

# One stage onlay hernia repair with abdominoplasty in patients following gastric bypass surgery

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Article history: Received: 03.10.2018 Accepted: 19.10.2018 Published: 25.10.2018

## ABSTRACT:

**Purpose:** 1. Evaluation of results after one-time incisional hernia repair (IHR) modo on-lay and abdominoplasty (Ab-pl) in patients after loss of weight following previous Roux-en-Y Gastric Bypass – RYGB. 2. Analysis of differences in quality of life (QL) changes in bariatric patients before RYGB, as well as before and after abdominal contouring operation.

**Material and Methods:** Clinical analysis involved 20 patients with abdominal disfigurement (following RYGB, and massive weight loss) who underwent one-time IHR using on-lay method together with abdominoplasty. We estimated postoperative results, as well as changes in QL, before RYGB and before and after abdominal contouring procedure (based on DAS 24 and SF-36 scales) in comparison with stage before surgeries.

**Results:** Complications - abnormal wound healing (infection, local necrosis) and pneumonia were found in two persons, seroma in two cases, whereas dysesthesia in four patients. We confirmed QL improvement in all aspects after each stage of treatment.

**Conclusions:** 1. One-stage on-lay hernia repair and abdominoplasty is a safe method improving the functioning of patients. 2. All stages of bariatric treatment resulted in gradual improvement of the quality of life. 3. High BMI in patients before onlay incisional hernia repair with abdominoplasty increases the risk of complications, which is connected with longer hospital stay.

## KEYWORDS:

bariatric surgery, abdominoplasty, life quality

## INTRODUCTION

Obesity reported in almost 1/3 of the adult population is related to the need for surgical intervention in a growing number of cases. Such proceedings may decrease not only symptoms of comorbidities, but lead to substantial loss of weight, which is not always permanent. Massive weight loss constitutes another challenge not only for surgeons, but also for therapists from other specialties. Numerous studies presented by various authors proved the importance of this problem. Postbariatric body disfiguration after major weight loss is responsible for functional, aesthetic, as well as psychological complications. Redundant, hanging skin folds are a common place of intertrigos, cause body posture deformations and reduce physical activity. A separate issue may be weight regain. All these factors together contribute to worse quality of life (QL) in patients after bariatric surgery compared to people with normal weight [1, 2, 3, 4].

In the majority of postbariatric individuals, anterior abdominal fold deformation (called abdomen pendulum) is seen to have the highest impact on both functional impairment and QL. Additionally, persons with pathological obesity are prone to develop incisional hernia after open bariatric surgery. Some authors present results of contouring procedures performed in one stage along with abdominal hernia repair. Usually, incisional hernia repair (IHR) in postbariatric patients is done using tension-free methods which vary in respect of mesh placement and may be done together with abdominoplasty. Alternatively to mesh placement under rectus muscles (sublay), we can use the less difficult onlay method, which requires shorter operation time and hospital stay [1, 5, 6]. Reparation of an incisional hernia with mesh placement is associated with increased risk of wound complications such as infection, se-

roma, and chronic pain occurrence [7, 8]. Various scales SF-36 and DAS-24 are used for complete evaluation of postoperative QL in postbariatric patients after IHR [9, 10, 3].

In spite of many reviews devoted to complex body contouring procedures in postbariatric groups after massive weight loss, there are few reports on simultaneous IHR and abdominoplasty [1, 6, 11, 12, 13]. This study is a continuation of our clinical experiences presented earlier, related to long-term results in patients treated surgically for obesity (RYGB), and then treated for disfigurement of the anterior abdominal wall and incisional hernia (IHR with sublay method and abdominoplasty) [5, 14]. The aim of this study was to evaluate the results of one-stage IHR with on-lay method and abdominoplasty in patients following RYGB (Roux-en-Y Gastric Bypass) including the change of QL after surgery.

## MATERIAL AND METHODS

We analyzed our previous 20 patients (16 - females, 4 - males), mean age 43.2 years, who underwent open RYGB for morbid obesity and, after stabilization of weight loss (21 months on average), IHR onlay method with abdominoplasty (2009-2014). Surgical treatment in bariatric patients comprised onlay IHR and abdominoplasty during the same procedure. First, a cellulocutaneous flap in the shape of an inverted T was typically incised along the suprafacial plane. After umbilicus translocation, remaining flaps were dissected from muscular aponeurosis up to the costal arches. In the second stage of the operation a polypropylene mesh (8cm/4 cm longer than wound) was attached to the anterior rectus sheath (onlay method). Suction drain was inserted and placed over the mesh. Routine low-molecular-weight heparin as well as antibio-

tic perioperative prophylaxis were used in the whole group. All patients were followed up in the Outpatient Clinic on a monthly basis (during the first six months), then after three months, and later once a year during consecutive years. We analyzed the postoperative course, both early and long-term results in patients. Patients completed QL survey before RYGB surgeries, then before and three years after onlay IHR and abdominoplasty. Short Form SF-36 Health Survey is used to evaluate physical and mental dimensions, and the Derriford Appearance Scale - DAS24 to evaluate the aesthetic aspect. SF-36 comprises eight health concepts: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions. DAS24 is a 24-item scale measuring distress and dysfunction related to problems with general appearance, in particular the intensity of emotional response, frequency of particular behaviors and physical impact on the problem of appearance (concerning pain and functional limitation).

Comparing continuous variables, Student's *t*-test was used for the normally distributed variables, while continuous variables with distribution other than normal were compared by the Mann-Whitney U test. Similarly, when dependent groups with normal distribution were analyzed, we used Student's *t*-test. Non-normal groups were compared with the Wilcoxon test. If non-normal distribution was found, then interquartile range (IQR) and non-standard deviation were given (Tables II, IV). Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp. Armonk, NY).

## RESULTS

Demographic data of the examined patients are shown in Table I. Table II comprises data related to onlay IHR with abdominoplasty and postoperative course. Postoperative results and complications are presented in Table III. Table IV refers to QL estimation (SF-36, DAS 24).

1. As for the operative and post-operative factors, their values (Table II.) reflect the safety of the applied surgical technique, and rapid recovery of patients after onlay IHR and abdominoplasty. Two patients with wound complications underwent secondary wound suturing. Their hospital stay was the longest; it lasted one month, and was complicated with pneumonia. They have diabetes and hypertension, and their BMI scores before IHR and abdominoplasty were 35.4 kg/m<sup>2</sup> and 40.4 kg/m<sup>2</sup>. These values were the highest in the study group; the average BMI for other patients was 28.6 kg/m<sup>2</sup>.
2. Noticeable changes were observed in patients' self-assessment. Statistical changes were significant in both used scales. Further reduction in the value of points in both scales after every stage of surgery indicate QL improvement in the aesthetical dimension (DAS 24), as well as physical and mental (SF-36). In the DAS24 scale, the mean number of points decreased by 29 on average (by 39.7 %) after RYGB operation and by a further 16 points (by 36.4 %) after onlay IHR and abdominoplasty ( $p < 0.0001$  for both). Aesthetically (DAS24), comparing to QL estimation before RYGB, we confirmed its improvement before abdominal contouring surgery 39.7%, and after this operation

**Tab. I.** Demographic data and comorbidities in the examined group.

NUMBER OF PATIENTS	20	
Females	16	
Age - mean (years)	43,2	
Age - range (years)	27–55	
Pre-RYGB BMI	46,84 [46,7] (+/- 4,63)	
Pre-onlay IHR and abdominoplasty BMI	29,56 [29,25] (+/- 0,64)	
Post-onlay IHR and abdominoplasty BMI	28,17 [28] (+/- 4,5)	
Weight regain (3-5 years after RYGB)	30,16 [30,3] (+/- 7,64)	
Interval between RYGB and onlay IHR and abdominoplasty (months)	21 [24] (+/- 8)	
	at the time of: RYGB	IHR and abdominoplasty
Hypertension	15	7
Disorders of skeletal system	10	10
Diabetes	5	3
Dysfunction of respiratory system	5	3
Disorders of lipid metabolism	7	4
Depression	2	2
Fertility disorders	2	2
Varicose veins of lower limbs	2	2
Hypothyroidism	2	2
Active smokers	7	5

Values are given in the following order: mean, median, standard deviation.

**Tab. II.** Parameters related to onlay IHR and Ab-pl, and to the postoperative course in patients from the examined group

EXAMINED FACTORS ASSOCIATED WITH IHR AND ABDOMINOPLASTY	
Duration of onlay IHR and abdominoplasty (hours)	1.8 [1.75] (+/- 0.5)
Weight of resected tissue-average (kg)	3.88 [4] (+/- 1.45)
Duration of hospitalization* (days)	10.5 [5] (+/- 3)
Time to mobilization* (days)	2 [2] (+/- 0)
Duration of suction drainage* (days)	5 [4] (+/- 1)
Time to full oral diet* (days)	2.2 [2] (+/- 0)
Duration of analgesic agents* (days)	5 [4] (+/- 1)

Values are given in the following order: mean, median, standard deviation (\* interquartile range- IQR).

61.6% (Table IV). Quality of life improvement in DAS-24 concerned an increased sense of own appearance, as well as reduction in the appearance's negative impact on: social relations (at home, work, and in public places), and relations with partners. Regarding the SF-36 scale, the mean decrease after RYGB was 89 points (around 65.5%;  $p < 0.0001$ ) and after onlay IHR and abdominoplasty it decreased by further 31 points (by 66%;  $p < 0.0001$ ). Patient's QOL estimation in this scale before RYGB showed its general improvement before abdominal contouring surgery 65.4%, and after this operation 88.2%. What is more, the analysis of SF-36 questionnaire categories reveals a great score reduction in the physical category after onlay IHR and abdominoplasty (it decreased by 24 points, that is by 85.7%;  $p < 0.0001$ ). In contrast, the score decrease in the mental category was lesser, as the mean reduction was 7 points (decrease by 36.84%;  $p < 0.0001$ ). In this scale, the patients' QL estimation before RYGB improved before and after abdominal contouring surgery, respectively 64.6 % and 94.9% - in the physical dimension, 66.7%

**Tab. III.** Results and complications after onlay IHR and Ab-pl in patients from the examined group.

Infection, abnormal wound healing, local necrosis	2
Seroma	2
Hematoma	0
Bronchogenic pneumonia, respiratory decompensation	2
Vein thrombosis	0
Fat embolism, thromboembolism	0
Presence of intertrigo (under the abdomen pendulum in all patients before abdominal hernia repair and abdominoplasty)	0
Appearance of postoperative scars	
linear - aesthetic	18
wide	2
“Dog ears”	0
Abdominal integument dysesthesia	
transient	2
persistent	2
Flaccidity in the epi- and hypogastric regions	0
Dysesthesia in area innervated by the lateral cutaneous nerve of the thigh	0
Disfigurement of pubic hair	0
Umbilicus translocation behind medial line	0
Umbilicus necrosis	0
Abdominal wall asymmetry	0
Hernia recurrence	0

and 78.9 % - in the mental dimension (Table IV). Estimation of the quality of life in SF-36 referred to improvement of: the sense of own health, physical functioning (at home, at work), and reduction of pain. Moreover, reduction of restrictions resulting from health, as well as personal and emotional problems (in social groups) were shown.

3. Prior to RYGB, the average BMI in our patients was 46.84 (+/- 4.63), after this operation the mean BMI decreased to 29.56 (+/- 4.64) (decrease of about 37%;  $p < 0.0001$ ). The impact of onlay IHR and abdominoplasty on the average BMI was definitely lesser, yet still statistically significant (decrease of 4.7%;  $p < 0.0001$ ). Secondary BMI increase, 3-5 years after RYGB (Table I), was confirmed in 55% of the examined group; all of the reported problems with self-control, healthy eating habits and lack of regular physical activity. Nine patients (45%) did not have a BMI change in the long-term follow-up when compared with the score post IHR with abdominoplasty. The increase of BMI was statistically significant ( $p=0.001$ ) with an average shift of 2.27. Therefore, a mean increase of 8.13% (27.9 vs. 30.16) was observed. To summarize, BMI in the long-term follow-up: the mean, median, standard deviation were 30.16, [30.3] and (+/- 7.64), respectively.

Differences related to BMI decrease or changes in patients' self-assessment after surgery are statistically significant ( $p < 0.0001$ ).

## DISCUSSION

Body contouring operations can be complementary for surgical treatment in morbidly obese patients who underwent bariatric surgery, and after massive weight loss suffered from various body distor-

tions at different body parts. High frequency of incisional hernia is often an indication for surgery. Some authors analyzed the positive impact on the quality of life in this group of patients after abdominal hernia repair and abdominoplasty as a single operation [15, 1]. Rubin warned against simultaneous repair of very large hernias along with other surgical procedures, but other authors (Saxe) suggest that these operations can be done together with no increase of morbidity [16, 12]. Altogether, the range of complication rate in literature varies between 4% and 80% [6]. Paniclectomies are related to a rather low complication rate (wound infection – 7.3 %, seroma/hematoma – 6%) [17]. However, Ortega, Fraccalvieri and Saxe reported higher rates (46 %), Downey noted a wound complication rate of 40% (without hernia recurrence), and Borud, in spite of a high wound complication rate, noted only one recurrence among 12 operated patients (after onlay IHR with abdominoplasty) [6, 8, 12, 7, 18]. Apart from wound morbidity, Fotopoulos' results are lower than Ortega's, but concerning hemorrhage rates the results are as follows: Fotopoulos 12 % - blood transfusion, 3 % - reoperated; Ortega blood transfusion and reoperated 5% [19, 6]. In our series, we noted wound complications (infection, prolonged healing, local necrosis, seroma) in 20%. Two of these cases (10 %) with wound dehiscence required surgical reintervention, and monthly hospital stay, but with a satisfactory final outcome. Similar cases were reported by Ortega in his study [6]. Loss of navel was not evidenced in our group, but some authors noted a connection between this complication and ventral hernia repair [12].

Berry noted thromboembolic events with deep venous thrombosis or pulmonary embolus in 13% of his patients [11]. In our group there were no thromboembolic events. Perhaps this is due to preoperative use of thromboprophylaxis. Saxe also reports beneficial effects of mechanical prophylaxis [6, 12]. In our group bronchogenic pneumonia was noted in 10% of cases. These rates correlate according to Vastine with BMI at the time of surgery (abdominoplasty), but not with previous bariatric operations [20]. In turn, in the Ortega group BMI at the time of surgery was not significantly different between complicated and uncomplicated patients [6]. A high complication rate probably explains the findings of Saxe. In his patients with a history of diabetes and smoking wound complication, the frequency rate was not higher than in patients without such a history [12]. In our data two persons with wound complications had diabetes and hypertension, and their BMI before onlay IHR and abdominoplasty was 35.4 kg/m<sup>2</sup> and 40.4 kg/m<sup>2</sup>; they were the highest in the study group. Combining hernia repair together with panniculectomy also allows to reduce wound complications by excising a significant amount of redundant tissue. This is consistent with our observations as well as those of other authors [21].

Holihan states that hernia recurrence is most often related to onlay and inlay repair, rather than sublay and underlay methods [22]. Mesh integration with patients' tissue reduces long-term recurrence. However, wound complications (53.8 % - Natarajan), as well as mesh infections, increase the risk of recurrence and are associated with higher rates of hernia repair failure [11, 23]. Apart from that, we did not confirm hernia recurrences, nor mesh infection/rejection in any case of our study with onlay mesh insertion during at least two years of follow-up. The confirmed duration of abdominal contouring surgery, as well as onset of oral feeding, patients mobilization, duration of drainage, and use of painkillers refer to rapid convalescence of our patients after this operation. This confirms that this technique is save for individuals from the examined

group. Considering selected intra- and postoperative parameters, the rates of early and late events after incisional onlay hernia repair with abdominoplasty were higher in Natarajan (wound infection, seroma, sinus formation, mesh "rejection" or migration, hernia recurrence), comparing to our results [23]. For the sake of comparison, the average operative time with the use of sublay technique in Berry's report was 5.2 hours, and wound complications rate was 25.5%, while cardiac, venous, genitourinary, respiratory complications, also distant infections constituted 44% [11]. Analyzing QL in the studied group of patients before and after IHR and abdominoplasty, we have demonstrated quality of life improvement in the functional, psychological and aesthetic aspects due to weight loss following RYGB. Menderes also reported improvement of general self-consciousness and sexual bodily self-consciousness of appearance in patients after bariatric surgery and further improvement after surgery (body contouring procedures) [24]. However, Song reports poor QOL (in HRQOL/SF-36) in the pre-weight loss period which improves after massive BMI loss, but after body contouring (including abdominal procedures) further improvement was insignificant [15]. Undoubtedly, simultaneous onlay IHR and abdominoplasty in a short period, as a one-stage procedure, and rapid convalescence of patients resulted in a significantly higher QOL rating in our group, as compared to weight loss after bariatric surgery. Weight regain in over 50% of patients from the study group within 3-5 years after bariatric surgery was connected with problems of self-control and incorrect eating habits, as well as lack of physical activity. These results correspond to earlier observations [4, 14]. These patients, regardless of the stage of their post-operative follow up, should be subjected to systematic and long-term observation of specialists dealing with weight reduction in bariatric groups.

## REFERENCES:

- Koolen P.G.I., Ibrahim A.M.S., Kim K., Sinno H.H., Lee B.T., Schneider B.E., Jones D.B., Lin S.J.: Patient Selection Optimization following Combined Abdominal Procedures: Analysis of 4925 Patients Undergoing Panniculectomy/Abdominoplasty with or without Concurrent Hernia Repair. *Plast. Reconstr. Surg.*, 2014; 134: 539-550e.
- Coriddi M.R., Koltz P.F., Chen R., Gusenoff J.A.: Changes in Quality of life and Functional Status following Abdominal Contouring in the Massive Weight loss Population. *Plast. Reconstr. Surg.*, 2011; 128: 520-526.
- Jabir S.: assessing Improvement in Quality of Life and Patient satisfaction following body Contouring Surgery in Patients with Massive Weight Loss: A Critical Review of Outcome Measures Employed. *Plast. Surg. Int.*, 2013; 2013:515737. doi: 10.1155/2013/515737.
- Van der Beek E.S.J., te Riele W., Specken T.F., Boerma D., van Ramshorst B.: The Impact of Reconstructive Procedures Following Bariatric Surgery on Patient Well-being and Quality of Life. *Obes. Surg.*, 2010; 20: 36-41.
- Iljin A., Szymański D., Kruk-Jeromin J., Strzelczyk J.: The Repair of incisional Hernia Following Roux-en-Y Gastric Bypass-With or Without Concomitant Abdominoplasty. *Obes. Surg.*, 2008; 18: 1387-1391.
- Ortega J., Navarro V., Cassinello N., Lledo S.: Requirement and postoperative outcomes of abdominal panniculectomy alone or in combination with other procedures in a bariatric surgery unit. *Am. J. Surg.*, 2010; 200: 235-240.
- Downey S.E., Morales C., Kelso R.L., Anthon G.: Review of technique for combined closed incisional hernia repair and panniculectomy status post-open bariatric surgery. *Surg. Obes. Relat. Dis.*, 2005; 1(5): 458-461.
- Fraccalvieri M., Datta G., Bogetti P., Verna G., Pedrale R., Bocchiotti MA, Boriani F, Obbialero FD, Kefalas N, Bruschi S.: Abdominoplasty after weight loss in morbidly obese patients: a 4-year clinical experience. *Obes. Surg.*, 2007; 17: 1319-1324.
- Tylka J., Piotrowicz R.: Kwestionariusz oceny jakości życia SF – 36 – wersja polska. *Kardiologia Pol.*, 2009; 67: 1166-1169.

**Tab. IV.** Evaluation of QL (SF-36, DAS 24) in patients from the examined group.

	ONLAY
Pre RYGB SF-36 *	136 [140] (+/- 29)
Pre-RYGB SF-36 (physical) *	79 [82] (+/- 12)
Pre-RYGB SF-36 (psychological) *	57 [62] (+/- 11)
Pre-onlay IHR and abdominoplasty SF-36	47 [49] (+/- 11)
Pre-onlay IHR and abdominoplasty SF-36 (physical)	28 [30] (+/- 9)
Pre-onlay IHR and abdominoplasty (psychological)	19 [19] (+/- 5)
Post-onlay IHR and abdominoplasty SF-36	16 [17] (+/- 8)
Post-onlay IHR and abdominoplasty SF-36 (physical)	4 [4] (+/- 3)
Post-onlay IHR and abdominoplasty SF-36 (psychological)	12 [14] (+/- 5)
Pre-RYGB DAS 24	73 [74] (+/- 14,5)
Pre-onlay IHR and abdominoplasty DAS 24	44 [44] (+/- 9)
Post-onlay IHR and abdominoplasty DAS 24	28 [26] (+/- 6)

The values are given in the following order: mean, median, standard deviation (\* interquartile range - IQR)

## CONCLUSIONS

- One stage onlay hernia repair and abdominoplasty is a safe method improving the functioning of patients.
- All stages of bariatric treatment resulted in gradual improvement in the quality of life.
- High BMI in patients before onlay incisional hernia repair with abdominoplasty increases the risk of complications, which is connected with longer hospital stay.

- Carr T., Moss T., Harris D.: The DAS24: A short form of the Derriford Appearance Scale DAS59 to measure individual responses to living with problems of appearance. *Br. J. Health Psychol.*, 2005; 10: 285-298.
- Berry M.F., Paisley S., Low D.W., Rosato E.F.: Repair of large complex recurrent incisional hernias with retromuscular mesh and panniculectomy. *Am. J. Surg.*, 2007; 194: 199-204.
- Saxe A., Schwartz S., Gallardo L., Yassa E., Alghanem A.: Simultaneous panniculectomy and ventral hernia repair following weight reduction after gastric bypass surgery: is it safe? *Obes. Surg.*, 2008; 18: 192-195.
- [13] Rao R.S., Gentileschi P., Kini S. U.: Management of ventral hernias in bariatric surgery. *Surg. Obes. Relat. Dis.*, 2011; 7: 110-116.
- Iljin A., Antoszewski B., Durczyński A., Lewandowicz E., Strzelczyk J.: Long-Term Results of Incisional Hernia Repair with Concomitant Abdominoplasty in Postbariatric Patients. *Pol. Przegl. Chir.*, 2016; 88: 147-154.
- Song A.Y., Rubin P., Thomas V., Dudas J.R., Marra K.G., Fernstrom M.H.: Body Image and Quality of Life in Post Massive Weight Loss Body Contouring patients. *Obesity* 2006; 14: 1626-1636.
- Rubin J.P., Nguyen V., Schwentker A.: Perioperative management of the post-gastric-bypass patient presenting for body contour surgery. *Clin. Plast. Surg.*, 2004; 31: 601- 610.
- Grazer F.M., Goldwyn R.M.: Abdominoplasty assessed by survey, with emphasis on complications. *Plast. Reconstr. Surg.* 1977; 59: 513-517.
- Borud I.J., Grunwaldt L., Janz B., Mun E., Slavin S.A.: Components separation combined with abdominal wall plication for repair of large abdominal wall hernias following bariatric surgery. *Plast. Reconstr. Surg.*, 2009; 119: 1792-1798.
- Fotopoulos I., Kehagias I., Kalfarentzos F.: Dermolipectomies following weight loss alter surgery for morbid obesity: *Obes. Surg.*, 2000; 10: 451-410.
- Vastine V.L., Morgan R.F., Williams G.S., Gampper T.J., Drake DB, Knox LK, Lin KY.: Wound complications of abdominoplasty in obese patients. *Ann. Plast. Surg.* 1999; 42: 34-39.

21. Robertson J.D., de la Torre J.L., Gardner P.M., Grant J.H. 3rd, Fix R.J., Vásconez L.O.: Abdominoplasty repair for abdominal wall hernias. *Ann. Plast. Surg.* 2003; 51: 10-6.
22. Holihan J.L., Nguyen D.H., Nguyen M.T., Mo J., Kao L.S., Liang M.K.: Mesh Location in Open Ventral Hernia Repair : A Systemic Review and Network Meta-analysis. *World J. Surg.*, 2016; 40: 89-99.
23. Natarajan S., Meenaaa S., Thimmaiah K.A.: A randomized Prospective Study to Evaluate Preperitoneal Mesh repair Versus Onlay Mesh repair and Laparoscopic IPOM in Incisional Hernia repair. *Indian J. Surg.* 2017; 79: 96-100.
24. Menderes A., Baytekin C., Hacıyanlı M., Yılmaz M.: Dermalpectomy for body contouring after bariatric surgery in Aegean region of Turkey. *Obes. Surg.* 2003; 13: 637-641.

Word count: 3020

Page count: 5

Tables: 4

Figures: –

References: 24

DOI: 10.5604/01.3001.0012.7027

Table of content: <https://ppch.pl/issue/11483>

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Competing interests: The authors declare that they have no competing interests.



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Cite this article as: Aleksandra I., Bogusław A., Zieliński T., Skulimowski A., Szymański D., Strzelczyk J.: Results of one-stage onlay hernia repair with abdominoplasty in patients after gastric by-pass surgery; *Pol Przegl Chir* 2018; 90 (6): 32–36