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Personal history of obesity matters. Adolescent adiposity may influence the late results of gastric bypass performed in adults

Personalna historia otyłości ma znaczenie. Otyłość wieku młodzieńczego może wpływać na wyniki odległe operacji ominięcia żołądka u dorosłych

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Abstract

Introduction: The influence of adolescent obesity on weight loss following bariatric surgery in adults has not been evaluated. The purpose of this study was to determine the impact of prior adolescent obesity on long-term weight changes following Roux-en-Y gastric bypass (RYGB) in adulthood.

Material and methods: This single centre retrospective cohort study evaluated changes in body mass index (BMI) after RYGB within 9–13 years. Questionnaires were sent by post to patients (n = 147) operated on between January 1999 and December 2003 in the Department of General and Transplant Surgery of Medical University, Lodz, Poland. Long-term data was obtained from 33.33% (n = 49, mean age 46.1 ± 10.7 years). Preoperative, nadir and actual BMI and differences between these values were calculated. Data was analysed with a cut-off BMI at 18 years old of 30 and 35 units (U).

Results: Patients with a BMI of more than 30 and 35 U in adulthood regained more weight after initial achievement of nadir total weight loss compared to their only adult obese counterparts. Preoperative BMI varied by weight at 18 years old (p = 0.02), while value and time to nadir postoperative BMI and actual BMI were comparable.

Conclusion: Adolescent obesity may be a risk factor for long-term RYGB failure. Surgery cannot be definitively curative in this group of patients, and continued active conservative treatment is required. **(Endokrynol Pol 2013; 64 (1): 2–6)**

Key words: *adolescent obesity, late result of bariatric surgery, Roux-en-Y gastric bypass*

Streszczenie

Wstęp: Dotychczas nie oceniano wpływu otyłości wieku młodzieńczego na utratę masy ciała po operacjach bariatrycznych. Celem badania było określenie odległych zmian masy ciała po operacji ominięcia żołądka (RYGB) wykonywanych u dorosłych, którzy byli otyli w wieku młodzieńczym.

Materiały i metody: W jednoośrodkowym badaniu kohortowym poddano ocenie zmiany wskaźnika masy ciała (BMI) w okresie 9–13 lat po RYGB. Do chorych operowanych w Klinice Chirurgii Ogólnej i Transplantacyjnej Uniwersytetu Medycznego w Łodzi w latach 1999–2003 (n = 147) wysłano kwestionariusze drogą pocztową. Wyniki odległe leczenia uzyskano w 33,33% przypadków (n = 49, średnia wieku 46,1 ± 10,7 roku). Wyliczono przedoperacyjne, minimalne oraz aktualne BMI oraz różnice pomiędzy nimi. Dane analizowano przy punkcie odcięcia dla BMI w 18. roku życia wynoszącym 30 i 35 jednostek.

Wyniki: Przyrost masy ciała po wcześniejszym osiągnięciu jej minimalnej wartości był większy u chorych z BMI wyższym od 30 i 35 j. w wieku młodzieńczym, w porównaniu do osób otyłych jedynie w wieku dorosłym. Wykazano różnice w przedoperacyjnym BMI w zależności od masy ciała w 18 roku życia ($p = 0,02$), podczas gdy wartość i czas do osiągnięcia minimalnego pooperacyjnego oraz aktualnego BMI były porównywalne dla analizowanych grup.

Wnioski: Otyłość wieku młodzieńczego może być czynnikiem ryzyka nawrotu otyłości po RYGB. W tej grupie chorych odległe wyniki operacji mogą być niezadowalające, dlatego konieczne jest dalsze aktywne leczenie zachowawcze tych chorych. **(Endokrynol Pol 2013; 64 (1): 2–6)**

Słowa kluczowe: *otyłość, odległe wyniki operacji bariatrycznej, ominięcie żołądka sposobem Roux*

Introduction

Adolescent obesity has been proven to be a risk factor for adult morbidity and mortality [1, 2]. The lack of effective behavioural or pharmacological options for obesity treatment has raised questions regarding surgical intervention in the group of most severely obese teenagers [3]. Bariatric surgery is still reserved for only a small group of young patients, and even then follows strict criteria and is contemplated with great caution.

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As a result, persistence of obesity into adulthood is observed, with more than 70% of obese adolescents remaining severely overweight in future [4].

Bariatric surgery, such as a Roux-en-Y gastric bypass (RYGB), has become the only successful and effective management in obtaining weight loss and improvement in comorbidities in adults [5]. Thus most sustained obesity patients (previously obese adolescents) would be considered for surgical treatment. However, long-term postoperative weight regain is observed in a subset of these patients [6]. Previous studies have been carried out to determine prognostic indicators to screen patients who would not be successful candidates for surgery [7]. Nonetheless, the influence of a history of adolescent obesity on weight loss following bariatric surgery in adults has not previously been evaluated.

Thus, the purpose of our study was to determine the impact of prior adolescent obesity on long-term weight changes following RYGB surgery in adulthood.

Material and methods

From January 1999 to December 2003, patients hospitalised in the Department of General and Transplant Surgery of the Medical University in Lodz, Poland, were selected for RYGB, if they met the criteria for bariatric surgery proposed in 1991 by the National Institutes of Health Consensus Development Panel [8]. Routine detailed preoperative evaluation was performed on all patients, including clinical history, physical investigation, psychiatric assessment and necessary specialty consultations. For all patients, baseline study data including demographics, preoperative obese patients characteristics was collected retrospectively from hospital charts and follow-up notes. Changes in body weight (BW) and body mass index (BMI) after surgery within 9–13 years were assessed by sending a questionnaire by post to all these patients (n = 147) and they were asked to indicate their 18 year-old, preoperative, and actual body weights with value and time to nadir postoperative weight loss. Relative measures including preoperative, nadir and actual BMI and differences between these values were calculated. To determine the influence of body mass index at age 18 on weight changes following bariatric surgery in adulthood, patients (n = 49) were classified into groups: (1) BMI < < 30 units (U); n = 22 (44.9%), and (2) BMI ≥ 30 U; n = 27 (55.1%). Data was further analysed with cut-off BMI values at age 18 of 35 U: (3) BMI < 35 U; n = 35 (71.4%) and (4) BMI ≥ 35 U; n = 14 (28.6%).

Statistical analyses were carried out using STATISTICA 8.0 software package with the level of statistical significance $p < 0.05$. Shapiro-Wilk test of normality was performed. To compare differences in body weight and body mass index, values in all surveyed patients and between study subgroups, a non-parametric Mann-Whitney U test was used. All data is given in text, tables and figures.

Results

Initially from January 1999 to December 2003, 147 patients were operated on. The mean age was 36 ± 10 years (females 36 ± 9.7, males 38.4 ± 10.6, range 18 to 59) and male to female ratio 52/95 (64% females). The mean preoperative weight was 132.4 ± 29.3 kilograms (F 118 ± 18, range 86–178; M 161 ± 28, range 112–220) and BMI 45 ± 8 U (F 43 ± 7, range 35 to 61; M 50 ± 8, range 38–78).

Long-term, 9-13 years follow-up data was obtained in 33.33% (n = 49, mean age 46.1 ± 10.7 years) of the 147 bariatric surgical candidates. Mean nadir total weight loss (TWL) in all surveyed patients was 51 ± 15.8 kg (from preoperative 136.2 ± 28.3, by 37.6%) and nadir total BMI loss (TBL) was 17.5 ± 5.6 U (from 46.3 ± 7.9; ANOVA, $p = 0.000016$) and mean time to its occurrence was 13 ± 6.5 months postoperatively, while actual (mean follow-up time of 10 ± 1.5 years) BW and BMI were, respectively, 104.3 ± 27.6 kg and 35.4 ± 7.9 U (ANOVA, $p = 0.000016$, compared to preoperative data).

We proved that preoperative BMI significantly varied by weight at age 18, while value and time to nadir postoperative BMI and actual BMI in the analysed subgroups were comparable (Table I).

We observed an increased weight regain rate (Δ BW and BMI nadir to actual) after Roux-en-Y gastric bypass in subgroups with BMI values at age 18 of more than 30 (Table II) and 35 U (Table III), compared to subjects who were nonobese during childhood.

Discussion

Bariatric surgery is the gold standard treatment for significant and durable weight loss in morbidly obese patients [9]. RYGB is the most commonly performed bariatric procedure in the US [10], since it demonstrates optimal results with minimal operative risk and postoperative complications. However, long-term weight regain rate after RYGB is increasingly being reported [11]. This is a multifactorial and complex phenomenon [12] that involves either physiological and psychosocial or anatomic and genetic factors controlling food-intake behaviour. Post-RYGB difficulties with durable weight loss in this subset of patients reflect the same problems that they face with non-invasive treatment before bariatric surgery. Attempts to discover key risk factors that allow the anticipation of weight regain on the preoperative evaluation are still ongoing. Identifying risk factors for

Table I. *Preoperative, nadir, actual weight and time to occurrence in subgroups with cut-off BMI values at 18 years old of 30 units (U). Subgroup comparisons were done using the Mann-Whitney U test. Significance levels appear in the p column*

Tabela I. *Przedoperacyjna, minimalna i aktualna masa ciała oraz czas do ich osiągnięcia w podgrupach w odniesieniu do wartości odcięcia BMI dla 18. roku życia wynoszącej 30 jednostek. Porównanie podgrup przeprowadzono z użyciem testu Manna-Whitneya. Poziomy istotności statystycznej przedstawiono w kolumnie p*

BMI at 18 years old	BMI < 30 (U)				BMI > 30 (U)				p
	Mean ± SD	Median	Upper quartile	Lower quartile	Mean ± SD	Median	Upper quartile	Lower quartile	
Preoperative BMI (U)	44.7 ± 10	41.8	49.1	40.1	47.6 ± 5.7	46.8	51.9	43.4	p = 0.02
Nadir postoperative BMI (U)	28 ± 5.9	27.2	30.1	24.9	28.7 ± 4.7	29.1	31.7	26.1	p = 0.26
Time to nadir postoperative BMI (months)	14.3 ± 8.9	12	12	8	13.4 ± 7.2	12	24	7	p = 0.79
Actual BMI (U)	34.6 ± 8.2	32.6	34.9	29.4	36.1 ± 7.9	34.6	39	31.8	p = 0.22
Time to actual BMI (years)	10.6 ± 1.6	11	12	9	9.4 ± 1.1	9	10	9	p = 0.01

BMI — body mass index

Table II. *Changes in weight and body mass index in surveyed patients according to cut-off BMI at 18 years old of 30 units (U). BMI at age 18. p values associated with Mann-Whitney U test*

Tabela II. *Zmiany masy ciała oraz wskaźnika masy ciała u badanych chorych w odniesieniu do wartości odcięcia BMI dla 18. roku życia wynoszącej 30 jednostek. BMI w 18. roku życia. Wartości p ustalono na podstawie testu Manna-Whitneya*

BMI at 18 years old	BMI < 30 (U) (Subgr 1, n = 22)				BMI ≥ 30 (U) (Subgr 2, n = 27)				p
	Mean	Median	Upper quartile	Lower quartile	Mean	Median	Upper quartile	Lower quartile	
Δ BW preoperative to nadir (kg)	47.18 ± 16.67 (by 36.9%)	44.5	55	35	56.66 ± 15.94 (by 39.3%)	55	69.5	48.5	0.029796
Δ BMI preoperative to nadir (U)	16.76 ± 5.85	15.74	20.27	13.15	18.87 ± 16.36	18.11	22.97	16.36	0.106069
Δ BW preoperative to actual (kg)	28.63 ± 19.27 (by 22.1%)	27	37.5	18.25	34.51 ± 26.93 (by 23.5%)	35	47.5	27	0.085731
Δ BMI preoperative to actual (U)	10.15 ± 6.6	10.03	13.38	6.81	11.5 ± 8.6	12.37	15.39	8.41	0.176450
Δ BW nadir to actual —weight regain (kg)	18.54 ± 14.65	13.5	22.75	8.75	22.14 ± 20.18	15	26.5	10	0.653940
Δ BMI nadir to actual — weight regain (U)	6.61 ± 5.17	5.21	8.45	3.29	7.37 ± 6.3	4.84	9.14	3.36	0.742416

Subgr — subgroup; BMI — body mass index; BW — body weight; Δ — body weight/body mass index changes; (U) — units

Table III. *Changes in weight and body mass index in surveyed patients according to cut-off BMI at 18 years old of 35 units (U). BMI at age 18. p values associated with Mann-Whitney U test*

Tabela III. *Zmiany masy ciała i wskaźnika masy ciała u badanych chorych w odniesieniu do wartości odcięcia BMI dla 18. roku życia wynoszącej 35 jednostek. BMI w 18. roku życia. Wartości p ustalono na podstawie testu Manna-Whitneya*

BMI at 18 years old	BMI < 35 (U) (Subgr 3, n = 35)				BMI ≥ 35 (U) (Subgr 4, n = 14)				p
	Mean	Median	Upper quartile	Lower quartile	Mean	Median	Upper quartile	Lower quartile	
Δ BW preoperative to nadir (kg)	48.54 ± 15.3 (by 37.4%)	50	58	35	62.07 ± 16.9 (by 40.3%)	60	72.5	53.25	0.010093
Δ BMI preoperative to nadir (U)	17.17 ± 5.5	16.29	20.83	13.32	19.81 ± 6	18.73	23.26	17.31	0.125015
Δ BW preoperative to actual (kg)	30.48 ± 18.69 (by 23.1%)	30	42	18.5	35.35 ± 33.93 (by 22.4%)	42	48.75	26.25	0.213857
Δ BMI preoperative to actual (U)	10.72 ± 6.5	10.28	15.04	6.97	11.33 ± 10.45	12.69	14.83	8.29	0.462923
Δ BW nadir to actual — weight regain (kg)	18.05 ± 12.77	14	22.5	10	26.71 ± 26.24	19.5	29.25	10	0.504096
Δ BMI nadir to actual — weight regain (U)	6.44 ± 4.62	4.95	8.36	3.46	8.48 ± 8	6.17	9.69	3.08	0.701828

Subgr — subgroup; BMI — body mass index; BW — body weight; Δ — body weight/body mass index changes; (U) — units

RYGB failure may allow them to be targeted with cost-saving early treatment approaches and improved self-monitoring strategies in future. Otherwise, postoperative weight regain has a negative impact on psychological health and weight-related quality of life, and as a result patient compliance with further strategies of treatment is poor [13]. Thus, clinical research is needed to determine predictors of surgical success in obese patients.

In our study, adulthood onset of obesity was suspected to be a risk factor for late weight regain after RYGB. Patients with a history of adolescent obesity regained more weight after initial achievement of nadir total weight loss compared to their only adult obese counterparts (Table II and III). If confirmed by future studies on larger groups of patients, these individuals may need additional instructions and postsurgical support regarding expectations for surgery results and their future life after surgery.

In our opinion, additionally to the routine preoperative medical evaluation, a history of adulthood obesity should be obtained. This is an important finding as it might help explain to those obese subjects who have been struggling with obesity since their early years that the late postoperative weight loss may differ from their expectations.

A close relationship between adolescent obesity and effects of treatment is well known in conservative approaches in obese adults. It has been proved that reducing weight by adults who were obese in childhood is far less successful than by those who gained weight later in life [14]. This phenomenon has several identified causes; with long established unhealthy eating behaviour and low exercise level chief among them [14, 15].

Evidence of studies on RYGB outcomes in adults can be used to guide the application of bariatric procedures to severely obese adolescents, as childhood obesity has reached epidemic proportions [16].

The results of our study may be a supportive argument in the debate on indications for bariatric operations during adolescence [17]. Weight reduction in obese children improves insulin sensitivity and lipids' profile, and decreases blood inflammatory markers [18]. The timing for bariatric surgery in young patients is still controversial and should be considered individually. However, a delay of invasive treatment until obese adolescents are grown might expose them to suboptimal outcomes following bariatric surgery in future, with higher weight regain rate. Alongside other indications [19], this needs to be considered in planning elective operations in obese adolescents.

Conclusions

We hypothesise that adult patients with a history of adolescent obesity need lifelong medical management, since many of them may continue to struggle with their disease. Because surgery cannot be definitively curative in this group of patients, continued intensive and active conservative treatment is required.

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