2型糖尿病合并肥胖患者腹腔镜下袖状胃切除术后复胖行SADI-S术后3年随访1例报告

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【摘要】 减重手术是治疗重度肥胖有效且持久的方法。腹腔镜下袖状胃切除术(laparoscopic sleeve gastrectomy,LSG)是目前临床上采用最广泛的术式,但其存在中远期减重疗效欠佳、易复胖的缺点。LSG术后体重反弹问题逐渐受到减重医师的关注。修正手术中,袖状胃切除联合单吻合口十二指肠转位术(single-anastomosis duodena-ileal bypass with sleeve gastrectomy,SADI-S)可达到令人满意的减重效果,体重反弹风险最低且并发症较少。本例患者为2型糖尿病合并重度肥胖,LSG术后4年复胖后采用SADI-S修正,术后随访3年,体重再次下降并稳定保持。

【关键词】 肥胖; 修正手术; 腹腔镜下袖状胃切除术(LSG); 袖状胃切除联合单吻合口十二指肠转位术(SADI-S)

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Conversion from laparoscopic sleeve gastrectomy to SADI-S for weight regain in a patient with type 2 diabetes and morbid obesity: a case report and 3-year follow-up

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【Abstract】 Bariatric surgery remains an effective and long-lasting treatment for morbid obesity. Laparoscopic sleeve gastrectomy (LSG) is currently the most widely used surgical procedure, but it has the disadvantages of suboptimal medium- and long-term weight loss effects and weight regain. The problem of weight regain after LSG has drawn increasing attention from bariatric physicians. In revision surgery, single-anastomosis duodena-ileal bypass with sleeve gastrectomy (SADI-S) achieves satisfactory weight loss with lowest risk of weight regain and fewest complications. In this case, a patient with type 2 diabetes and morbid obesity regained weight four years after LSG underwent SADI-S revision, resulting in further weight loss and stable maintenance during a 3-year follow-up period.

【Key words】 obesity; revision surgery; laparoscopic sleeve gastrectomy (LSG); single-anastomosis duodena-ileal bypass with sleeve gastrectomy (SADI-S)

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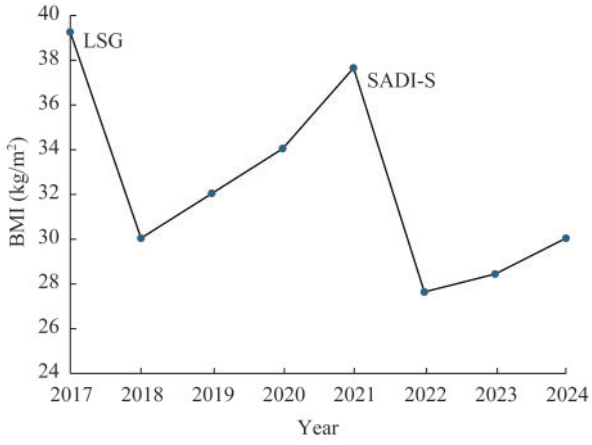
腹腔镜下袖状胃切除术(laparoscopic sleeve gastrectomy,LSG)是最常见的减重术式之一,也是一种对病态肥胖安全有效的外科治疗方法,但其存在疗效不佳或出现中远期复胖的问题,LSG术后体重反弹问题逐渐受到减重医师的关注。在内科药物干预无效的情况下,需要考虑采取修正性减重手术(revisional bariatric surgery,RBS)进行补救。修正手术是在初次减重手术后减重不充分或体重反弹显著时的一种选择[1]。国外调查发现,修正手术中袖状胃切除联合单吻合口十二指肠转位术(single-anastomosis duodena-ileal bypass with sleeve gastrectomy,SADI-S)可达到令人满意的减重效果,体重反弹风险最低且并发症较少[2]。本例患者为2型糖尿病合并重度肥胖LSG术后4年复胖而行SADI-S修正,体重再次下降并稳定保持。由于我国减重手术起步较晚,故目前临床上以SADI-S进行RBS的案例报道较少,长期随访数据缺乏,本例修正术后随访3年,随访时间较长,有较强的临床参考价值。

病例资料 患者女性,55岁,因"体重进行性增加40年"入院,少年时期为乒乓球运动员,训练强度较大,约40年前(16岁)时停止体育锻炼后体重进行性增加,30余年前(24岁)时体重70 kg左右。23年前(32岁)产后食欲增强、进食量增大,平素喜碳水及油炸类食物,体重逐渐增加至85 kg。12年前(43岁)因口干多饮,血糖升高,确诊为2型糖尿病(type 2 diabetes mellitus,T2DM),口服二甲双胍等降糖治疗。同时合并原发性高血压,缬沙坦等降压治疗。曾尝试多种方式减重(饮食控制、针灸、减肥药),在1年内体重降至80 kg,停止干预措施后体重反弹。7年前(48岁)体重至最高98 kg。

患者于7年前(2017年6月)在我院行LSG,术前体重98 kg,身高1.58 m,BMI 39.3 kg/m^2,术后半年体重下降15 kg,术后1年体重下降23 kg。此后进食量逐渐增加,体重逐渐反弹,每年增加约5 kg,期间皮下注射利拉鲁肽1.2 mg/d,但体重无明显减轻,至2021年(LSG术后4年)体重反弹至94 kg。患者于3年前(2021年6月)再次来我院行RBS,采用SADI-S术式,术后1年体重下降25 kg,BMI 27.6 kg/m^2,术后2年71 kg,术后3年体重维持在75 kg(其两次手术前体重变化见图1)。患者血糖、血糖波动、血压、血脂等代谢指标控制良好,停用降糖、降压药治疗,无贫血、低蛋白血症等营养障碍(手术前后代谢指标见表1)。



BMI: Body mass index; LSG: Laparoscopic sleeve gastrectomy; SADI-S: Single-anastomosis duodena-ileal bypass with sleeve gastrectomy.

图1 患者两次手术前后BMI变化

Fig 1 Changes in the patient's BMI before and after the two surgeries

本例采用标准SADI-S术式,术前进行消化道造影,对残胃进行三维重建以了解术后形态。术中进行二次修正,基于扩张的胃部进行再次切除,增加术后患者进食后饱腹感。目前对SADIS手术的具体操作仍有争议,本手术选择了十二指肠-回肠吻合术并行端侧缝合,从回盲部向上测量小肠长度(300 cm),确认食物经过的回肠长度,取得减重效果与避免营养并发症的平衡。

讨论 减重手术可通过限制营养吸收及调节代谢等多种方式在降低体重的同时缓解T2DM、高血压病、非酒精性脂肪性肝病、阻塞性睡眠呼吸暂停综合征和多囊卵巢综合征等,成为治疗病态肥胖最有效的方式。1991年,Marceau引入袖状胃切除术(sleeve gastrectomy,SG)作为一种独立的减重手术[3],因其相对简单、无需异物植入及胃肠道并发症

表1 两次手术前后患者代谢及营养指标变化

Tab 1 Changes in the patient's metabolic and nutritional indices before and after the two surgeries

Items	Before and after LSG surgery			After SADI-S surgery		
	Before LSG (Jun 2017)	1 y after LSG (Jun 2018)	4 y after LSG and before SADI-S (Jun 2021)	1 y after SADI-S (Aug 2022)	2 y after SADI-S (Jun 2023)	3 y after SADI-S (Nov 2024)
SBP (mmHg)	152	142	156	151	144	149
DBP (mmHg)	90	86	94	84	88	93
HbA1c (%)	7.2	5.8	6.6	5.6	5.6	6.1
FPG (mmol/L)	6.08	5.13	5.53	5.22	4.01	5.98
2hPG (mmol/L)	8.46	6.86	12.1	4.43	3.51	7.94
FINS (μU/mL)	14.23	7.71	10.08	14.36	95.41	17.64
FCP (ng/mL)	2.76	2.31	2.15	2.16	8.06	5.24
2Hins (μU/mL)	44.93	–	62.56	9.52	24.91	87.82
2hCP (ng/mL)	6.46	–	6.98	3.13	5.64	15.18
TC (mmol/L)	5.65	5.37	5.73	4.52	3.96	4.62
TG (mmol/L)	1.72	1.27	1.75	0.98	1.41	0.64
HDL-c (mmol/L)	1.45	1.25	1.44	1.46	1.37	2.19
LDL-c (mmol/L)	3.83	3.75	3.53	3.53	1.97	2.14
Albumin (g/L)	40.1	39.0	42.0	38.8	42.3	36.6
Leukocytes ($\times 10^9$/L)	8.4	4.4	7.8	5.6	4.6	4.6
Hemoglobin (g/L)	108	105	110	104	103	119
Ferritin (ng/mL)	20.81	14.98	25.0	18.5	17.9	8.76
Vitamin B12 (ng/L)	340.0	529.0	488.1	390.9	546.6	757.0
Folic acid (μg/L)	9.73	15.58	10.50	7.95	4.91	2.96
25 (OH) D (ng/mL)	11.68	23.21	18.71	8.18	12.82	7.48
Calcium (mmol/L)	2.24	2.47	2.08	2.29	2.32	2.22
Phosphorus (mmol/L)	0.87	1.11	0.85	1.08	1.11	1.14
PTH (pg/mL)	91.92	69.34	82.19	106.40	92.96	121.30
CGM						
TIR (3.9–10.0 mmol/L, %)	74	–	82	95	–	–
TAR (≥10.0 mmol/L, %)	24	–	18	0	–	–
TBR (2.8–3.9 mmol/L, Grade 1 hypoglycemia)	2	–	0	5	–	–
TBR (≤2.8 mml/L, Grade 2 hypoglycemia)	0	–	0	0	–	–
CV (%)	29.4	–	27.8	19.3	–	–

LSG: Laparoscopic sleeve gastrectomy; SADI-S: Single-anastomosis duodena-ileal bypass with sleeve gastrectomy; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; HbA1c: Glycosylated hemoglobin; FPG: Fasting glucose; 2hFG: 2-hour postprandial glucose; FINS: Fasting insulin; FCP: Fasting C-peptide; 2hINS: 2-hour postprandial insulin; 2hCP: 2-hour postprandial C-peptide; TG: Triglycerides; TC: Total cholesterol; HDL-c: High-density lipoprotein cholesterol; LDL-c: Low-density lipoprotein cholesterol; 25 (OH) D: 25 Hydroxyvitamin D; PTH: Parathyroid hormone; CGM: Continuous glucose monitoring; TIR: Time in range; TAR: Time above range; TBR: Time below range; CV: Coefficient of variation.

少，在临床上得以广泛采用[4]，其安全性和有效性已在多次国际共识峰会上确立[5-6]。尽管已有许多研究认可SG有良好的体重减轻效果和减少肥胖共病[7]，但术后中远期“复胖”问题一直是临床“痛点”。在复胖判定标准方面，我们通常采用最大减重百分比（percentage of maximum weight lost，MWL%）来评价，即（术后反弹体重–术后最低体重）/术后最大减轻体重，MWL%≥20%即为复胖[8]。根据此方

法,本例患者SG术后4年时MWL%为82.8%,符合复胖标准。

Alvarenga等[9]发现,SG术后8年肥胖患者多余体重减少百分比(percentage of excess weight loss, EWL%)仅为52%,这意味着在所有SG患者中有一半在术后8年明显复胖而减重失败;另有研究发现LSG远期失败率高达64%[10]。对于内科治疗失败的复胖患者,修正手术可能是LSG术后远期不可或缺的部分。LSG作为一项限制性手术,其主要操作是切除大部分的胃底、胃体和胃窦。一项研究表明,胃囊的扩张可能会导致体重反弹,这可能由于残留的胃底在食物容积机械性刺激下不断膨胀,从而分泌释放更多的胃饥饿素。除解剖因素外(如胃囊扩张、吻合口径增大等),复胖还与不良的饮食习惯、缺乏运动、依从性差、精神心理状态、术前BMI、年龄、遗传等因素相关[11-13]。本例患者年龄偏大、术后2年食欲渐增、依从性差,故体重不断增加。

术后复胖的解决方案主要有4种,即饮食控制、加强运动、药物治疗和修正手术。目前,对于复胖后选择强化体重管理还是应用胰高糖素样肽-1受体激动剂(glucagon-like peptide-1 receptor agonist, GLP-1RA)或是修正手术尚无统一意见。一项瑞士减重中心的单中心回顾性观察性研究共纳入50例减重术后复胖的患者,接受GLP-1RA(利拉鲁肽3.0 mg/d皮下注射,或司美格鲁肽1.0 mg/wk皮下注射)治疗6个月,总体重减轻百分比(percentage of total weight loss, TWL%)中位数为8.8%、ΔBMI为2.9 kg/m^2 [14]。减重药物的长期减重效果和安全性尚需进一步观察和研究,且目前关于药物干预术后复胖的多为回顾性研究,尚不能明确药物干预的真实疗效和最佳节点。

目前复胖后修正手术术式主要包括针对LSG后复胖患者的Re-LSG、腹腔镜单吻合口胃旁路术(one anastomosis gastric bypass, OAGB)、腹腔镜Roux-en-Y胃旁路术(laparoscopic Roux-en-Y gastric bypass, LRYGB)、SADI-S术等[15]。SADI-S术是在袖状胃切除的基础上,在胃十二指肠动脉水平离断十二指肠,使得十二指肠残端长3~4 cm,再将近端十二指肠残端与远端小肠吻合。根据PRISMA和Cochrane指南,结果显示胆胰转流术(biliopancreatic diversion with duodenal switch, BPD-DS)、SADIS被认为在体重减轻方面效果最好,但BPD-DS术后营养不良发生率明显高于其他术式,故并非首选[16]。一项纳入1 066名LSG修正为SADI-S的系统回顾和Meta分析显示,在体重减轻方面,SADIS患者减重效果显著,其中EWL% 6个月时为47.73%(95%CI: 37.86%~57.61%),12个月时为59.39%(95%CI: 51.18%~67.61%),24个月时为23.84%(95%CI: 5.76%~41.92%)[17]。研究发现,与RYGB相比,SADI-S术后5年体重减轻更多,复胖程度更低,且两组营养不良发生类型及发生率无显著差异[18],因此,SADI-S术作为修正手术可能更值得推荐。本例患者在修正术后3年体重明显下降且保持稳定,无贫血、低蛋白等不良反应,T2DM、高血压病等亦处于持续缓解中。

相较于首次手术,修正手术由于术后粘连、解剖结构改变以及手术复杂等因素,导致其难度更高、手术时间更长,并发症发生率和病死率也随之上升。《肥胖代谢外科修正手术东亚专家共识(2018)》提出在行修正手术前应常规进行胃镜、上消化道造影和全腹部CT检查以了解患者腹腔解剖情况,并由腹腔镜技术熟练的代谢外科医师完成[19]。

综上所述,我们对1例初次LSG手术减重失败的患者采用SADI-S手术修正,随访3年中减重效果理想、代谢指标改善,且营养状态良好,未发生营养障碍。近年来亦有消化内镜医师尝试在内镜下进行改良袖状胃成形术,取得了不错的减重疗效[20],这些进展都为今后复胖患者的临床管理提供了更多解决方案。

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