

Progressive Tension Suture in Abdominal Flap

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ABSTRACT

Abdominoplasty, known as the procedure through which an abdominal skin flap resection is performed by removing remnants of fat and skin, is considered one of the four most frequently performed medical-surgical interventions in the United States. Over the years, for the development of the process, it has been decided to carry out the original technique implemented by the plastic surgeon Ivo Pitanguy, however, due to the frequency of associated complications and the report of unsatisfactory results, Various authors have generated a series of modifications to the surgical technique, among which the performance of progressive tension sutures stands out, the objective of which is to guarantee adequate adhesion of the flap with the deep layers of the abdominal part and prevent the development of two of the main factors related to complications of the procedure, which are the displacement of the tissue and the formation of free space. In this document you will find a systematic review of specific data on the performance of progressive tension sutures for abdominal flap fixation in order to broaden the associated knowledge and promote the optimization of the results achieved.

KEYWORDS: Abdominoplasty; Flap; Technique; Complications; Suture; Adhesion

INTRODUCTION

Aesthetic surgery as a branch of plastic surgery is responsible for developing surgical and non-surgical procedures that aim to improve congenital or acquired human conditions that require repair or replacement of body shape and function [1]. For its part, abdominoplasty is a surgical procedure that consists of the

reconstruction of the abdominal wall by removing or eliminating excess skin and fat, which is performed in order to obtain a more stylized figure or a flat abdomen [1,2]. This procedure is recognized as one of the most frequent medical interventions worldwide with the ability to generate impact not only on a physical level but also on a mental and emotional level.

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In abdominoplasty and specifically in the positioning of abdominal flaps, the classic method used during the process has been defined by the plastic surgeon Ivo Pitanguy [2], however, over the years and with the aim of reducing the occurrence of reported complications, various authors have presented modifications in the technique, among which the use of progressive tension sutures (PTS) stands out, since it has been ensured that by means of them it is possible to guarantee early adherence of the abdominal tissue with the flap and the muscular fascia, interrupting the movement by shearing and preventing the formation of the space recognized

as potentially free [3]. Ricardo Baroudi and Carlos Affonso in 1998 introduced padded sutures as a prevention method for the development of seromas by bringing the deep layer of the flap closer to the deep fascia of the abdomen (Figure 1) while, in 2004, doctors Todd Pollock and Harlam Pollock reinforced the use of PTS, pointing out a very low local complication rate compared to historical controls, which could be demonstrated based on figures that evidenced timely recovery in patients as well as effective reinstatement of their functional capacity [4,5].

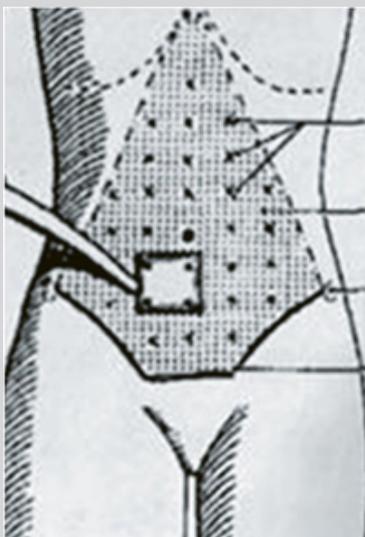


Figure 1: Technique or Baroudi points.

The ideal candidate for the tummy tuck procedure is defined as one who is young, healthy, non-smoker, close to ideal body weight, with minimal excess skin or fat, psychologically stable, and with a full understanding of the implications and expectations of the procedure, however, candidate patients rarely present these characteristics, which conditions an increase in the number of post-surgical complications that have been fully defined and studied, understanding that they largely trigger the occurrence of complications as well as a significant increase in indicators related to morbidity and mortality [6]. The main complication associated with abdominoplasty is seroma, for which incidence rates of up to 20% have been reported, causing repercussions related to infection, wound dehiscence, patient discomfort, pseudobursa formation, and adverse aesthetic changes [7]. Finally, taking into account the above, the importance of developing frequent investigative processes that allow healthcare personnel to remain in the process of scientific updating, improve known techniques and venture into carrying out new procedures in order to improve results should be highlighted, as well as the level of satisfaction after the event.

METHODOLOGY

For the development of this document, a systematic review of bibliographic references was carried out in specialized data sources such as PubMed, Google Scholar, Scielo, Elsevier and Medline using terms such as "Abdominoplasty", "Modified technique", "Suture", "Progressive tension" and "Abdominal flap". After verifying the results obtained, the presence of a total of 15 articles in the Spanish and English languages that met the characteristics of having been carried out from the year 2010 and included information related to the implementation of the tension suture technique were identified, progressive in abdominal flap.

DISCUSSION AND RESULTS

Abdominoplasty is the fourth most common cosmetic procedure in the United States according to statistics published by the American Society for Aesthetic Plastic Surgery in 2018 [5], a situation that continues to grow due to the popularity of the interventions and the satisfactory results in patients. Patients, however, throughout the evolution of the technique (as in all procedures) associated complications have continued to be reported as frequent and conditions a greater requirement for follow-up time by the surgeon as well as the appearance of possible chronic conditions that are difficult to manage that increase the figures related to morbidity and mortality worldwide. According to Pollock [1] it has been reported that abdominoplasty generates a high risk of early complications within which seroma presents the highest incidence (10.9%) with various theories about its etiology (concomitant liposuction, dead space due to dissection extensive, interruption of the abdominal lymphatics and post-surgical movement by the patient) while, in other studies, the frequency has been reported as variable [4,8]. Additionally, various authors, including Pollock [1] have shown that the seroma fluid aspirated at various times after surgery is initially an exudate of inflammatory origin and that only around 2 weeks after the procedure, the presence of characteristics related to the composition of the lymph is evidenced, indicating that inflammation is essential for the development of the condition. According to Hatef et al. [7] other complications such as skin necrosis or VTE, although much less common, are equally a reason for investigation. Taking into account the above, over the years the need has arisen to implement new systems for the comprehensive care of the patient that include a series of interventions carried out by healthcare personnel, among which practices related to

the placement of drains stand out. , external compression, use of tissue adhesives, progressive tension sutures (PTS), avoidance of electrocautery during the surgical procedure, preservation of lymphatics, or restriction of the amount of flap elevation.

According to Isaac et al. [8] in addition to Pollock [1], the concept of PTS is simply an adaptation of the basic surgical principles through which the securing of the abdominal flap is sought from an advanced position by means of sutures arranged between the superficial and deep fascia in order to favor control of two factors that are considered determinant for the results derived from aesthetic procedures such as abdominoplasty: dead space and flap movement (Figure 2,3). This is accomplished by effective union of the two tissue planes, which provides resistance to disruption during early healing and helps prevent fluid

accumulation by eliminating the risk of flap displacement derived from the characteristic wide range of motion. at the abdominal level (flexion, extension, rotation). The first suture is placed at the highest dissection point at midline level, remembering the importance of suture being deep enough to include Scarpa's fascia while the surgeon advances the flap with the non-dominant hand to the site where it will be secured (Figure 4,5). Subsequently, the umbilical region is located where 4 points are made at 12, 3, 6 and 9 o'clock to finally perform an additional progressive tension suture 2 centimeters away from the midline with greater spacing and in a more random manner to achieve tissue adaptation to the degree of undermining obtained. Once the lower edge of the wound is reached, excess skin is removed, closing the dermis and skin in the usual way [8-13].

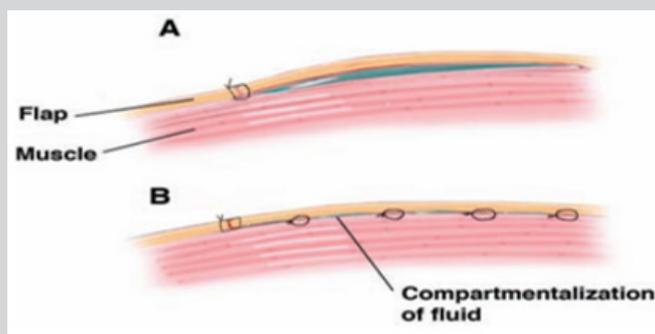


Figure 2: Transverse illustration of the advanced flap. Comparison of dead space and presence of free fluid in flaps without PTS (A) and with PTS (B).

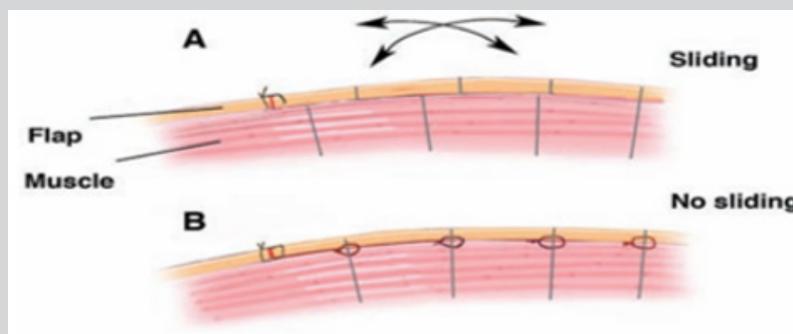


Figure 3: Cross-sectional illustration of the advanced hang without PTS (A) and with PTS (B).

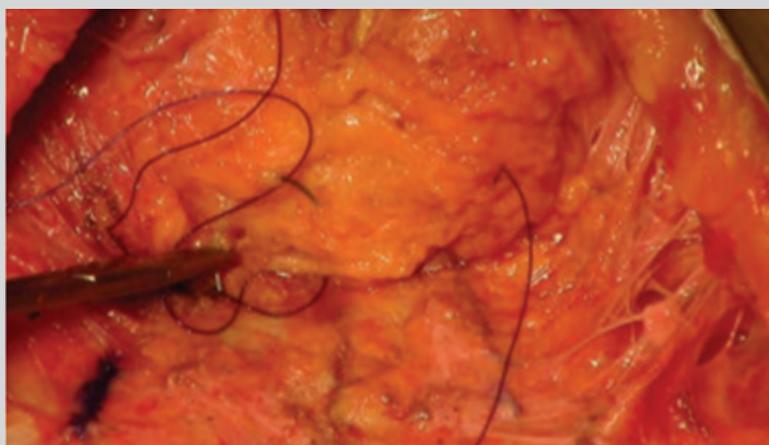


Figure 4: Progressive tension suture. The presence of PTS between the abdominal musculoaponeurotic layer and Scarpa's fascia.

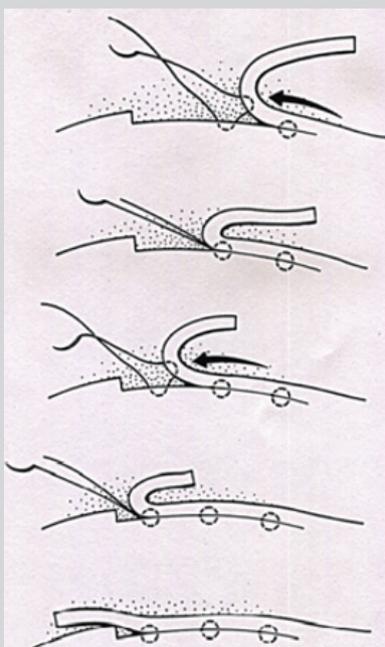


Figure 5: Flap advancement sequence with PTS.

According to Pollock [1], the modification of the surgical technique, specifically the use of PTS in the abdominal flap, has shown a low incidence of complications since, in their study carried out in 2012 with 597 cases, reported a seroma occurrence rate of 0.1% with overall local complications of 4.2%, which represented a significant decrease from the figures obtained after switching from abdominoplasty with drains to the PTS technique. Maclas et. al [2] state that they agree with this, however they comment that one of the important limitations for the reproduction of the process is the time necessary to complete the technique, since approximately 20

to 50 minutes are required to perform 30 or 40 sutures that allow the abdominoplasty flap to be effectively attached to the abdominal wall, a situation that has sought to be corrected through the implementation of techniques such as the “padded” and “barbado” suture, among others [12,14,15]. On the other hand, Bromley [5] highlights the importance of remembering that regardless of the suture technique (continuous or interrupted), PTS placement is a technique that can be easily adapted to the different influencing factors. derived from the patient or surgeon.



Figure 6: Illustration of maintenance of post-surgical results. In the upper part are the preoperative images and in the lower part the patient with an 8-month post-surgical abdominoplasty with PTS.

Another of the complications that have been positively impacted by the implementation of techniques related to the use of PTS is the presence or development of VTE since Maclas et al. [2] ensure that the increase in intra-abdominal pressure evidenced in patients undergoing abdominoplasty for practices related to the repair of diastasis recti, the use of compression garments and the flexed position of the hips decreases venous return and increases the risk of thrombosis of the lower extremities, a situation that

can be prevented by eliminating reliance on compression devices that exert excessive tension for wound closure. In this same study it was reported that after performing 597 abdominoplasties, the presence of tissue necrosis was reported in only 4 cases, while Villegas assures that another advantage of the development of the technique is the effective reduction of wound dehiscence rates since, in his study, no patients developed the condition compared to those who underwent conventional abdominal closure. Finally,

Villegas also concludes that a high level of patient satisfaction is obtained from the use of this technique, both from the aesthetic and functional point of view, since it is possible to simplify post-surgical instructions by providing the possibility to return to the basic activities of daily life earlier with the security of maintaining the results (Figure 6). Villegas [10] assures that another advantage of the development of the technique is the effective reduction of wound dehiscence rates since, in his study, no patient developed the condition compared to those in whom the procedure was performed. conventional abdominal closure.

CONCLUSION

Progressive tension sutures have notable benefits, among which the greatest satisfaction of patients after the aesthetic procedure is highlighted, as well as the significant decrease in the rates related to associated complications, for which the practice has currently been established as a possible option. routine intervention in the performance of abdominoplasties worldwide since they effectively eliminate the potential free space between the flap and the abdominal wall, stabilize tissue adherence and favor the patient's recovery process. The requirement of a prolonged operating time compared to the original techniques has been identified as the only major drawback, however, it is considered that from the investigative processes already carried out and those that are in the structuring process, it will be possible to continue with the progressive evolution of the medical technique and the favoring of the time necessary for the procedure.

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