


# Does Abdominoplasty Add Morbidity to Incisional Hernia Repair? A Randomized Controlled Trial

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## Abstract

**Background.** Abdominoplasty is considered an operation linked to a considerable rate of morbidity. The convenience of simultaneously performing an incisional hernia repair and an abdominoplasty remains controversial. **Methods.** A total of 111 patients were randomized prospectively to compare isolated incisional hernia repair and hernia repair when combined with abdominoplasty. Primary end points were in-hospital stay and early morbidity. Secondary end points were late morbidity, recurrences, and quality of life. Patients were followed-up for 24 months. **Results.** Duration of the surgical procedure differed significantly between both groups (39 vs 85 minutes,  $P < .001$ ) and postoperative hospital stay (2.5 vs 3.5 days;  $P < .001$ ). No statistically significant differences in early or late morbidity between both groups were detected. The perceived quality of life for patients was higher in the combined surgery group ( $P < .001$ ) than in the isolated hernia repair group. **Conclusions.** Postoperative in-hospital stay and early and late morbidity do not differ significantly between isolated incisional hernia repair and simultaneous hernia repair with abdominoplasty, but associated abdominoplasty provides a higher quality of life when indicated.

## Keywords

abdominoplasty, incisional hernia repair, morbidity, quality of life

## Introduction

Abdominoplasty (Ap) is an aesthetic surgery that aims to remove the excess of skin and fat from the abdominal wall. Though well standardized, it is still considered as a high-morbidity plastic surgery technique.<sup>1-3</sup>

Incisional hernias are often associated with an excess of skin and fat, laxity or muscle relaxation, and abdominal shape deformity with hernia bulge and scars. This set of changes has an impact on physical and mental health of patients such as back pain, digestive disorders, eating disorders, urinary incontinence, increased tendency to depression, stress, and so on. Classically, general surgeons have avoided to add abdominal remodeling in this setting thinking that this “secondary maneuver” would mean a higher morbidity and a longer surgical time. This belief may have originated in the lack of adequate evidences on the advantages of a tummy tuck for many patients.

However, many surgeons (mostly those who work in multidisciplinary abdominal wall units) have currently made up their minds and offer their patients a tailored solution to their problem, performing a simultaneous hernioplasty and tummy tuck operation.<sup>4-6</sup>

The aim of this study is to find if an incisional hernia repair associated with a tummy tuck is a cause of high morbidity for patients, or if they could be safely

combined using its potential aesthetic and functional advantages, without changes in morbidity.

## Patients and Methods

### Study Design

This is a randomized prospective blinded study comparing 2 methods of abdominal wall repair, only incisional hernia repair or combined with abdominoplasty, in a specific abdominal wall surgery unit.

The *inclusion criteria* specified that patients should be older than 40 years of age with an American Society of Anesthesiology (ASA) classification of 3 or less, diagnosed of incisional hernia, no comorbidity with regard to cardiopulmonary, hepatic, or renal impairment, and consent was given for surgery. In this study, incisional hernia was defined as any abdominal wall gap with a bulge in the area of a postoperative scar perceptible or palpable by clinical examination and imaging (computed tomography

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[CT]), wide (5 to 10 cm), and localized between the umbilical and pubic bone.

*Exclusion criteria* were patients with hernias smaller than 5 cm or greater than 10 cm, patients with ASA higher than 3, subcostal hernias, strangulated hernia, current malignant diseases, proven mental illness, or other circumstances that might compromise the patient's cooperation in addition to those who refused to give informed consent. All patients signed an informed consent form. The ethics committee of the university hospital approved the trial, and all procedures were performed in accordance with good clinical practice guidelines. This clinical trial is registered with number ISRCTN14892408.

### Randomization

Patients were randomized on the day of surgery to receive either an incisional hernia repair (IHR group) or a combined incisional hernia repair and abdominoplasty (IHR-Ap group). A computer, which generated a table of random numbers, performed the simple randomization sequence and patients were assigned to the groups using closed opaque envelopes with identification numbers. After the day of surgery all members of the research team were blinded as to the method of the abdominal wall repair until results were analyzed. The study was performed without any grants; all costs were covered by the national healthcare system.

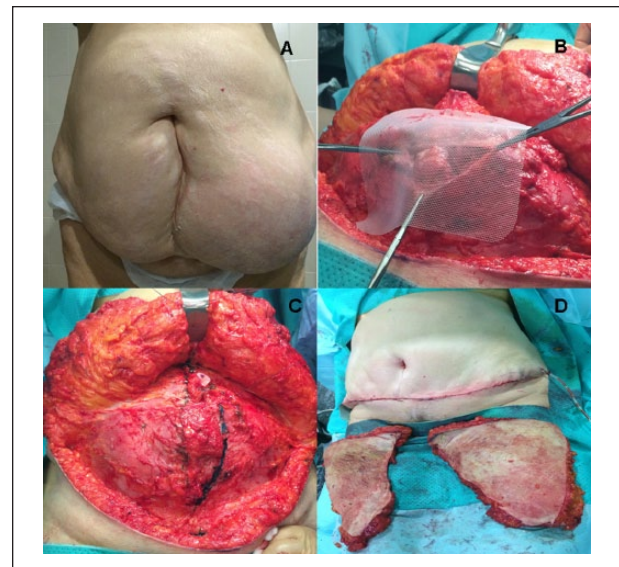
### Preoperative Workup

All the patients were evaluated in a multidisciplinary unit specializing in the abdominal wall, where they had a detailed clinical history, a directed comprehensive examination, and a CT to assess the volume of contents of the sac, nature of the contents, reducibility when lying flat, estimate of the percentage of the contents in the sac, size of the defect, and state of adjacent tissues. They were then evaluated by a plastic surgeon (possible need for additional treatment) and an anesthesiologist (to determine the risk of operation).

Preoperative preparation included dietetic instructions for weight control, cessation of smoking (>3 months), mucolytic agents for lung disease, respiratory physiotherapy (including intercostal muscle and diaphragm exercises), clapping exercises, disinfection of skin folds, and treatment of associated fungal infections or other skin lesions when required. Associated diseases (cardiac conditions, hypertension, and diabetes) were treated and stabilized when present.

### Surgical Technique

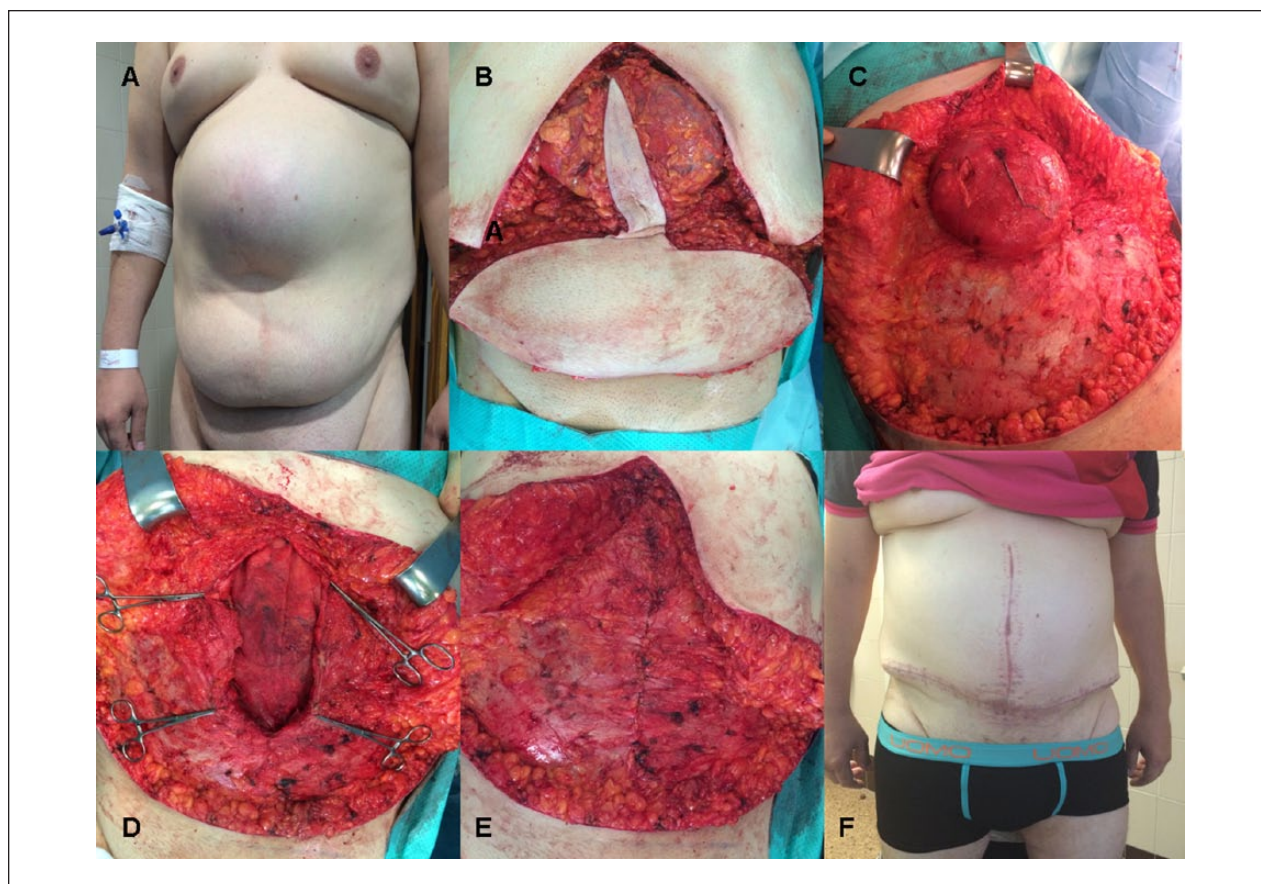
A standardized surgical technique was performed by a single senior surgeon specialized in abdominal wall surgery (AME). All patients received thromboembolic prophylaxis with a low-molecular-weight heparin and a one-shot antibiotic prophylaxis (cefuroxime 750 mg) immediately before surgery. Each patient was prepared



**Figure 1.** Female patient with a large infraumbilical incisional hernia (A). Intraoperative view showing hernia repair with mesh (B) and the rectus muscle diastasis with a plication (C). (D) Abdominoplasty and neoumbilicus formation.

from xiphoid to pubis, and as far laterally as possible, and their skin was covered with a protective skin drape to avoid any contact between skin flora and the prosthetic mesh. Repair was done under general anesthesia with patients marked preoperatively in a standing position.

In the IHR group a standard retrorectal (midline defect) or preperitoneal (lateral defect) prosthetic hernia repair removing only some overlying skin and subcutaneous tissue was performed. In the IHR-Ap group, the lower incision was placed in the lowest skin crease above the pubic hairline and continued through onto the superficial fascia of the anterior rectus sheath. The abdominal flap was then elevated deep to Scarpa's fascia. Flap dissection was continued up to the costal margins avoiding lateral undermining to preserve the intercostal perforators to the flap. Careful hemostasis was performed with diathermy. After exposure of the sac, the hernia was reduced and the posterior fascia of rectus abdominis was dissected from its adjacent structures. The retrorectus spaces were entered bilaterally and extended both superiorly and inferiorly, from the symphysis pubis to the xiphoid. The posterior sheath was closed in the midline with an absorbable running 0 monofilament suture. A light-weight macroporous polypropylene-coated titanium mesh was placed over the posterior rectus fascia (TiMesh, PFM, Germany). The abdominal muscles were sutured together. A little plication of recti abdominis was made. The excess of the abdominal skin flap was sectioned after marking the cranial border of the flap. A negative pressure drainage was left in place. Closure was completed with Vicryl 2/0 sutures for the superficial fascial system and 4/0 for dermis. We used metallic clips for skin closure (Figures 1 and 2).



**Figure 2.** Male patient with a large midline incisional hernia (A). (B) “fleur de Lys” abdominoplasty. Defect and repair with preperitoneal mesh (C-E). (F) After incisional hernia repair in conjunction with abdominoplasty.

All patients received standardized postoperative oral pain medication consisting of diclofenac  $2 \times 50$  mg, novaminsulfone  $4 \times 500$  mg, and omeprazole  $1 \times 20$  mg. Pain was managed with paracetamol or ibuprofen as needed and was documented.

### Study Outcome Measures

Patients were discharged when their autonomy was recovered, pain was under control, and the surgical team was satisfied with the absence of obvious immediate complications. Patients were clinically reevaluated 7 days and 1, 6, 12, and 24 months after surgery. Evaluated parameters were operative time, duration of postoperative in-hospital stay, and early morbidity (primary end point), late morbidity, recurrence rate, and quality of life (secondary end points).

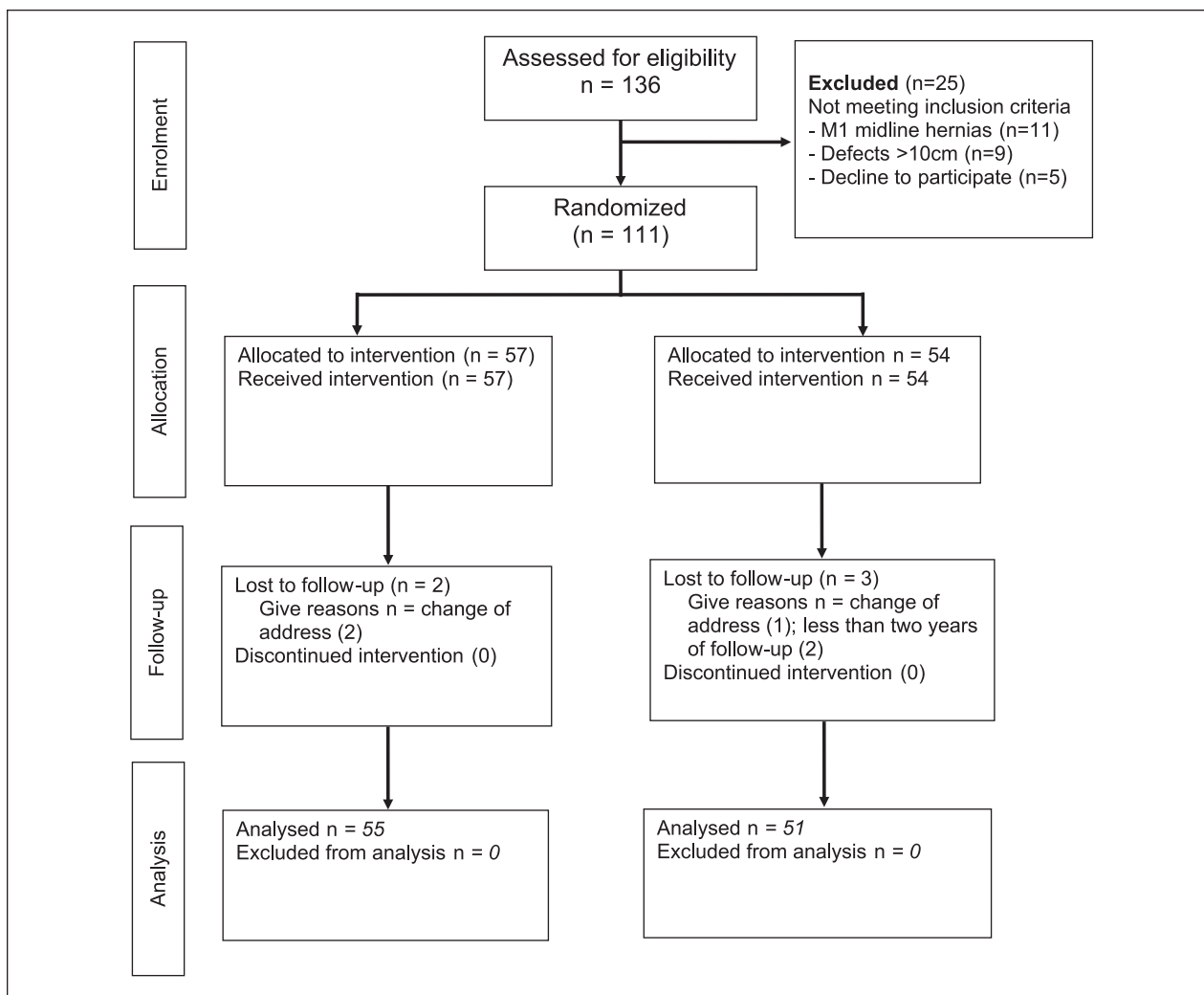
Seroma was defined as a fluid collection detected by palpation on clinical examination when patients attend for routine follow-up clinic appointments. Skin edge necrosis was defined as necrotic loss of full-thickness skin for which operative intervention was needed (debridement). Wound infection was defined as redness, discharge of pus from the wound, or a positive bacteria

culture. Patients who expressed any concerns about their repair or had any reported abdominal discomfort during physical examination were reevaluated, and a CT was performed. At 12 months, recurrence was tested by clinical examination and CT, and quality of life was measured using a modified standard scale (EuroQol-5D; 1 = no improvement; 2 = minor improvement; 3 = very satisfied). The follow-up averaged 2 years (range = 14-36 months) and was complete in 100% of the patients.

### Statistical Analysis

Analysis was performed on an intention-to-treat basis and noninferiority study. If an incisional hernia repair associated with a tummy tuck is a cause of high morbidity for patients as primary end point, randomization of 111 patients would identify a difference between the 2 groups, with 80% power and an  $\alpha$  of .05 and 15%.

Descriptive statistics were used for characterization of patient groups, presented as mean (standard deviation [SD]) or frequency (percentage) depending on the type of data and distribution. Normally distributed data were compared with Student's *t* test. Comparisons of dichotomous



**Figure 3.** Diagram template.

outcomes were made using Pearson's  $\chi^2$  test. Analysis of smaller groups within the study was permitted, using Fisher's exact test, where  $P < .05$  was considered significant. All tests were 2-sided, and the data were analyzed using SPSS software package for Windows (SPSS Inc, v13.0, Chicago, IL).

## Results

Between January 2012 and December 2014, 111 patients were randomized to either IHR ( $n = 55$ ) or IHR-Ap ( $n = 51$ ; Figure 3). No statistically significant differences were noted between the 2 groups in terms of demographics, as shown in Table 1.

### Early Outcomes

There was no intraoperative morbidity nor blood requirement. From the parameters evaluated for differences

between the 2 groups, the duration of the surgical procedure differed significantly in favor of the IHR group (39 vs 85 minutes;  $P < .001$ ) and the postoperative hospital stay (2.5 vs 3.5 days;  $P < .001$ ). No statistically significant difference in postoperative in-hospital stay between IHR and IHR-Ap was found. No mortality occurred in this study. Morbidity details are provided in Table 2.

There were no incidences of ischemia or skin necrosis during the first 30 days of follow-up. Four patients had a surgical-site occurrence, 3 a prolonged seroma requiring office drainage, and one a superficial wound infection, which was treated with wound opening, drainage, and dressing.

### Late Outcomes

With a mean of 428 days of follow-up (range = 360-548 days), there were no recurrences in the simultaneous surgery group (IHR-Ap). In the IHR group, 2 recurrences

**Table 1.** Demographic and Clinical Data of Patient Groups: Incisional Hernia Repair (IHR) and Simultaneous Incisional Hernia Repair With Abdominoplasty (IHR-Ap)<sup>a</sup>.

	IHR (n = 55)	IHR-Ap (n = 51)	P
Age (years)	64 ± 7	66 ± 8	.08
BMI (kg/m <sup>2</sup> )	32 ± 2	33 ± 5	.09
Prior surgery			
Appendectomy (McBurney)	5 (9)	8 (15.7)	
Cesarean (Pfannestiel)	26 (47.3)	19 (37.2)	
Infraumbilical laparotomy	11 (20)	15 (29.4)	
Laparotomy (supra-infra)	9 (16.3)	9 (17.6)	
Prior attempts to repair hernia			.1
One	45 (81.8)	37 (72.5)	
Two or more	10 (18.2)	14 (27.5)	
Location			
Midline: M3	10 (18.2)	15 (29.4)	.08
M4	24 (43.6)	19 (37.2)	.25
Lateral: L3	6 (10.9)	7 (13.7)	.32
Midline and lateral	11 (20)	10 (19.6)	.47
Defect size (cm)	6.4 ± 3	9.2 ± 4	<.001

Abbreviations: BMI, body mass index; IHR, incisional hernia repair; AP, abdominoplasty. Localization of the hernia (EHS classification): M3, periumbilical; M4, infraumbilical; L3, iliac.

<sup>a</sup>Values are expressed as mean ± SD for continuous variables and number (%) for categorical variables.

**Table 2.** Operative and Postoperative Clinical Data of Patient Groups: Incisional Hernia Repair (IHR) and Simultaneous Incisional Hernia Repair With Abdominoplasty (IHR-Ap)<sup>a</sup>.

	IHR (n = 55)	IHR-Ap (n = 51)	P
Duration of surgery (minutes)	39 ± 24	85 ± 32	<.001
Mean hospital stay (days)	2.5 ± 1	3.5 ± 2	.0009
Early complications			
Seroma	4 (7.3)	3 (5.8)	.5
Skin necrosis	0	0	1
Wound infection	3 (5.4)	1 (1.9)	.1
Deep venous thrombosis	0	0	1
Late complications			
Prolonged pain after 6 months	1 (1.8)	1 (1.9)	.7
Hypertrophic scar	2 (3.6)	0	.2
Umbilical stenosis	0	0	1
Recurrences	2	0	.2
Follow-up (months)	14 ± 2	16 ± 4	

<sup>a</sup>Values are expressed as mean ± SD for continuous variables and number (%) for categorical variables.

were detected ( $P < .05$ ). One patient developed abdominal wall pain that resolved within 8 months of surgery. There were no reoperations for abdominal wall complications (Table 2).

## Quality of Life

All parameters evaluated in the survey of quality of life were statistically significant in favor of the simultaneous surgery group. Performing a tummy tuck led to an improvement in the quality of life, body satisfaction, urinary incontinence, and constipation ( $P < .001$ ; Table 3).

## Discussion

This study shows that performing a simultaneous abdominoplasty does not add morbidity to incisional hernia repair and allows improvement in quality of life, both short term and long term. Two previous reports on this topic combining abdominoplasty with small umbilical hernia repair suggested this same conclusion though with a lower level of evidence (Therapeutic, IV).<sup>7,8</sup>

The repair of incisional hernias still represents a challenge for surgeons. It is a common procedure but lacks a specific protocol on how this repair should be made. Incisional hernia surgery and abdominoplasty are 2 different operations: incisional hernia is a medical condition and abdominoplasty is an aesthetic surgery. However, they often have a common origin. In addition, large ventral hernias often coexist with rectus diastasis.<sup>7,9</sup> Both result on stretching forces and high pressure on skin and abdominal tissue and musculature weakening. It seems to make sense to aim for a comprehensive operation where the hernia repair could be associated to a procedure able to stabilize the abdominal wall and firm up the overlying tissue and skin as abdominoplasty is.

Ap theoretically allows covering the hernia repair with previously unmanipulated anatomical planes providing a decreased risk of infection. The construction of the flap allows for a full assessment of the abdominal wall before making the decision of the technique to be performed. Nevertheless, surgeons have been reluctant in the past to combine these 2 methods in a single act claiming an increasing operative time, a possible compromise on vascularity of the abdominal skin and fat, and delayed healing, all of which may worsen outcomes. However, not everyone shares this hypothesis. Hughes et al<sup>10</sup> demonstrated that an abdominoplasty at time of hernia repair reduces the incidence of wound complications and the possibility of hernia recurrence, and recently, Reid and Dumanian<sup>11</sup> demonstrated a reduction in the incidence of wound infection. Karthikesalingam et al<sup>12</sup> suggested that preexisting scars did not significantly predispose to an increased number of complications. In our study, morbidity was not increased and only the operative time was found to be longer though without statistical significance.

Many plastic surgeons rather avoid the placement of meshes to reinforce the abdominal wall because of infection, dehiscence, and extrusion or associated pain risk,

**Table 3.** Values for the EuroQol-5D Modified for Abdominal Wall Surgery of Patient Groups: Incisional Hernia Repair (IHR) and Simultaneous Incisional Hernia Repair With Abdominoplasty (IHR-Ap)<sup>a</sup>.

	IHR (n = 55)			IHR-Ap (n = 51)			P
	1	2	3	1	2	3	
Mobility	43	9	3	0	10	51	<.001
Self-care	25	13	17	0	14	37	<.001
Usual activities	19	6	20	0	17	34	<.001
Pain/discomfort	13	23	19	1	16	34	<.001
Anxiety/depression	20	30	5	6	14	31	<.001
Body satisfaction	30	22	3	0	11	40	<.001
Urinary incontinence	40	15	0	9	21	21	<.001
Constipation	37	18	0	12	15	24	<.001

<sup>a</sup>Values were expressed as frequencies (EuroQol-5D: 1 = no improvement; 2 = minor improvement; 3 = very satisfied).

with the potential need for removal of the mesh. The use of meshes during a tummy tuck was proposed by Marques et al.<sup>13</sup> Since then, 2 published series evaluated the use of a mesh overlay or in the retromuscular plane.<sup>14,15</sup> All showed good results, without notable complications or increase in recurrence of abdominal bulge. Our experience supports the thesis that during a tummy tuck, concomitant hernia repair with a mesh (placed in a posterior plane) does not add risks or changes significantly the postoperative course. Following Cheesborough and Dumanian, the concept that aesthetics and prosthetic mesh are incompatible is no longer valid.<sup>7</sup>

Abdominoplasty, considered by many general surgeons only as an aesthetic technique has shown to provide great benefits for patients: (1) removal of excessive skin, which promotes better hygiene and reduces skin infections; (2) strengthening of muscular bending (better muscular tone, corporal position, and then de-ambulation); (3) stabilization of the lumbar spine level (by changing the angle of lumbar lordosis and sacral inclination, which improves low back pain), scar removal and, finally, a better perception of our body (higher self-esteem, satisfaction and quality of life), less anxiety, and better personal relationships.<sup>16-25</sup> All these changes are always desirable for our patients. Cooper et al<sup>26</sup> demonstrated that an abdominoplasty in the setting of a hernia repair can improve patients satisfaction, particularly, appearance, hygiene, and self-confidence. Saarniemi et al<sup>27</sup> published a prospective study that concluded that abdominoplasty significantly improved quality of life, body satisfaction, effectiveness, sexual functioning, self-esteem, and mental health. Our study achieved similar results in patients with moderate-sized incisional hernias. The combination of a hernia repair and a tummy tuck at the same time in our series had a positive impact on the quality of life of patients when compared to the isolated hernia repair technique as verified by follow-up (comments about reduced back pain, easier dressing, local hygiene and walking, improvement of incontinence and

constipation, etc). Our results show a considerable advantage for the combined surgery option. Patients' satisfaction, quality of life improvement, and low morbidity allow us to strongly recommend a simultaneous repair and restoration technique for well-selected patients.

The main limitation of this study is the relatively small number of patients included. This study was conducted by specialized surgeons in the abdominal wall field, and the extrapolation of results to less specialized surgeons may not be comparable. It is necessary to assume that a tummy tuck is, in itself, a complex operation that requires adequate training and experience. Our advice to surgeons who undertake the treatment of a hernia is to update their knowledge and experience in this type of surgery. Patients' satisfaction will be their best reward.<sup>28</sup>

In conclusion, abdominoplasty can be seen in patients considering large incisional hernia repair. Simultaneous techniques can be safely performed with the same morbidity and recurrences, but with major quality of life improvement.

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### Author Contributions

Study concept and design: Alfredo Moreno-Egea  
 Acquisition of data: Alfredo Moreno-Egea, German Morales-Cuenca, Álvaro Campillo-Soto  
 Analysis and interpretation: Alfredo Moreno-Egea, German Morales-Cuenca, Álvaro Campillo-Soto  
 Study supervision: Alfredo Moreno-Egea, German Morales-Cuenca

### Declaration of Conflicting Interests

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