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Minimally invasive lipoabdominoplasty (MILA) tactic

Lipoabdominoplastia minimamente invasiva - Tática MILA

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ABSTRACT

While diastasis recti (DR) was long neglected by general surgeons, plastic surgeons considered conventional abdominoplasty as the only repair option. However, this scenario has changed recently, either due to a better understanding of the correlation between DR and abdominal wall function and greater risk of recurrence in abdominal hernia repairs, or due to the development of new minimally invasive techniques for repairing DR. One of these surgical procedures consists of the concept of an abdominoplasty, that is, supra-aponeurotic dissection and plication of the DR (with or without abdominal hernia) but performed through three small supra-pubic incisions by laparoscopy or robotic approach. More recently, this procedure has gained new stages. Liposuction and skin retraction technology have been associated with MIS plication of DR, which increases the indications for the technique and potentially improves results. For the first time in the literature, we describe these steps and the synergy between them.

Keywords: Rectus Abdominis. Diastasis, Muscle. Abdominoplasty. Hernia.

INTRODUCTION

Diastasis Recti (DR) has long been neglected by general surgeons. The apparent absence of symptoms and complications led the surgeons to differentiate them from abdominal hernias[1,2]. Signaling the need for a large longitudinal incision in the midline of the abdomen as an alternative repair made it clear that the cost of treatment did not outweigh its potential benefits.

However, plastic surgeons have always provided alternatives for DR repair through abdominoplasty. However, for a significant group of patients, mainly those without excess skin and subcutaneous tissue, this option did not meet the expectations.

Recently, several changes have been made in this regard. First, understanding that DR has a significant impact on the risk of recurrence in abdominal hernia repairs and understanding the functions of the abdominal wall far beyond just containing the abdominal organs[3,4]. In addition, there is a recent description of numerous minimally invasive, laparoscopic, or robotic techniques for repairing DR with or without abdominal hernias[5,6].

Associated with DR plication using minimally invasive techniques, liposuction and skin retraction techniques have expanded the number of patients who can benefit from this type of procedure without the need for classic abdominoplasty[7].

The purpose of this article is to describe the systematization of the Minimally Invasive LipoAbdominoplasty (MILA) tactic, which consists of three main stages:1. Liposuction; 2. DRA MIS plication; 3. Skin Retraction.

Technical Description

Stage 1: Liposuction

Liposuction incisions were positioned according to the surgeon's preference, with at least two suprapubic incisions made in suprapubic positions (4–5cm away from the midline) coinciding with the

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lateral surgical ports of the second stage (Figure 1). The site of a previous C-section incision can be used. An additional incision can be made just above the navel. We started infiltrating the subcutaneous fat tissue with a combination of 1000cc saline, 1 vial of lidocaine 2%, and 1 vial of adrenaline 1%, with a final volume of 2-3 liters was infiltrated.

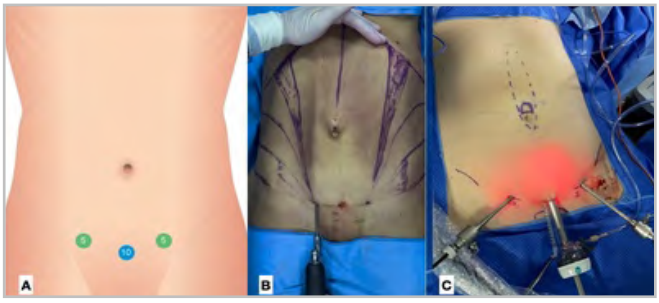

Figure 1. A - schematic figure with position of incisions for the 3 stages of the MILA tactic; B - surgical photo of liposuction; C - surgical photo of laparoscopic ports placement for DR plication.

The next step is to apply energy to emulsify fat. This can be performed using a ultrasound -assisted or laser lipolysis equipment. Most of this equipment was used throughout the previous incisions for 1 min for every 100cc of infiltrated fluid.

Then, aspiration of subcutaneous fat tissue can be performed with different definition intensities and assisted by power equipment and cannulas according to plastic surgeons' preferences and goals. Therefore, it is important to avoid "aggressive cannulas", such as scratchers, baskets, or any other that can damage the connective tissue. Maintaining connective tissue is important for the success of skin retraction techniques, which is the last step of the procedure. In patients with midline hernias, liposuction of this region can cause damage to the hernia contents. In these cases, liposuction of the lateral portions of the abdomen is normally performed while midline liposuction is carried out only after the hernia repair performed in stage 2.

Stage 2: Endoscopic plication

With the patient in a supine position, the surgeon is positioned laterally between the patient's legs and the assistant. In robotic approaches, the abdomen may be flexed with the hips located at the level of the flexion joint of the table to decrease arm collisions. A small 2cm transverse midline incision was made just above the pubis. The subcutaneous tissue is dissected until it reached the anterior aponeurosis of the rectus abdominis muscle. The pre-aponeurotic plane is dissected to create enough space to insert the optical trocar, and two assistant 5mm ports are positioned 4-5cm laterally. In patients with a previous cesarean section incision, ports are placed on the incision site (Figure 1).

The cutaneous abdominal flap is dissected in a preaponeurotic plane from the pubis to the xiphoid and subcostal margins, as described in traditional abdominoplasty. The CO_2 insufflation pressure is maintained at 6-10mmHg. Hernia sacs are found as projections from the aponeurotic muscle plane toward the upper subcutaneous tissue (usually containing preperitoneal fat).

In cases where prior liposuction is performed, the diffusion of gas into the subcutaneous tissue occurs quickly due to the prior partial "dissection" of this space. Likewise, the dissection itself of the subcutaneous tissue of the aponeurotic plane is greatly facilitated by the prior removal of much of the fat. There are only a few beams or septa of connective tissue left to be released (Figure 2).

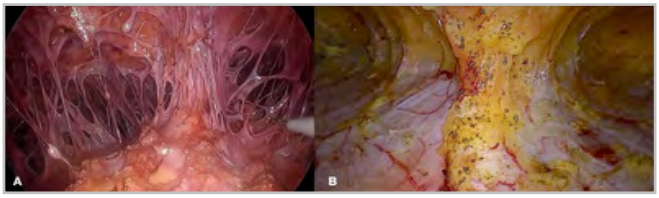

Figure 2. Surgical photo of subcutaneous dissection. A - with liposuction, only a few strands of connective tissue remain for dissection; B - without liposuction, it is necessary to perform supraaponeurotic detachment of all subcutaneous fatty tissue.

In order to reduce the risk of seroma and changes in vascularity and skin sensitivity, we currently recommend less extensive lateral dissections; 3-5cm on each side seems more than enough (Figure 3). Connective tissue lateral to the plication must be kept intact for better action of the skin retraction technologies that will be applied in stage three (Figure 3B)

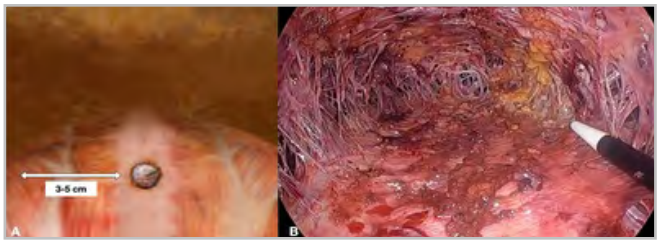

Figure 3. A - schematic figure demonstrating the extent of the lateral dissection; B - surgical photo demonstrating, in addition to the more restricted lateral dissection, the maintenance of the subcutaneous fibro-connective septa.

Plication of DR (with or without hernias) is performed through a single continuous suture, from the xiphoid to close to the pubis (Figure 4). Lower plication is best performed by continuing the suture through a small incision made to create the initial space. The use of barbed sutures facilitated this step.

The indication for mesh use depends on the size of the hernia and the patient's expectations. Medium weight polypropylene or monofilamentar polyester mesh with large pores is inserted through the (11mm) trocar in the craniocaudal direction and laterally overlapping the whole plication by about 3-4cm (Figure 5). Mesh can be fixed using sutures or surgical glue. Is just important to emphasize that mesh should be properly secured in an "onlay" position.

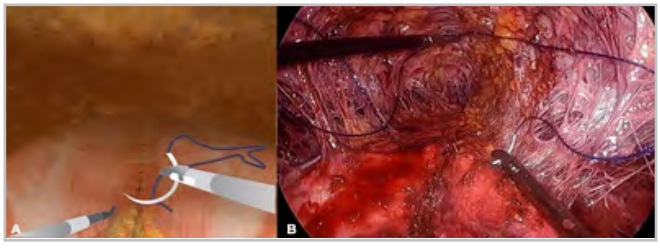

Figure 4. Plication of DR. Figure B, a less extensive lateral dissection can be seen, as well as the maintenance of the fibroconnective septa.

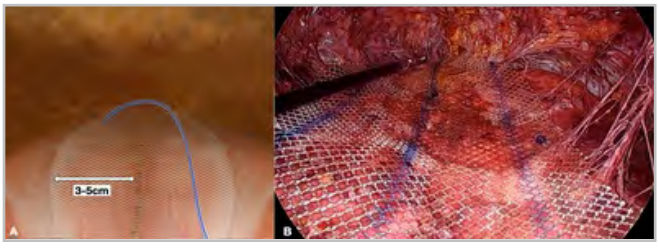

Figure 5. Principles of mesh placement after DR plication.

Fixation of the umbilicus stalk back to the musculoaponeurotic plane is then performed using simple sutures.

Stage 3: Skin-tightening technologies

Skin retraction equipment was used through the same incision used for liposuction and DR plication. The most known options are: monopolar radiofrequency with helium gas (Renuvion®); radiofrequency equipment (BodyTite® and ArgoPlasma®) or Laser Diodo 980. Each device has its own specifications and the surgeon's learning curve.

These technologies are applied through handpieces or cannulas with fiber optics and act by causing retraction of the fibers of the fibroseptal network[8-11]. There is also thermal stimulation and effect on fibroblasts for collagen formation in the dermis (Figure 6). None of the technologies have their effectiveness or application safety altered due to the carbon dioxide used in stage 2.

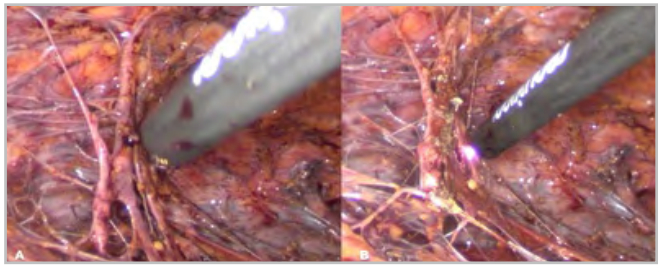

Figure 6. Surgical photo of the action of skin retraction technologies applied to the connective tissue septa.

As a recommendation for use for the lateral areas of the abdomen, follow the protocol recommended by the manufacturers and the plastic surgeon's experience regarding power, number of strides and speed in centimeters/second[8-11]. For the central area, the area of dermal-fat detachment, a 30 to 40% reduction in parameters is recommended in relation to the power used in the lateral areas.

It is important to evaluate skin perfusion throughout stage 3 to reduce risks related to the application of technologies, especially burns and damage to the subdermal vascular plexus.

Finally, one or two suction drains were placed in the subcutaneous space to reduce the risk of postoperative seroma. Baroudi stitches can also be used to reduce the seroma. However, using endoscopic techniques, they are technically difficult to perform.

DISCUSSION

For a long time, DR was considered of little importance to general surgeons. As the initial association was "only" with aesthetic issues, it was addressed for repair by plastic surgeons. However, this concept has changed recently. On the one hand, the understanding that the abdominal wall functions far beyond just containing the organs and the correlation between a higher risk of recurrence in hernia repairs associated with DR and, on the other hand, the description of several new MIS techniques for repairing DR associated or not with abdominal hernias[3-6].

Among these techniques, we can highlight the supra-aponeurotic plication described in the literature with different names (SCOLA, REPA, etc.) that follow the same principles as a classic abdominoplasty, that is, subcutaneous detachment from the lower abdomen to the costal space followed by midline plication; however, in this case, it is performed through small incisions (laparoscopic or robotic)[12-14].

Despite initial discrepancies between authors regarding its use, this technique is well indicated for patients with DR, whether associated with small hernias of the anterior abdominal wall, without excess skin or fatty tissue. Although patients with larger incisional hernias can also be treated with this alternative, most authors understand that there are better options in terms of results, complications, and long-term recurrence, especially with retromuscular techniques. Although prospective studies with longer follow-up periods may be lacking, the results published thus far have shown good results in terms of DR/hernia recurrence, complications, and degree of patient satisfaction[12-15].

Although the principle of the technique is not new, it was published by the Brazilian plastic surgeon Marco Faria Correa about 30 years ago and was revived by general surgeons using the principle of laparoscopy and the use of carbon dioxide gas to help create the operative field and the dissection[16]. The technique initially described was intended only for the treatment of DR with or without abdominal hernias. This fact seems to limit the indications for the technique, as many patients, in addition to DR, have some degree of skin flaccidity and eventual excess of subcutaneous fat tissue.

Aware of this fact, considering the increasing application of the technique and patient satisfaction, some plastic and general surgeons have begun to work together to find alternatives. Thus, a new concept emerged: the Minimally Invasive Lipoabdominoplasty (MILA) tactic. MILA offers the possibility of treating patients with DR without excess skin that is, without indication or desire for an abdominoplasty incision, removing a small excess of subcutaneous fat tissue, and promoting retraction of skin flaccidity.

In addition, these steps act synergistically and complementarily. The same incisions used for the ports in endoscopic plication were used for liposuction (first stage) and for the skin retraction devices in the third stage. Furthermore, liposuction facilitates supra-aponeurotic dissection by removing most of the fat. Another interesting aspect observed on a preliminary basis was the lower incidence of seromas in the postoperative period. This may be explained not only by the smaller detachment, but also by the greater retraction and fibrosis of the skin and subcutaneous tissue caused by the third stage.

The concept of abdominoplasty includes improving: abdominal strength through correction of DR; body contouring through liposuction; sagging skin through resection of the excess. Repairing DR through endoscopic MIS techniques (laparoscopic or robotic), excess fat and contour through liposuction and sagging through skin retraction techniques, we can perform an abdominoplasty in a minimally invasive way - MILA.

Since the introduction of the laser in its different presentations and wavelengths, it has become possible to achieve better levels of skin retraction[17]. This is especially due to the photothermal effect and stimulation of collagen remodeling with up to 30% more retraction than liposuction alone[18-19]. Nagy & Vanek documented in 2012 that the effect of skin retraction was approximately 50% greater with the aid of soft ultrasound (Vaser)[19]. With the evolution of technologies

and the use of new elements, such as radiofrequency and plasma jets, a new level can be established.

There is no literature that can support the superiority of any of the skin retraction equipment, with the plastic surgeon's experience with the equipment being the biggest determinant in the choice. Considering the area detached from the dermal-fat tunnel dissected to perform the plication, there will be a smaller fibroseptal network in the central area of the abdomen. This raises the question about the effectiveness of equipment for this area. However, the impression is that even with the use of the flap, there is an effect of skin retraction or this is enhanced by the scarring process of the flap itself on the fascia.

Although there is still no consensus on the precise indications for this technique, the authors have used as a reference: 1) BMI (body mass index) below 27/28Kg/m^2 (associated liposuction expanded the indication in relation to BMI compared to patients submitted only to endoscopic plication); 2) good skin quality, that is, without stretch marks, as in this case skin resection is necessary in most cases; 3) diastasis recti not exceeding 4/5cm as well as associated abdominal hernias not exceeding 3-4cm in width, as the risk of recurrence with this technique in these cases is potentially high. We believe that MILA technique can replace many of the current indications for mini-abdominoplasty (which continues to play a role especially when it is also necessary to treat poor quality skin).

In these patients, most of whom are thin, DR plication can result in a slight bulging of the skin in the midline (due to the approximation of the musculo-aponeurotic plane). However, when this bulging occurs, it naturally disappears in the first 4-6 weeks with the accommodation/adherence of the skin to the deep planes.

Considering the evolution of skin retraction equipment in recent years in terms of effectiveness and safety, it is believed that more patientes will be able to benefit from MILA Tactic and not just those who do not have sagging skin. We are still waiting for studies that make clearer the percentage of skin retraction that each piece of equipment is capable of.

CONCLUSION

Recent recognition of the role of DR not only in the aesthetic issue but also in the functionality of the abdominal wall and also greater risk of recurrence in abdominal hernia repairs, has brought more attention to this problem. Likewise, MIS alternatives for the repair of DR associated or not with abdominal hernias have gained popularity not only with surgeons but also patients.

Pre-aponeurotic plication presents very encouraging initial results for patients with DR and without excess skin or subcutaneous fat tissue. However, indications are limited. Aggregation of liposuction and skin retraction technologies has increased the indication of the technique and can potentially improve the degree of patient satisfaction. But undoubtedly, studies with clinical results and longer-term follow-up are still needed to confirm these initial impressions.

RESUMO

Embora a diástase de reto abdominal (DR) tenha sido negligenciada por muito tempo pelos cirurgiões gerais, os cirurgiões plásticos consideravam a abdominoplastia convencional como a única opção de reparo. No entanto, esse cenário mudou recentemente, seja pelo melhor entendimento da correlação entre DR e a função da parede abdominal e o maior risco de recorrência na correção de hérnias abdominais, seja pelo desenvolvimento de novas técnicas minimamente invasivas (MIS) para reparo da DR. Um desses procedimentos cirúrgicos consiste no conceito de abdominoplastia, ou seja, dissecção supra-aponeurótica e plicatura da DR (com ou sem hérnia abdominal), mas realizada através de três pequenas incisões suprapúbicas por laparoscopia ou abordagem robótica. Mais recentemente, esse procedimento ganhou novas etapas. A lipoaspiração e a tecnologia de retração da pele têm sido associadas à plicatura MIS da DR, o que aumenta as indicações da técnica e potencialmente melhora os resultados. Pela primeira vez na literatura, descrevemos essas etapas e a sinergia entre elas.

Palavras-chave: *Diástase Muscular. Abdominoplastia. Hérnia. Reto do Abdome.*

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