



# Technical Aspects of an Improved Method of Combined Alloplasty of Hernias of the Anterior Abdominal Wall

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## Abstract

For practical surgery, the first domestic mesh prosthesis with a composite coating has been developed for use in allohernioplasty of ventral hernias. Taking into account the fact that modern herniology continues to actively use plastic surgery methods with fixation of the prosthesis in the onlay position, which are characterized by a higher frequency of paraprosthesis complications, this article presents an improved method of combined alloplasty of hernias of the anterior abdominal wall, aimed at reducing the frequency of specific postoperative complications.

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## Introduction

Over the past few decades, the concepts of the biological basis of the development of ventral hernias, surgical techniques and the use of biomaterials for abdominal wall plasty have significantly expanded. Biomaterials significantly improved the postoperative course with a significant reduction in the recurrence rate from 50% to less than 20% [1]. However, there are different opinions in this regard. Despite the fact that it has been proven that prosthetic allohernioplasty led to a decrease in the frequency of relapses, the negative aspect of this type of

surgery was a higher risk of developing wound complications compared with restoration with local tissues only [2-4]. The placement of a foreign body such as a mesh can lead to serious adverse reactions, including pain, infection, fistulas and the formation of adhesions in the abdominal cavity. In fact, there is little data in the literature on long-term complications after abdominal wall prosthetics and their association with early complications, and it is difficult to accurately determine the true frequency of late complications associated specifically with the use of mesh. Retrospective studies are often misleading, as they



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involve a relatively small number of patients, and the follow-up period is usually too short to identify the occurrence of complications associated with the use of the grid, which can also occur after a long period of time [5].

Recently, the literature has reported an increase in the number of cases of wound infection, formation of intra-abdominal adhesions, migration of the prosthesis and other complications [6,7]. Visceral complications associated with the mesh can occur when a reaction to a foreign body affects the organs of the abdominal cavity. The biological properties of the meshes, related to the type of material structure, fiber type, and pore size, play a role in the safety and tolerability of the biomaterial. However, direct contact between the prosthesis and internal organs seems to underlie the pathogenesis of these complications. Adhesions are a very common finding during repeated surgery. When placing prosthetic material, an inflammatory reaction may occur, leading to adhesions between the mesh and abdominal organs [8]. Although manufacturers have used various strategies to minimize the formation of adhesions, a safe prosthesis has not yet been created.

The complications associated with the mesh represent unusual but severe consequences of surgery, the pathogenesis of which is still not completely clear. Indeed, there has been an increase in these complications associated with the dominance of laparoscopic techniques in the new era of hernioplasty, suggesting that the distance between the mesh and the peritoneum may be an important factor [9].

It has been reported in the literature that the method of plastic surgery and the type of prosthesis affect the frequency of wound complications and the possibility of migration of the prosthesis along anatomical planes. A mesh infection can be a severe complication of prosthetic plastic surgery with serious consequences, prolonged hospitalization and increased costs. Its frequency ranges from 1 to 10%, depending on the technique, patient population and type of mesh prosthesis [10]. Traditionally, the initial treatment is conservative, based on intravenous administration of antibiotics, percutaneous or surgical drainage, and treatment of wounds with negative pressure, but in deep prosthetic infections with the formation of abscesses, mesh removal is often required [10]. Mesh removal can be complete or partial, but it is always a difficult task for both surgeons and the patient, as it is a technically complex procedure requiring good knowledge of anatomy and surgical skills, as well as accompanied by the development of postoperative complications in 36-50% of cases with prolonged hospitalization [11].

Thus, prosthetic repair of ventral hernias continues to gain popularity, but surgeons are likely to see more patients with complications related to the use of mesh, since no technique or material for hernia repair has demonstrated immunity to these complications. However, it has been clearly demonstrated that the use of mesh to enhance recovery is associated with a much lower risk of recurrence compared to local tissue grafting. Therefore, research on the development of new various approaches and methods remains an urgent task of modern surgery, while taking into account not only the size of the initial hernial defect, the type of plastic surgery, the exact anatomical location of the mesh, the technique of fixing the mesh, but also the improvement of the mesh material, which would contribute to reducing the frequency of various wound and abdominal complications.

To improve the method, the following task was set: Reducing the traumatic nature of the operation, improving the immediate (prevention of gray and specific prosthetic complications)

and long-term results of the operation, such as adhesive disease, improving the process of engraftment of a synthetic mesh prosthesis.

The method is performed as follows:

Mobilization and isolation of the hernial sac and hernial gates are performed;

Next, a longitudinal dissection of the hernial sac is performed along a conditional longitudinal line dividing the walls of the sac into 1/3 and 2/3, after which the contents of the hernial sac are mobilized and immersed into the abdominal cavity.

On the side of a larger area (2/3) of the dissected hernial sac, the anterior abdominal wall is mobilized over the aponeurosis at a distance of at least 5 cm from the edge of the hernial gate.

After that, a Synthetic Mesh Prosthesis (SMP) with dimensions corresponding to the volume of the planned plastic is placed on top of the specified free edge of the wall of the dissected hernial sac, one side edge of which is brought under the subcutaneous tissue over the selected area of aponeurosis, and from the other edge a free sheet of peritoneum from the hernial sac is turned on the prosthesis in such a way that the edge of the prosthesis turns into a fold from the duplication of the peritoneum (from the 2/3 side) and the latter are stitched together along this edge of the prosthesis with a continuous suture of vicryl 3.0;

Next, from the side of the created peritoneum duplication with SMP, at a distance of 4-5 cm from the edge of the hernial gate, the parietal peritoneum is ellipsoidally dissected parallel to the hernial defect, the latter is separated with the formation of a 1.0-1.5 cm wide area from the edge of the dissection and the edge of the SMP with the peritoneum duplication fixed to it is sewn to this area to the posterior leaf of the vagina of the rectus abdominis (according to the sublay method) 2/0 is cut with a continuous seam.

The upper edges of the hernial gate are sewn together for at least 3 cm with the involvement of the corresponding zone of the prosthesis into the seam, the lower edges of the hernial gate are sewn in the same way;

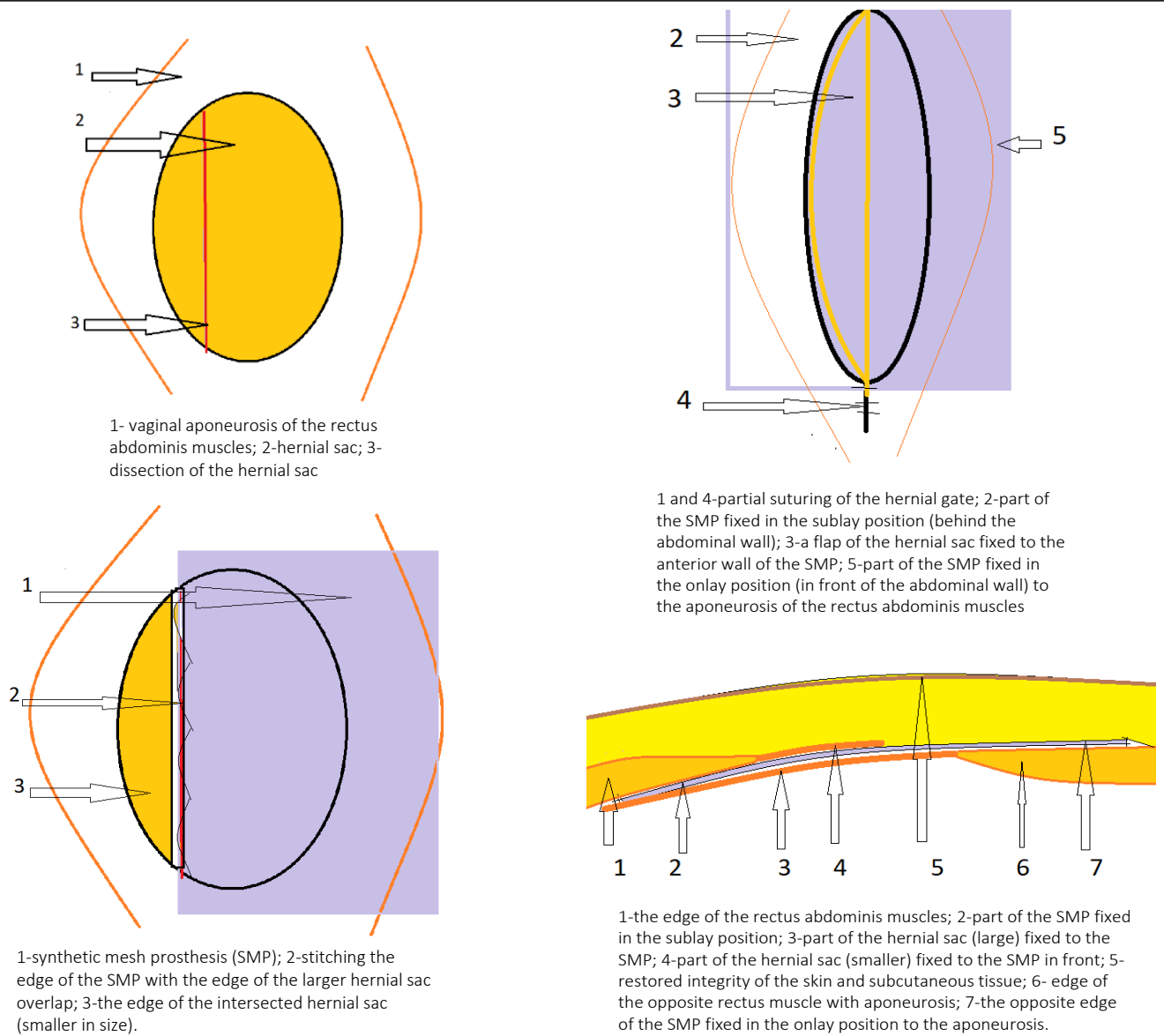
After that, the remaining free edge of the SMP is sewn to the surface of the anterior wall of the aponeurosis (according to the onlay method) with a continuous seam of 2/0;

The free flap of the peritoneum remaining on the side of strengthening the prosthesis to the posterior sheet of the vagina of the rectus abdominis muscle is sewn to the SMP over the latter with a continuous suture with a vikril 3/0 thread;

Drainage is introduced into the wound, which is removed through the contrapperture to the outside and the subcutaneous tissue and skin are sutured.

The main essential signs that cause an improvement in the result of allohernioplasty are the following:

The free edge of the dissected hernial sac is wrapped on one side on the edge of the SMP and sewn with a continuous suture of vicryl 3.0; on the other hand, at a distance of 4-5 cm from the edge of the hernial gate, the parietal peritoneum is dissected along the hernial defect with the formation of a 1.0-1.5 cm wide area; An SMP with a peritoneum fixed to it is sewn to the posterior leaf of the aponeurosis of the rectus abdominis muscle in the area of the dissected parietal peritoneum with a continuous suture prolene 2/0; the upper and lower edges of the hernial



**Figure 1:** Scheme of the method of combined alloplasty of hernias of the anterior abdominal wall

gate are sewn at a distance of at least 3 cm with SMP involvement in the seam; the free edge of the SMP is sewn to the anterior wall of the rectus abdominis aponeurosis with a continuous seam of prolene 2/0; the free flap of the peritoneum is sewn to the surface of the SMP with a vicryl 3/0 thread (Figure 1).

The advantages of the method are due to the following causal relationship between the distinctive / essential features of the claimed method and the achieved result:

As a result of fixation of the (SMP) to the hernial sac, the “exposure” of the prosthesis from the abdominal cavity is prevented and, accordingly, the formation of adhesions between the organs of the abdominal cavity and SMP;

Fixation of the SMP in the sublay position on the one hand helps to prevent the development of paraprostatic hernia recurrence;

The formation of a site after dissection of the parietal peritoneum contributes to better engraftment of SMP to the anterior abdominal wall;

Mobilization of the anterior wall of the aponeurosis on only one side allows you to create a large area for fixing the mesh, and also reduces the risk of formation of subcutaneous seromas;

Covering the SMP with a loose leaf of the hernial sac helps to further reduce the risk of seroma formation in the area of the surgical wound;

In general, the traumatic nature of the operation decreases, the risk of developing specific prosthetic complications, and the process of SMP engraftment improves during alloplasty of large and giant postoperative hernias of the anterior abdominal wall;

Thus, a method of corrective alloplasty of hernias of the anterior abdominal wall has been developed, characterized by a combined option for fixing a mesh prosthesis, providing reliable non-protracted correction of a hernial defect, as well as adequate isolation of the implant from the abdominal organs and the zone of the mobilized subcutaneous fat layer.

**Conclusion**

An improved method of corrective allohernioplasty with a combined option for fixing a mesh prosthesis in large and giant ventral hernias provides reliable non-protracted correction of an anterior abdominal wall defect, adequate isolation of the implant from the abdominal organs and the zone of the mobilized subcutaneous fat layer, and also reduces the traumatic nature of the operation and the risk of developing specific prosthetic complications.

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