



Technical Note

Mini Abdomen Experience: A Novel Approach for Mini-Abdominoplasty Minimally Invasive (MAMI) Abdominal Contouring

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Abstract: Purpose: Our aim is to offer an additional surgical option for patients with rectus diastasis, with or without associated abdominal wall hernias, through a minimally invasive approach with endoscopic surgical correction, presenting a new method for abdominal contouring via minimally invasive mini-abdominoplasty (MAMI). **Ideas:** According to the European Hernia Society (EHS) classification for RD, a widening greater than 2 cm of the linea alba is generally considered an indication for surgical correction. Recent approaches, such as MILA and SCOLA, are indicated for patients with a body mass index (BMI) of up to 28, based solely on height and weight. However, some authors consider this insufficient for determining the best surgical indication. Despite advances in skin retraction, there is still no evidence on how these devices affect postoperative outcomes when added to these techniques, as they depend on multiple factors such as age, skin firmness, number of passes, applied energy, etc. Consequently, even patients with a BMI of up to 28 may present significant flaccidity both above and below the umbilicus, as well as poor skin quality (thin, lax, with stretch marks), making SCOLA or MILA surgery alone unsuitable due to possible skin redundancy after surgery. Similarly, even patients with a high-positioned umbilicus, moderate flaccidity, and rectus diastasis, who in the past would have been strictly indicated for abdominoplasty, may benefit from mini-abdominoplasty with a minimally invasive approach (MAMI). **Discussion:** The main objective of this study is to provide another surgical option for patients who would otherwise be indicated for abdominoplasty and also for those undergoing MILA or SCOLA who still require minor skin removal to enhance the surgical result. Based on our experience, mini-abdominoplasty with a minimally invasive approach (MAMI) has the potential to serve a larger number of patients, since most present degrees of skin laxity that, even after using technologies, require skin excision. In addition to complementing the results, it reduces complications, results in smaller scars, allows a better correction and visualization of the diastasis, avoids periumbilical scars, and offers faster recovery compared to abdominoplasty. **Conclusions:** MAMI surgery has proven to be a safe and reproducible approach for selected women who wish to restore feminine body features after pregnancy and achieve a quick recovery. It yields satisfactory esthetic results due to the minimized scar, preservation of the natural umbilical scar, and improved surgical correction of rectus diastasis.



Academic Editors: Egidio Riggio, Katarina Andjelkov and Benedetto Longo

Received: 22 March 2025

Revised: 29 April 2025

Accepted: 30 April 2025

Published: 9 May 2025

Citation: Galhego, R.F.; Martins, T.; Carvalho, A.C.; Faria-Correa, M.; Nogueira, R. Mini Abdomen Experience: A Novel Approach for Mini-Abdominoplasty Minimally Invasive (MAMI) Abdominal Contouring. *Surg. Tech. Dev.* **2025**, *14*, 16. <https://doi.org/10.3390/std14020016>

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Keywords: minimally invasive mini-abdominoplasty; abdominal contouring; rectus diastasis; endoscopy-assisted mini-abdominoplasty

1. Introduction

Rectus diastasis (RD) was first classified by Rath et al. in 1996; however, the available literature is still scarce [1]. The soaring discussion on the topic reached international societies, and in 2021, the European Hernia Society (EHS) established a classification method based on the width of the rectus muscles, considering muscle separation, the post-pregnancy state, and the presence of concomitant hernia. An altered body image is the most common and relevant symptom, and it is still unclear if the widening of the linea alba can negatively influence ventral hernia repairs. Most published studies associate the widening of the linea alba with parity, with a positive correlation observed in prospective studies, especially up to 12 months postpartum [2–6].

In the late 1980s, mini-abdominoplasty was described as a way to treat RD and flaccidity, aiming to correct lower abdominal wall deformities [7,8]. Recently, advances in minimally invasive abdominal wall reconstruction techniques have also allowed cranial deformities to be treated using the SCOLA (Subcutaneous Onlay Laparoscopic Approach) and MILA (Minimally Invasive Lipoabdominoplasty Approach), which include liposuction and skin retraction devices associated with RD plication [4–6,9–15]. Given these advances, doubts arise about their effectiveness in addressing parity-related skin laxity [16].

New evidence and studies about RD and how to apply it at the general and specific levels make room for targeted treatment. Rather than a standardized treatment, a patient-fitted approach can increase the cost-effectiveness of this process, reduce superfluous procedures, and achieve a better health-related quality of life for our patients [17].

Our goal is to offer another surgical option for patients with rectus diastasis, with or without abdominal wall hernias, through a minimally invasive endoscopic correction approach, presenting a new method for abdominal contouring via minimally invasive mini-abdominoplasty (MAMI).

2. Ideas

A widening greater than 2 cm of the linea alba is generally indicated for surgical correction, according to EHS [3]. Newer approaches, such as MILA and SCOLA, are indicated for patients with a BMI of up to 28, based on height and weight only. However, this criterion may be insufficient for some patient profiles. Despite advancements in skin retraction, there is still no evidence on how devices affect postoperative results when added to these techniques, since results depend on multiple factors such as age, skin firmness, number of passes, applied energy, etc. Therefore, even patients with a BMI of up to 28 may present significant supra- and infraumbilical flaccidity and poor skin quality (thin, flaccid, with stretch marks), making SCOLA or MILA surgery alone unsuitable due to possible skin redundancy. Likewise, even patients with a high-positioned umbilicus, moderate flaccidity, and rectus diastasis, who in the past would have been strictly indicated for abdominoplasty, may benefit from mini-abdominoplasty with a minimally invasive approach (MAMI) [9,10,18–22].

The increasing appreciation for minimally invasive surgeries prompts us to bring up another option for RD treatment, involving skin retraction technologies and optional skin removal. This opens a new range of candidates who would not benefit from SCOLA or MILA alone, as well as those who previously only had abdominoplasty as an option [19,21].

To better assess the ideal treatment for each patient, metrics beyond the BMI should be considered. The BMI alone cannot predict skin laxity or body composition. In non-obese patients, bioimpedance, with or without the clinical pinch test and fat mass index, may provide more information to define the surgical approach [7]. We propose, for this reason, adding to the pre-operative BMI assessment the evaluation of body fat percentage (Figure 1), taking into account that this technique should not renounce optimization with physical therapy and weight loss stimulation before surgery.

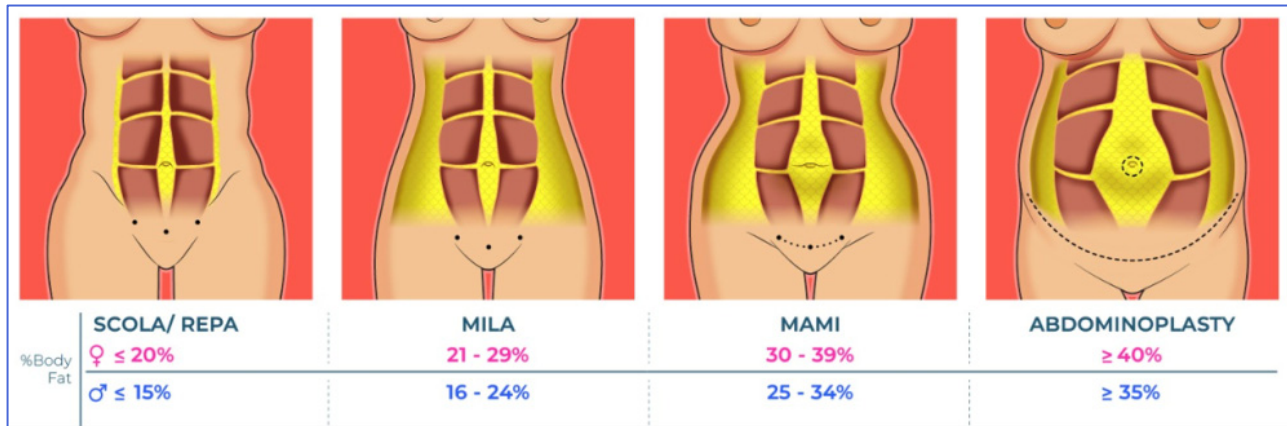


Figure 1. Proposed classification using percentage body fat rather than the usual BMI classification for determining surgery indication between minimally invasive surgery and conventional surgery. Dots and dashed lines represent length of the incision for each type of surgical approach.

MAMI Approach Steps:

Superwet infiltration with 1000 mL of 0.9% saline + adrenaline 1:500,000 + 1 vial of tranexamic acid—infiltrating 2 to 3 L across the entire abdominal region. Twenty minutes of waiting for vasoconstriction followed by 70% ultrasonic liposuction (safer).

Total Definer liposuction with vibroliposuction device (Vibrofit), prioritizing negative zones along semilunar lines and linea alba at 0.5 cm thickness and positive zones at 1.5 cm, paying attention to the inferior flap near the scar and superior regions (deep liposuction with less intensity) using a 4.0 curved Mercedes-type cannula. The RD will be repaired with a minimally invasive approach, with supraponeurotic repair of midline hernias and rectus abdominis plication, assisted or not with the robotic platform. We recommend a midline suprapubic optical trocar and a minimal distance of 5 cm at the same height for the other 0.5 cm trocars. Initially, the subcutaneous layer will be accessed with blunt dissection, and once there is prompt endoscopic access, the dissection of the anterior rectus sheet must be performed bilaterally with a narrow dissection along the midline and up to the xiphoid appendix. At this moment, a careful dissection is made around the umbilical scar and the costal margins, avoiding the vascular impairment of the perforator arteries in those areas. The dissected space can also make room for mesh and/or drain placement if the surgeon feels that it is best suited. The RD plication is followed by the use of argon plasma skin retraction technology at 30 W with 1.6 gas, 5 passes per region (5 min), mainly in the lateral regions of the dissection. It is crucial to excise the cesarean scar or skin excision or a smaller suprapubic excision in women with vaginal delivery or nulliparous aiming to avoid the sagging postoperative effect.

3. Results

The main objective of this study is to provide another surgical option for RD patients and discuss the possible inadequacy of endoscopic correction indications based on the typical clinical presentations used so far. In 2024, Hubner et al. published a series that

studied the linea alba in fresh corpses, showing that the widening of the ligament is not associated with its thickness [8]. High-quality evidence is still needed to associate RD with morbidity (as there is also no true abdominal wall defect that may cause incarceration, and its association with recurrence is still obscure) [6]. However, RD is still a frequent postpartum complaint in clinical care. Up to one-third of patients may develop linea alba widening. Due to limited evidence to support the non-operative treatment and no standardized physiotherapy regimen, surgery is still frequently indicated in clinical practice [3,21].

Various techniques have been described, with increasing general surgery involvement providing relevant contributions, as minimally invasive approaches may be used for RD assessment [19,20,22,23]. Liposuction can enhance esthetic outcomes in patients with RD without skin laxity. Although MILA can be performed with liposuction and skin retraction energy, patients with poor skin quality, higher body fat percentage, and moderate flaccidity may need more aggressive measures to achieve the same esthetic outcomes [9–13,19,20,22–24] (Figure 1).

Additionally, patients diagnosed with RD and no previous signs of skin laxity may develop it after MILA or SCOLA correction, due to the low compliance of midline skin after rectus sheath suturing, resulting in the slackness of the undermined skin, as described by Sahoo and collaborators [13,21–24] (Figure 2).

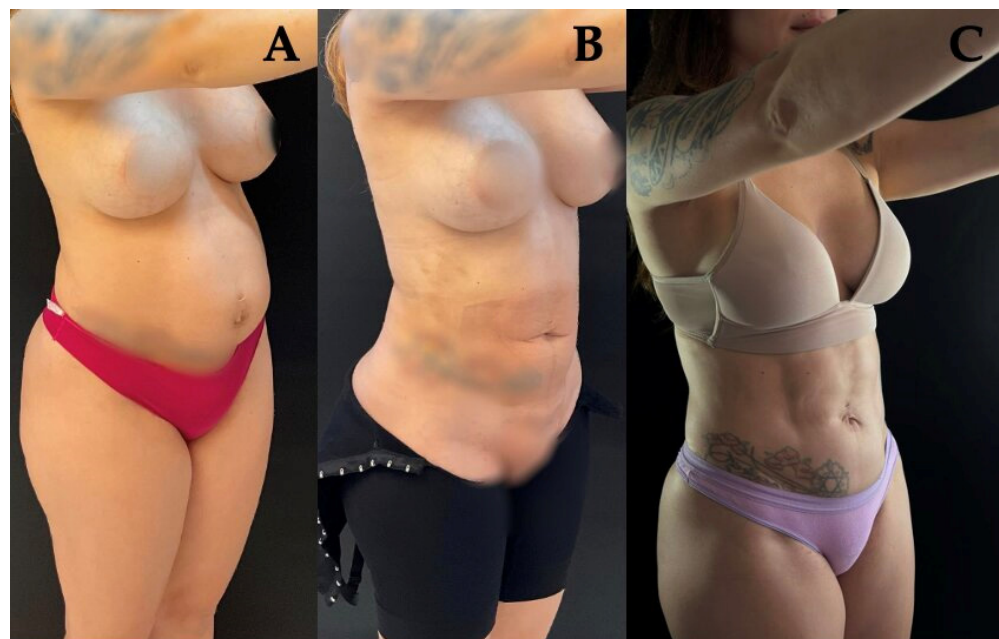


Figure 2. (A) Before MILA surgery. (B) After MILA surgery, with excess skin. (C) After the second surgery to remove skin. The significant advantage of MAMI is that it can treat a larger number of patients, often avoiding abdominoplasty when possible. It also offers the benefits of increased safety and improved visualization for diastasis correction.

Meanwhile, mini-abdominoplasty remains indicated for such patients, especially those desiring smaller scars. Even with advances in skin retraction gadgets, more clarity is still needed on the long-term performance of these devices. In this context, wedge excision serves as an ally in surgery, becoming a complement to improve results and encompass a larger number of candidate patients [4,5,18,19] (Figures 3 and 4).

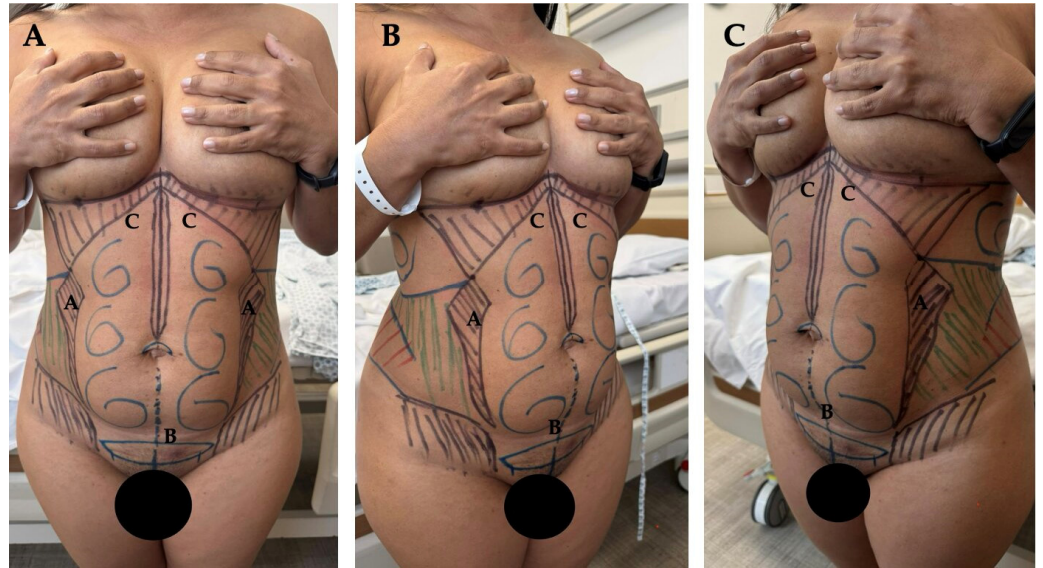


Figure 3. (A–C) While abdominoplasty was a possible option offered by many plastic surgeons, MAMI was recommended to this patient due to its described advantages, leading to a good result. Surgical planning based on anatomical landmarks. (A) (marks the semilunar line indicating the lateral limits of the abdominal rectus sheath); (B) (indicates the incisional marks for epithelial excision of pfnannestiel scar); (C) (marks the inferior costal margin indicating the super-lateral limits of the dissection).

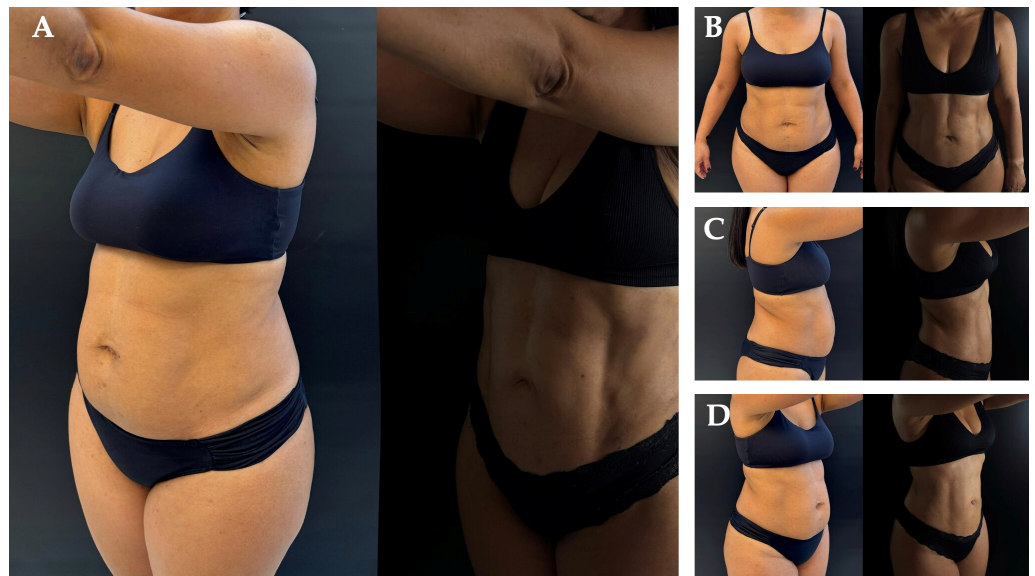


Figure 4. (A–D) MAMI technique in the same patient at six-month follow-up.

For surgeons, traditional mini-abdominoplasty is not ergonomic, as the inferior access does not allow the full visualization of the abdominal wall. The surgeon has a small space to operate, requires special retractors, limited lighting, and assumes a very uncomfortable position. It also causes more trauma and risks to the abdominal flap and may even prevent the correction of epigastric hernias that could go missing. Subcutaneous dissection and RD correction through a small incision require uncomfortable positioning and excessive skin traction, potentially compromising the lower flap and increasing the risk of ischemia and skin necrosis [14].

In contrast, the minimally invasive MAMI approach eliminates the need to open the subcutaneous layer to access the abdominal wall, preserving the lower flap's vascularization and making the procedure safer. Unlike traditional mini-abdominoplasty—which

requires larger scars, full wall access, excessive flap traction, and greater subcutaneous exposure (linked to higher surgical site infection rates, as seen in ventral hernia repairs)—MAMI avoids these risks once the endoscopic camera provides an enhanced view of the subcutaneous layer within a closed antiseptic space (Figure 5).

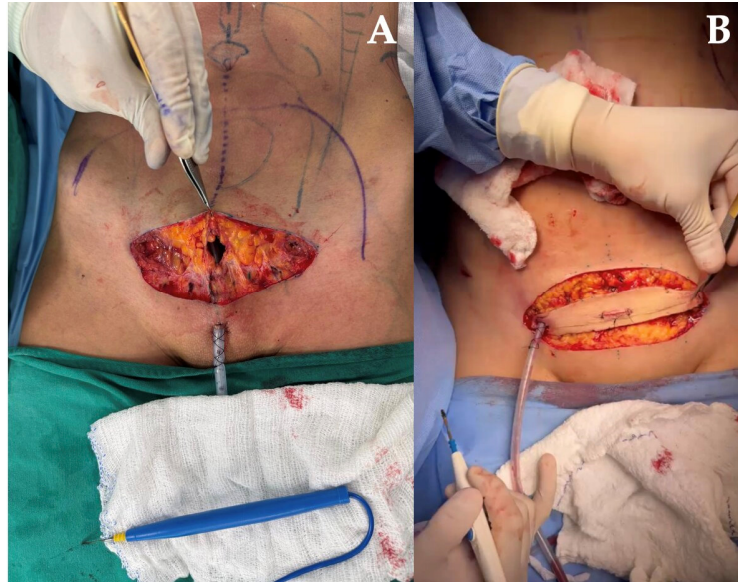


Figure 5. (A,B) Skin resection in MAMI, keeping the vascularization and subcutaneous tissue intact, and low exposure time of the subcutaneous tissue. The midline plication must have been performed MIS because there is no access to the wall with this incision.

The proposed technique—performed with the surgeon and assistant in upright positions—uses CO₂ insufflation to expand the subcutaneous tissue, eliminating the need for skin traction and enlarging the surgical field. After RD correction, the procedure allows umbilical scar fixation without needing neoumbilicoplasty and thus avoids stigmatizing umbilical scars (Figure 6).

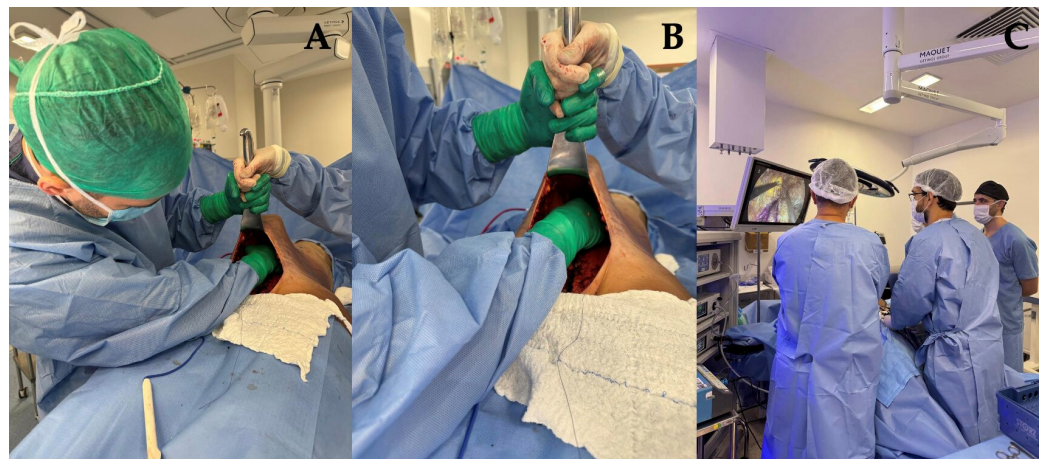


Figure 6. (A,B) Comparative surgeon, assistant positioning, and exposure throughout surgery during mini-abdominoplasty (C) ergonomic position and video-assisted exposure during mini-abdominoplasty mini-invasive (MAMI).

Based on our experience, mini-abdominoplasty with a minimally invasive approach (MAMI) has the potential to increase the number of eligible patients for minimally invasive surgery, improve access to RD correction, reduce complications, accelerate recovery compared to abdominoplasty, and provide smaller scars with no umbilical scarring and a lower

risk of skin dehiscence and other surgical site occurrences due to smaller incisions and less exposure of the anterior abdominal wall.

Therefore, conventional assessment based solely on BMI may not be the most suitable criterion for MILA correction indication, as observed in the literature [15,25,26]. Similarly, not all patients with moderate flaccidity and diastasis are clear candidates for abdominoplasty.

However, this proposal of a novel approach for liposuction, minimally invasive RD plication followed by skin retraction technology and wedge skin excision, has not yet been compared to other surgical techniques in a prospective fashion study. These results are based solely on a single-center, high-volume experience. The propagation of this study can make room for future research and collaborations that could substantiate a wider range of evidence for MAMI, reporting patients' outcomes with validated questionnaires that include cosmetic outcomes, quality-of-life, and work impairment, as well as skin laxity and abdominal wall bulging after RD plication.

4. Conclusions

MAMI surgery has proven to be a safe and reproducible approach for selected women wishing to restore feminine body features after pregnancy and achieve quick recovery.

It encompasses a larger number of patients, as it is easily reproducible in patients who are candidates for MILA surgery but also require skin excision, as well as those who would be typically indicated for abdominoplasty but present a high umbilicus and moderate flaccidity with diastasis. It offers satisfactory esthetic results due to the minimized scar, the preservation of the natural umbilical scar, and the improved surgical correction of rectus diastasis through better visualization.

It reduces the risks associated with traditional mini-abdominoplasty, such as abdominal flap ischemia and prolonged subcutaneous tissue exposure, and improves visualization during the subcutaneous dissection and treatment of RD and associated hernias.

Author Contributions: Conceptualization, R.F.G., T.M. and A.C.C.; methodology, R.F.G., A.C.C. and R.N.; investigation, R.F.G., T.M., A.C.C. and R.N.; data curation, R.F.G. and M.F.-C.; writing—original draft preparation, R.F.G. and A.C.C.; writing—review and editing, R.F.G., M.F.-C., T.M. and R.N.; visualization, R.F.G.; supervision, R.F.G., T.M., A.C.C. and M.F.-C. All authors have read and agreed to the published version of the manuscript.

Funding: The authors have no sources of funding to declare for this manuscript.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki. Ethical review and approval were waived for this study due to the data used in this technical note are completely de-identified, so there is no risk to individual privacy.

Informed Consent Statement: Patient consent was waived due to the data used in this technical note are completely de-identified, so there is no risk to individual privacy.

Data Availability Statement: No new data were created or analyzed in this study.

Conflicts of Interest: The authors have no conflict of interest to declare.

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