SURGICAL TREATMENT OF LARGE MULTI-RECURRENT INCISIONAL HERNIAS BY SUBSTITUTION ALLOPLASTY

SUMMARY:
The surgical treatment of multi-recurrent large incisional hernias represents a problem of medical actuality which still requires studies and interpretations, meant to clarify the most correct therapeutic behavior to obtain the best results. Important progress has been made in this field by solving the principles of the surgical treatment based on more precise notions of anatomy and physiology and by knowing and interpreting the physical laws lying at the basis of the abdominal wall unbalance in incisional hernias. This paper is based on the experience of the Surgical Clinic I of Timisoara, on 350 cases (47.62%) of large and very large incisional hernias, 17.70% of which being multi-recurrent, solved by means of the alloplastic method. The election indication of the substitution synthetic prostheses in large parietal defects was based on the principle of avoiding the rise of the intra-abdominal pressure with repercussions on the diaphragm and avoiding tension in the parietal tissues, noxious factors in the production of respiratory failure and recurrences. The achievement of these requirements was possible by using synthetic meshes as substitution elements for the parietal defects. The Dacron (Mersilene), polypropylene (Marlex) and indigenous Plastex meshes provided good results by a moderate inflammatory reaction, adequate mechanical resistance, good elasticity and satisfactory biocompatibility. It results from the study that the substitution alloplasty in large and/or recurrent incisional hernias represents a therapeutic progress, the postoperative results being good in more than 90% of the cases.

KEYWORDS: large multi-recurrent incisional hernias, treatment by substitutional alloplasty.

TRATAMENTUL CHIRURGICAL ÎN EVENTĂȚII MARI MULTIRECIDIVATE CU MATERIALE ALLOPLASTICE DE SUBSTITUȚIE

REZUMAT:
Tratamentul chirurgical al evențăților mari multirecidivate reprezintă o problemă de actualitate medicală care necesită încă studii și interpretări, menite să aducă precizări în conducerea terapeutică cea mai corectă pentru obținerea celor mai bune rezultate. Progrese importante s-au făcut în acest domeniu prin rezolvarea principiilor tratamentului chirurgical pe baza unor noțiuni mai precise de anatomi și fiziologie și prin cunoașterea și interpretarea legilor fizice ce stau la baza dezechilibrelor peretelui abdominal în evențăți. Lucrarea se bazează pe experiența Clinicii I Chirurgie Timișoara, pe 350 de cazuri (47,62%) de evențății mari și gigante din care 17,70% multirecidivate, operate prin metoda alloplastică. Indicația de elecție a protezelor sintetice cu rol de substituție în defectele paretale mari s-a bazat pe principiul de a se evita creșterea presiunii intraabdominale cu repercuzii asupra diafragmului și de a se evita tensiunea în țesuturile parietale, factori nocivi în producerea insuficientei respiratorii și a recidivelor. Rezolvarea acestor deziderate s-a făcut posibil prin folosirea placilor sintetice ca element de substituție a defectelor parietale. Plasele de Dacron (Mersilene), de polipropilenă (Marlex) dar și ploasele indigene de tip Plastex au asigurat rezultate bune, printr-o reacție inflamatorie moderată, rezistență mecanică adecvată, elasticitate bună și biocompatibilitate satisfăcătoare. Din studiul efectuat reiese că alloplastia de substituție în evențății mari și/sau recidivate reprezintă un progres terapeutic, rezultatele postoperatorii fiind bune în proporție de depășesc 90%.

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INTRODUCTION

The surgical treatment of large multi-recurrent incisional hernias represents a chapter of pathology where the great number and variety of proposed surgical techniques demonstrate that the problem has not been completely solved yet. Important progress in this field has been made after the re-evaluation of the principles of surgical treatment based on more precise notions of anatomy, physiology and physiopathology and by being knowledgeable of the physical laws lying at the basis of the abdominal wall unbalance in the case of incisional hernias: Pascal’s law, the law of action and reaction and the law of tangential forces.

Besides a careful and thorough investigation of the patient, large recurrent incisional hernias require adequate surgical techniques, meant to achieve a solid closing of the abdominal wall without being detrimental to the major biological functions (respiratory, circulatory and digestive). These requirements have been met by introducing the alloplastic method for repairing the abdominal wall. The method, reservedly and shyly introduced in the surgical practice, nowadays makes real progress, through both the diversity of the synthetic materials used to substitute the parietal defects and the various application modes. Alloplasty enriches the therapeutic arsenal of large incisional hernias, its value being justified by the results.

MATERIALS AND METHODS

The present paper attempts to highlight the real value of alloplasty, based on the experience of 350 cases (47.62%) with large and very large incisional hernias, 130 (17.705) being multi-recurrent. The data have been obtained by studying the statistics of Surgical Clinic I during 11 years (1996 – 2006).

During this period several types of synthetic prosthetic material were used, depending on the possibilities of the moment. At the beginning we used nylon, which we abandoned when we were able to use other materials of superior quality such as Dacron (Mersilene) and the indigenous product Plastex. We used the following prosthetic materials(table1):

During the study period substitutional alloplasty was performed on 253 patients with large and very large incisional hernias (34.42%). Compared to reinforcement alloplasties (94 cases), substitutional alloplasty was three times more frequent. All the substitutional meshes were intraperitoneally placed.

RESULTS

The elective indication of substitutional synthetic prosthetic materials in large parietal defects was based on the following principles:
1. Avoidance of the increase of intra-abdominal pressure which may affect the diaphragm and induce acute respiratory failure phenomena
2. Avoidance of tension in parietal tissues which may result in the tendency to dehiscence and recurrence.

Several technical variants were performed (table 2):

In the case of the intra-peritoneal procedure of substitutional alloplasty (29.14%) we made a synthetic mesh with size according to the surface of the parietal

<table>
<thead>
<tr>
<th>TYPE OF SYNTHETIC PROSTHETIC MATERIAL USED</th>
<th>NO. OF CASES</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon (polyamide)</td>
<td>53</td>
<td>15.14</td>
</tr>
<tr>
<td>Dacron, Mersilene (polyesters)</td>
<td>143</td>
<td>40.86</td>
</tr>
<tr>
<td>Plastex – Romanian product (polyesters)</td>
<td>97</td>
<td>27.71</td>
</tr>
<tr>
<td>Marlex (polypropylene)</td>
<td>27</td>
<td>7.71</td>
</tr>
<tr>
<td>Prolene (polypropylene)</td>
<td>18</td>
<td>5.14</td>
</tr>
<tr>
<td>Teflon, Goretex Exp. (polytetrafluoroethylene)</td>
<td>12</td>
<td>3.43</td>
</tr>
<tr>
<td>Vicryl (polyglycolic acid)</td>
<td>32</td>
<td>9.14</td>
</tr>
<tr>
<td>Dexone (polyglycolic acid)</td>
<td>3</td>
<td>0.86</td>
</tr>
</tbody>
</table>
defect, to which we added approx. 4-5 cm around the hernia ring. The prosthesis is applied on the profound surface of the parietal peritoneum. For the prosthesis to be correctly fixed, certain rules must be observed. Their non-observance may lead to the prosthesis pleating if the fixation is too loose, wrinkles if the fixation is asymmetrical and disproportioned tractions. The procedure starts from the upper pole of the defect, fixing the upper angles, then the next threads are placed without being symmetrically fastened (anchored on clips), at equal distance from the ring edge, the last thread being fixed to the lower pole. The threads are fastened in pair, going from the upper part towards the lower part, so that, after fastening the last thread, the prosthesis is stretched but not stressed. Before the threads ligature, we place the great epiplone between the mesh and the intestinal loops to avoid the direct contact of the mesh with the viscerà and the formation of adherences. The suture threads are U-shaped, placed at 3-4 cm from the defect edge, drawn through the wall and knotted above the aponeurosis. The threads should not be too numerous to avoid ischemia. Normally the distance between threads is about 1.5-2 cm. In order not to leave sac bottoms between the edge of the aponeurosis defect and the prosthesis we apply a few isolated threads which fix the ring edge to the mesh.

Dr. Brînzeu and his collaborators greatly contributed to the improvement of results in the substitutional alloplasty treatment. Their technique is called compartmenting procedure. The hernia sac or a great part of it is kept till the end of the intervention, when it is applied over the defect closed by the prosthesis. We successfully applied the procedure in incisional hernias with large parietal defect (22.29%). In order to ensure a better integration of the prosthesis we fixed the profound surface of the compartmenting sac to the mesh with a few threads. By using this method the prosthesis is separated from the subcutaneous cellular tissue, the serum collections appearing underneath the compartmenting sac are drained into the peritoneal cavity, and those above the sac are evacuated by suction drainage. The contact between the sac and the prosthesis allows an easier integration of the synthetic mesh.

The intra-abdominal alloplasty procedure with double, non-resorbable mesh was used on our lot in 14.86% of the cases. The aim of the procedure was to offer the mesh a better resilience in the case of incisional hernias with very large parietal defect. The method was used in the case of nylon or Plastex meshes and only exceptionally with other types of mesh.

A similar procedure is the one which uses a slowly resorbable mesh in the interior, in direct contact with the viscerà, over which a second non-resorbable mesh (Mersilene) is placed. The procedure was used on our lot for 17 cases; in 3 cases we used Dexon as resorbable mesh and in 14 Vicryl, and as non-resorbable mesh we used Mersilene and Plastex prostheses. The reason for applying this procedure was to isolate the intestinal loops devoid of the protection of the great epiplone (resected during the previous treatments of the incisional hernia) from the direct contact with the non-resorbable mesh, thus avoiding the adherences between them.

In 4 cases we used the “sandwich” procedure recommended by Matopurkar. This procedure uses a non-resorbable mesh which is placed between two peritoneal sheets coming from the hernia sac, the aim of the procedure being the same as above, i.e. to isolate the viscerà from the contact with the prosthesis.

As far as the alloplastic treatment of the incisional hernia with the laparoscopic method is concerned, our experience is very limited. We treated only three cases with medium incisional hernias. The pneumo-peritoneum is performed by means of a Veress needle introduced in the abdominal cavity at the edge of the crests, as far as

<table>
<thead>
<tr>
<th>TECHNICAL VARIANT</th>
<th>NO. OF CASES</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Simple intra-peritoneal procedure</td>
<td>102</td>
<td>29.14</td>
</tr>
<tr>
<td>The compartmenting procedure</td>
<td>78</td>
<td>22.29</td>
</tr>
<tr>
<td>The “sandwich” procedure (double mesh)</td>
<td>52</td>
<td>14.86</td>
</tr>
<tr>
<td>The Trivellini procedure (double mesh, one resorbable)</td>
<td>17</td>
<td>4.86</td>
</tr>
<tr>
<td>The Metopurkar procedure (peritoneal “sandwich”)</td>
<td>4</td>
<td>1.14</td>
</tr>
<tr>
<td>Laparoscopic procedure</td>
<td>3</td>
<td>0.86</td>
</tr>
</tbody>
</table>

**TABLE II**

Technical variants of alloplasty with substitutional role
possible from the incisional hernia. The needles are introduced very carefully, in order to have a good visualization and position for the application of the mesh. A complete peeling is performed which allows the visualization of the entire surface of the parietal peritoneum, then the mesh is introduced in the abdominal cavity; it exceeds the edges of the parietal defect by 2-4 cm. The mesh is fixed by suture.

In general the problems appearing in the surgical management of large multi-recurrent incisional hernias are difficult to solve. The common pathology associated to these patients, who frequently undergo multiple surgical interventions, is given by age, obesity and cardiovascular diseases. The surgery which reduces the volume of the peritoneal cavity exposes the patient to severe cardiovascular and respiratory complications. The surgical treatment of incisional hernias must ensure the replacement of the abdominal parietal defect and re-establish the normal physiology of the abdomen. As it results from the literature and our experience, these requirements are met by the mesh treatment of the incisional hernia. The repair involving the use of the mesh to close the parietal defect has significantly lower recurrence rates than the sutures. In our statistics the recurrence rate following alloplastic treatment is 3% compared to the recurrence rate following simple suture, which is 10 times higher (34.26%). The main cause of recurrence in the alloplastic treatment was the parietal infection. 22 patients had superficial infections which did not affect the mesh, and in 13 cases (1.77%) it was necessary to remove the mesh because of profound infections.

In general the postoperative results of substitutional alloplasty were good, more than 90% of the patients resuming their normal activity.

**COMMENTS**

The surgery of large multi-recurrent incisional hernias has been significantly modified lately, which made it possible to treat such patients with a high success rate. The Dacron (Mersilene), polypropylene (Marlex, Prolene) meshes, as well as the indigenous ones such as Plastex, have a number of advantages which ensure good results by modest inflammatory reaction, strong fibroblastic response, good elasticity, adequate resistance, satisfactory tissue acceptability and minimum risk of infection.

We consider that the intra-peritoneal insertion of the substitution synthetic mesh is a safe and efficient method for the treatment of large multi-recurrent incisional hernias. It is a simple method, which does not require the dissection of the intermediate layers, thus drastically reducing the incidence of postoperative infection. We recommend the fixation of the prosthesis to the dorsal surface of the parietal defect, as far as possible from its edges (3-4 cm), and the mesh should be sutured with isolated threads at small distance (1.5-2 cm). The mesh should be fixed tension-free and must be stretched, without wrinkles. The contact between the mesh and the intestine should be avoided because of the risk of adherences, bowel obstruction and fistulae. That is why we interpose the great epiploane or a resorbable mesh if this one is not available.

Substitutional alloplasty represents a remarkable progress in the surgery of large recurrent incisional hernia, with a low incidence of recurrences and complications, reason for which it should be recommended in all the cases for which it is suitable. The good results pertain to a great extent to the asepsis and accuracy of the surgical technique, but also to the complementary therapeutic measures of the associated diseases and the correct postoperative attendance.

**CONCLUSIONS**

1. Large multi-recurrent incisional hernias require adequate surgical techniques, meant to achieve a solid obliteration of the parietal defect without being detrimental to the respiratory, cardio-circulatory or digestive functions. This has been possible by introducing the alloplasty method to repair the abdominal wall.

2. Substitutional alloplasty was performed on 253 patients with large and very large incisional hernias during 11 years, using various types of synthetic prostheses: Nylon, Mersilene, Plastex, Marlex, Prolene, Goretex Exp., Vicryl and Dexon. The fixation technique of the meshes was endoperitoneal.

3. The postoperative results were good in over 90% of the cases, the synthetic prostheses were integrated by the organism, offering a solid resistance of the abdominal wall, without affecting the major functions, with a low recurrence and complications rate (3%).
BIBLIOGRAPHY