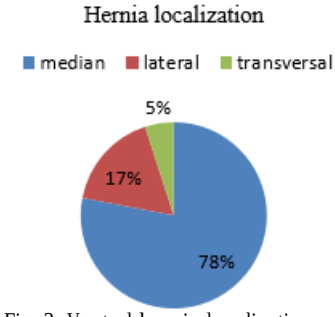

Fig. 3. Ventral hernia localization

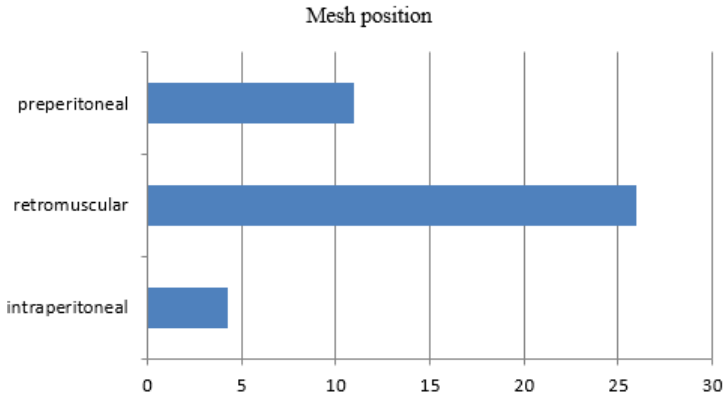

Fig. 4..Distribution of mesh positioning

Considering the localisation of hernia the most frequant was at midline (78%). Lateral hernia have been encoutered in 17% of cases, and transversal hernia in 5%.

In 26 cases out of 176, the intervention was an emergency (irreducible or incarcerated ventral hernia and strangulated ventral hernia). For alloplastic substitution the most used were in order from polipropilene, poliester and dacron. Polipropilene mesh has been used in most of cases (91%). As for mesh position the most preferred was intraperitoneal (139 cases), retromuscular (26 cases) and preperitoneal (11 cases). Figure 4 is illustrating the percentage distribution of mesh positioning.

Immediate postoperative complications have been noted in 41 cases (23.3%). Wound infection accounted for 41.46% from all complications.

Lenght of hospital stay varied widely according to the presense of complications, between 7 days and maximum 62 days. Medium length was 14.3 days.

We have colected all the questionnaires and the consecutive raw data for all the questions. The mean value and standard deviation (SD) have been calculated for each answer, pre- and postoperative. In table 1 we have compared the three big domains of questions in terms of mean values ± SD and the *p value*.

We could notice a double pre- and postoperative difference for the pain at the site of hernia/hernia repair, with statistical significance (2.71±1.70; *p=0.23*). For the other two domains of questions the answers had also statistical significance. Analyzind the behavior pattern of each question we have seen the same patern of distribution for restrictions of activities and for cosmetic discomfort (fig 5).

The ratio between the figures obtained for every question of the three domains is pointing that pain as an indicator of quality of life declines more post operative, (1.92-2.39) than the cosmetic discomfort (1.23-1.32) with around 23% (fig. 6).

The incidence of incisional ventral hernias has increased as abdominal surgery has become more prevalent [11]. Currently, about one million meshes are used per year world-wide [11]. The benefits of meshes were accepted for many years but the need for evidence-based medicine led to several trials designed to quantify their advantages. In 2002, the EU trialist collaboration analysed 58

Status of the pacient	*Pain at the site of hernia/hernia repair*		*Restrictions of activities at the site of hernia/hernia repair*		*Cosmetic discomfort*	
	media± SD	*p value*	media± SD	*p value*	media± SD	*p value*
preoperator	2.71±1.70	0.23	3.46±1.96	0.23	5.70±2.04	0.34
postoperator	1.29±0.97	0.13	2.15±1.50	0.17	4.45±1.89	0.31

Table 1
COMPARISON BETWEEN MEAN VALUES± SD AND *P VALUE* PRE-AND POSTOPERATIVE

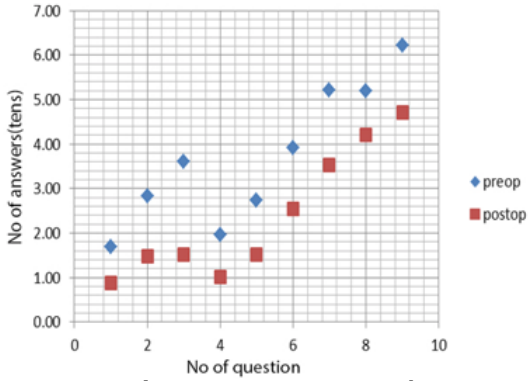

Fig. .5. Pre- and postoperative comparison between pattern behavior of the answers to the questionnaire

randomised controlled trials and found that the use of mesh was superior to other techniques. In particular, they noted fewer recurrences and less postoperative pain with mesh repair [12]. Although these results are not accepted by all surgeons, [13] meshes have now virtually replaced suture repair in the developed world.

The risk of infection is mainly determined by the type of filament used and pore size. The meshes at lowest risk of infection are, therefore, those made with monofilament and containing pores greater than 75 μm [14].

Immediate postoperative complications have been noted in our study in 41 cases (23.3%). Wound infection accounted for 41.46% from all complications.

Nearly all meshes continue to use one or other of three basic materials - Polypropylene, Polyester and ePTFE. These are used in combination with each other or with a range of additional materials such as titanium, omega 3, monocryl, PVDF and hyaluronate [15].

In our study, polipropilene mesh has been used in most cases (91%).

When choosing a mesh, the surgeon must decide which properties are the most important for the specific situation. For example, materials such as ePTFE have a good profile for adhesion risk but a high risk of infection. In contrast, Polypropylene meshes are durable and have a low infection risk but they have little flexibility and a high adhesion risk [15].

Assessing the quality of life (QoL) in patients undergoing a ventral hernia repair is extremely useful to evaluate and measure the surgical outcomes in terms of reasonable functional and cosmetic outcomes, patient satisfaction, and acceptable complication rates [15].

Muysoms, [9] has used EuraHS Qol in a study including 101 patients that underwent unilateral laparoscopic inguinal hernia repair with ProGrip laparoscopic, self-fixating mesh. One of the conclusions was that EuraHS-QoL instrument is a short and valid patient-reported outcome measurement following groin hernia repair.

In our study we could notice that all the answers were statistically significant (p value=0.05) and the biggest difference was for the pain at the site of hernia/hernia repair pre-and postoperative (2.71±1.70; *p=0.23*). The ratio between the figures obtained for every answer is indicating that pain declines more postoperative (1.92-2.39) than the cosmetic discomfort (1.23-1.32). Maintaining the integrity of the abdominal wall after implantation is the main factor that leads to success in wall defect reconstruction. Therefore, the material used for reconstruction must be durable enough to withstand the physiologic forces placed upon it without losing its flexibility. It should also incorporate over time into the surrounding tissue [2].

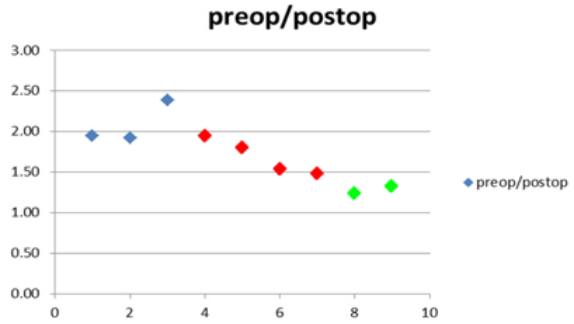

Fig. 6. Ratio between the number of answers/no of question pre- and postoperative

blue dots: pain domain; red dots: restriction of activities; green dots: cosmetic discomfort

Conclusions

Based on the obtained results the most used synthetic mashes for large ventral hernia repair were in order from polypropylene, polyester and Dacron. Polypropylene mesh has been used in most of cases and as for mesh position the most preferred was intraperitoneal. Immediate postoperative complications have been noted in 23.3% and wound infection accounted for 41.46% from all complications. Impact of surgical treatment on the patients' quality of life has been investigated in a comparative manner. We could notice that all the answers were statistically significant and the biggest difference was for the pain at the site of hernia/hernia repair pre-and postoperative. Synthetic mesh is a valuable option in case of large ventral hernia repair. Pain, restriction of activities and cosmetic comfort assessed pre-and postoperative by EuraHS-Qol is a measure of surgical outcomes.

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