

CLINICAL DECISION-MAKING AND SELECTION CRITERIA BETWEEN ANATOMICAL REVERSAL AFTER METABOLIC BARIATRIC SURGERY AND OTHER REVISION SURGERIES



Zefeng Xia (China)
Wuhan Union Hospital, Huazhong University of Science and Technology

Disclosure Slide

☒	No, nothing to disclose
☐	Yes, please specify:

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Example: company XYZ	x		x		x			



Revisional MBS Trend — Global vs China

Global (IFSO 9th Registry 2023)

593,500
Total MBS reported (35 countries + 2 regional registries)

50,500
Revisional MBS (conversion + corrective + reversal)

8.5%
Revision share = 50,500 / 593,500

IFSO 9th Report gives global aggregate + per-country absolute revision counts (Fig.7), but no certified single-country revision % → only global 8.5% used.

表 1 2008-2024 年中国肥胖代谢外科手术推算数量 ^[2-6]

术式	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	%
RYGB	10	30	395	850	1 660	3 132	2 920	2 350	1 830	1 729	2 380	1 851	976	1 505	1 117	901	1 520	4.7
SG	10	30	60	165	240	777	2 200	3 221	4 201	5 119	6 233	7 386	10 669	19 846	25 642	30 352	24 443	75.6
OAGB	0	0	0	0	0	0	0	0	0	0	0	75	100	537	760	1228	1234	3.8
SG Plus	0	0	0	0	0	48	30	110	49	15	560	646	1064	1999	1618	2183	3021	9.3
AGB	97	220	185	135	45	36	0	1	0	0	0	0	7	1	1	0	5	0.0
Fundoplication	0	0	0	0	5	113	90	10	32	10	5	0	30	103	11	254	112	0.3
JIB/GIA	0	0	0	0	0	0	0	400	100	1 880	1 200	1 500	850	581	650	1 718	801	2.5
DS/SADI-S	0	0	0	0	0	0	0	0	0	0	0	10	145	311	6	99	102	0.3
Endoscopic	0	0	0	0	0	0	0	0	0	0	0	9	12	58	15	21	158	0.5
Revision	0	0	0	0	0	0	0	0	100	110	120	134	182	237	248	385	725	2.2
Other	0	0	0	0	0	0	0	0	28	79	77	89	2	30	3	108	221	0.7
TOTAL	117	280	640	1 150	1 950	4 106	5 240	6 092	6 340	8 942	10 575	11 700	14 037	25 208	30 071	37 249	32 342	100.0

注：RYGB: Roux-en-Y gastric bypass, Roux-en-Y胃旁路术；OAGB: One-anastomosis gastric bypass, 单吻合口胃旁路术；SG: Sleeve gastrectomy, 袖状胃切除术；SG Plus: 袖状胃切除联合手术；AGB: Adjustable gastric banding, 可调节胃束带术；Fundoplication: 胃底折叠术；JIB/GIA: Jejunioileal bypass/gastric-ileal anastomosis, 空肠回肠旁路术/(大胃囊)胃肠吻合术；DS/SADI-S: Duodenal switch/Single-anastomosis duodenoileal bypass with sleeve gastrectomy, 十二指肠转位术/单吻合口十二指肠回肠旁路术联合袖状胃切除术；Endoscopic: 内镜减重手术/技术；Revision: 修正手术；Other: 其他；TOTAL: 总数；%: 各种手术数量占总数的百分比

References

1. IFSO Global Registry Committee. 9th IFSO Global Registry Report 2024 (2023 data). <https://www.ifso.com/pdf/9th-ifso-global-registry-report-2024.pdf> — Fig.2 (total 593,500), Fig.6/7 (revisional 50,500, 8.5%).

2. 中国医师协会外科医师分会肥胖和代谢病外科专家工作组, 等. 中国肥胖代谢外科数据库:2024年度报告. 中华肥胖与代谢病电子杂志 2025;11(2):85-91. DOI:10.3877/cma.j.issn.2095-9605.2025.02.001. <https://zhfpydxbdzzz.cma-cmc.com.cn/CN/10.3877/cma.j.issn.2095-9605.2025.02.001>

3. 中国医师协会外科医师分会肥胖和糖尿病外科医师委员会. 肥胖代谢外科修正手术东亚专家共识(2018). 中华肥胖与代谢病电子杂志 2018;4(1):1-4. DOI:10.3877/cma.j.issn.2095-9605.2018.01.001. <https://zhfpydxbdzzz.cma-cmc.com.cn/CN/Y2018/V04/I01>

4. 中华医学会外科学分会甲状腺及代谢外科学组, 中国医师协会外科医师分会肥胖和代谢病外科专家工作组. 中国肥胖及代谢疾病外科治疗指南(2024版). 中国实用外科杂志 2024;44(8):841-849. DOI:10.19538/j.cjps.issn1005-2208.2024.08.01. <https://www.zgsyz.com/zgsywk/CN/Y2024/V44/I08>

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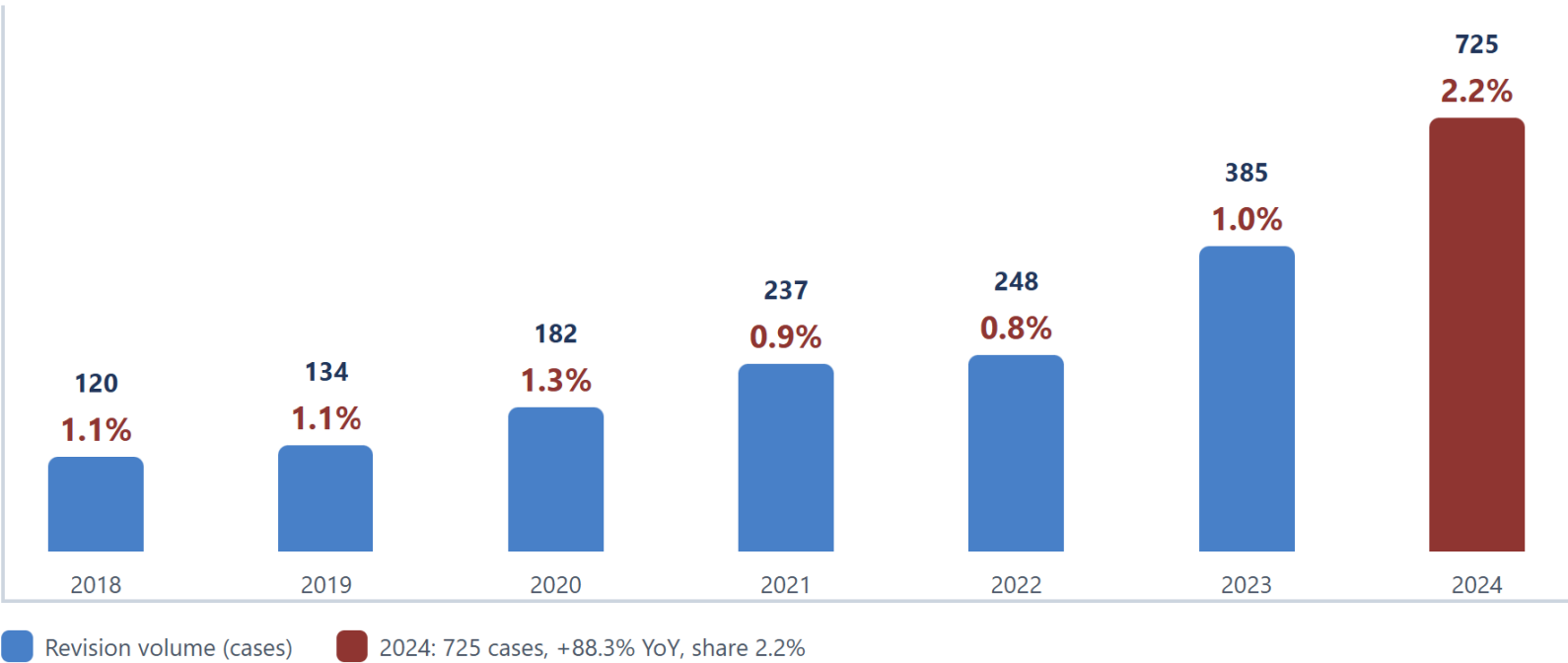
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China (COMES Database 2018–2024)



Total MBS 2024 = 32,342 (–13.2% YoY); SG primary 24,443 (75.6%). Revision row COMES Table 1: 120→134→182→237→248→385→725.

References

- IFSO Global Registry Committee. 9th IFSO Global Registry Report 2024 (2023 data). <https://www.ifso.com/pdf/9th-ifso-global-registry-report-2024.pdf> — Fig.2 (total 593,500), Fig.6/7 (revisional 50,500, 8.5%).
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- 中华医学会外科学分会甲状腺及代谢外科学组, 中国医师协会外科医师分会肥胖和代谢病外科专家工作组. 中国肥胖及代谢疾病外科治疗指南(2024版). 中国实用外科杂志 2024;44(8):841-849. DOI:10.19538/j.cjps.issn1005-2208.2024.08.01. <https://www.zgsyz.com/zgsywk/CN/Y2024/V44/I08>

Drivers of Increasing Revisional Metabolic & Bariatric Surgery (MBS)

IFSO 2026 · 16:9 · Literature-anchored: Brethauer 2014 · Switzer 2016 · Clapp 2018 · EA Consensus 2018 · China Guideline 2024 · IFSO 9th Registry 2024 · COMES 2024 · Hu 2021 · Axer 2019 · Ma 2016

① Primary MBS Denominator Effect

- ▶ **IFSO 9th (2024):** 593,500 primary MBS worldwide → revision pool expands
- ▶ **Brethauer 2014 (ASMBS Task Force):** up to ~28% of primary MBS may require reoperation over long-term FU
- ▶ **Sample US MBSAQIP cohort:** revision share 6.7%→16.8% (+311%) across 2014–2019 (single-cohort estimate, not global rate)
- ▶ **China:** primary MBS surge post-2018 → mid-term revision wave anticipated (COMES 2024)

Brethauer 2014 · IFSO 9th 2024 · COMES 2024

② Procedure-Specific Failure

- ▶ **AGB:** 20–30% revision (band slip, erosion, port issue) — Switzer 2016
- ▶ **SG:** 19.9% cumulative revision at ≥7 yr (GERD, dilation, regain) — Clapp 2018
- ▶ **RYGB:** 25–30% weight regain at 10 yr; ulcer, GJ dilation — Ma 2016
- ▶ **BPD-DS / OAGB:** malnutrition, limb complications (EA Consensus 2018)

Switzer 2016 · Clapp 2018 · Ma 2016 · EA Consensus 2018

③ Broadening Indications (EA Consensus 2018)

- ▶ **Inadequate loss:** %EWL <50% at 1 yr (EA Consensus 2018)
- ▶ **Recurrent gain:** >15% of nadir weight (EA Consensus 2018)
- ▶ **Comorbidity relapse:** T2DM / OSA / HTN / NAFLD uncontrolled
- ▶ **Mechanical & metabolic:** leak, stricture, deficiency, hypo-GLY (Brethauer 2014)

EA Consensus 2018 · China Guideline 2024 · Brethauer 2014

④ China-Specific Accelerators

- ▶ **SG dominance:** 75.6% (24,443 / 32,342) → future GERD/regain load (COMES 2024)
- ▶ **Legacy non-standard ops:** JIB/GIA 801 cases still in pool (Hu 2021)
- ▶ **Workforce ratio:** case manager (800) vs bariatric surgeon (1,430) (COMES 2024)
- ▶ **2024 revision volume:** 725 cases (2.2%), +88.3% YoY (COMES Table 1)

COMES 2024 · Hu 2021 · China Guideline 2024

⑤ Standardized Decision-Making (Pull Factor)

- ▶ **Framework:** structured conversion / corrective / restoration (EA Consensus 2018)
- ▶ **MDT + definitions:** reduce variability, make revision "countable"
- ▶ **Axer 2019:** revisional RYGB intra-op complication 15.5% vs primary 3.0% → protocol-driven selection
- ▶ **Clear criteria:** expand appropriate (not excessive) revision use

Axer 2019 · EA Consensus 2018 · Brethauer 2014

⑥ Registry & Reporting Visibility

- ▶ **IFSO 9th 2024:** global revision rate 8.5% (50,500 / 593,500)
- ▶ **COMES 2024:** China revision rate 2.2% (725 / 32,342), rising faster than primary
- ▶ **Registries:** surface previously unreported revisions
- ▶ **Standardized coding:** enables cross-country benchmarking

IFSO 9th 2024 · COMES 2024



Revisional MBS — Definition

Content: East Asia Consensus 2018 (verbatim) · Nomenclature: ASMBS Task Force (Corrective / Conversion / Reversal)

Definition of Revisional MBS

Revisional surgery refers to reoperation after primary MBS indicated by **inadequate outcome** (weight loss or comorbidity control) and/or **severe postoperative complication** refractory to conservative management. — East Asia Consensus 2018, §2

Corrective **Same procedure**, restore standard anatomy — e.g. reduce dilated gastric pouch/stoma, re-sleeve, band repositioning

Conversion **Change to a different MBS procedure** — e.g. SG→RYGB, AGB→SG/RYGB, RYGB→BPD-DS

Reversal **Restore native GI anatomy** — e.g. RYGB takedown, band removal, BPD-DS limb lengthening

ASMBS taxonomy (Brethauer 2014, Sudan 2015): **Corrective / Conversion / Reversal**. East Asia Consensus 2018 used Correction (= Corrective), Conversion (= Conversion), Restoration (= Reversal).

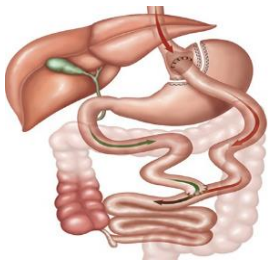
Source: 中国医师协会外科医师分会肥胖和糖尿病外科医师委员会. 肥胖代谢外科修正手术东亚专家共识(2018). *中华肥胖与代谢病电子杂志*. 2018;4(1):1-4.

Nomenclature: Brethauer SA et al. ASMBS Revision Task Force. *Surg Obes Relat Dis*. 2014;10(5):952-972; Sudan R et al. Taxonomy of reoperative bariatric surgery. *Surg Obes Relat Dis*. 2015.

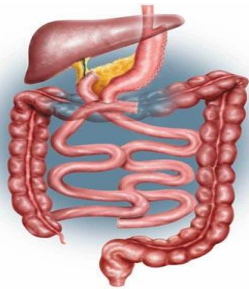
Pre-revision rule (§4.5): **≥6-month** supervised lifestyle trial before labeling inadequate loss/regain as surgical failure.



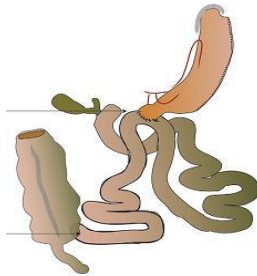
SG



RYGB



BPD-DS



SADI-S/SIPS



OAGB



LAGB



Revisional Metabolic & Bariatric Surgery — Conversion & Corrective

Classification	Indications & Definition	Representative Examples
Conversion <i>Change index procedure to a different procedure with a distinct mechanism of action</i>	- Suboptimal clinical response (legacy: inadequate weight loss) or recurrent weight gain following index MBS - Recurrent or de novo obesity-associated medical problems (e.g., GERD refractory to medical therapy, relapse of T2DM) - Mechanical complications or adverse sequelae better addressed by an alternative anatomic configuration	- Failed AGB → RYGB - Failed SG with refractory GERD → RYGB - Failed SG without GERD → OAGB or SADI-S - Failed RYGB → distalization or BPD-DS
Corrective Preserve the mechanistic class of the index procedure		
Restorative <i>Restore anatomy toward the intended postoperative construct</i>	- Anatomic deterioration from the intended surgical construct (dilated gastric pouch, enlarged gastrojejunostomy, widened sleeve diameter, elongated common channel/alimentary limb) - Chronic mechanical complication amenable to repair without changing procedure type	- Revision of dilated RYGB pouch with stoma reduction - Re-sleeve gastrectomy for residual fundus / inadequate initial resection
Augmentative <i>Add a component to enhance efficacy of the existing procedure</i>	- Suboptimal clinical response despite anatomically intact index procedure - Selected recurrent weight gain where conversion deemed excessive risk	- RYGB with ring augmentation (mesh/ring) - SG plus

Revisional Metabolic & Bariatric Surgery — Reversal

Classification	Indications & Definition	Representative Examples
Reversal <i>Restore gastrointestinal continuity to the anatomically native state</i>	- Life-threatening nutritional complications (protein-calorie malnutrition, refractory micronutrient deficiency) not manageable conservatively - Intractable post-RYGB hyperinsulinemic hypoglycemia unresponsive to dietary and pharmacologic therapy - Quality-of-life impairment for which no corrective or conversion option is appropriate	- RYGB takedown with restoration of near-normal gastroduodenal continuity - AGB removal without concurrent revisional procedure

Brethauer SA, et al. *Surg Obes Relat Dis.* 2014;10(5):952-972.



Benefits & Risks of Revisional MBS

Taxonomy: Brethauer 2014 (conversion/corrective) · East Asia Consensus 2018 (correction/conversion/reversal) · China Guideline 2024 (reversal/conversion/repair)

① Revisional vs Primary MBS — Global Trade-off

Benefits

- **Additional weight loss:** mean 39.3% EBWL after conversion, 35.9% EBWL after corrective (vs 43.5% primary) [Brethauer 2014 systematic review]
- **Comorbidity improvement** (T2DM, HTN, OSA, dyslipidemia) paralleling weight response
- Relief of anatomic/mechanical sequelae (GERD after SG→RYGB, pouch/stoma dilation, band erosion)
- **Salvage for life-threatening sequelae** (severe PCM, post-RYGB hyperinsulinemic hypoglycemia)

Risks

- **Complication rates generally higher** than primary; procedure-specific (Brethauer 2014: "higher after reoperative surgery")
- **Technical complexity:** leak, bleeding, stricture, adhesion-related bowel injury; conversion-to-open not rare
- **Amplified malnutrition** after malabsorptive conversion (Fe/B12/folate/VitD/Ca/Zn/protein)
- **Reversal/restorative** → weight regain and comorbidity return possible (Brethauer 2014)

References

1. Brethauer SA, Kothari S, Sudan R, et al. Systematic review on reoperative bariatric surgery: ASMBS Revision Task Force. *Surg Obes Relat Dis.* 2014;10(5):952-972. (175 studies; complication rates generally higher than primary; conversion 39.3% EBWL, corrective 35.9% EBWL)
2. Ma P, Reddy S, Higa KD. Revisional bariatric/metabolic surgery: what dictates its indications? *Curr Atheroscler Rep.* 2016;18(5):42.
3. 中国医师协会外科医师分会肥胖和糖尿病外科医师委员会. 肥胖代谢外科修正手术东亚专家共识（2018）. *中华肥胖与代谢病电子杂志.* 2018;4(1):1-4. (腹腔镜优先；Correction/Conversion/Reversal 三分)
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② Benefit–Risk Profile by Revision Type

Conversion (index mechanism changed)

Benefit: Strongest additional weight loss (mean 39.3% EBWL) and rescues failed mechanism (e.g. SG→RYGB for refractory GERD).

Risk: New anastomosis → leak/stricture; malnutrition amplified if shifted to malabsorptive procedure; non-reversible once completed.

Corrective / Repair (index mechanism preserved)

Benefit: Mean 35.9% EBWL; fixes anatomic deterioration (pouch/stoma reduce, re-sleeve) without changing metabolic mechanism; lower malnutrition risk.

Risk: Modest increment only; re-dilation or stricture possible; weight loss less predictable than conversion.

Reversal / Restorative (native anatomy restored)

Benefit: Definitive treatment for intractable hypoglycemia, severe PCM, band erosion intolerance — life-saving.

Risk: Weight regain and comorbidity return possible; technically demanding dissection; last-resort only per guidelines.

References

1. Brethauer SA, Kothari S, Sudan R, et al. Systematic review on reoperative bariatric surgery: ASMBS Revision Task Force. *Surg Obes Relat Dis*. 2014;10(5):952-972. (175 studies; complication rates generally higher than primary; conversion 39.3% EBWL, corrective 35.9% EBWL)
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Revisional MBS — Indications & Contraindications

Content: East Asia Consensus 2018 (verbatim) · Nomenclature: ASMBS Task Force (Corrective / Conversion / Reversal)

Indications (§3.1)

1. Inadequate weight loss or weight regain

Inadequate: %EWL <50% at 1 year; **Regain:** >15% of nadir weight

2. Unsatisfactory control or recurrence of obesity-related metabolic disease / comorbidity

3. Severe postoperative complication refractory to conservative treatment

(intractable GERD, severe dumping, **intractable hypoglycemia**, intractable vomiting/diarrhea, anastomotic stricture, intractable marginal ulcer, GI obstruction, fistula, internal hernia, band slippage / gastric wall erosion, **uncorrectable anemia**, hypoalbuminemia, micronutrient deficiency, **excessive weight loss**)

4. Post-primary BMI $\geq 35 \text{ kg/m}^2$, or BMI $\geq 27.5 \text{ kg/m}^2$ with poorly controlled T2DM or other severe obesity-related comorbidity

Contraindications (§3.2)

1. Interval <24 months from primary surgery

*except acute severe complication (stricture, fistula)

2. BMI <27.5 kg/m²

*except revision for severe malnutrition / life-threatening complication

3. No multidisciplinary team (MDT) evaluation

4. Non-adherence to postoperative follow-up and dietary guidance

5. Poor general condition; unable to tolerate surgery

6. Satisfactory weight loss with unsatisfactory control of obesity-related metabolic disease (alone)

Source: 中国医师协会外科医师分会肥胖和糖尿病外科医师委员会. 肥胖代谢外科修正手术东亚专家共识(2018). 中华肥胖与代谢病电子杂志. 2018;4(1):1-4.

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Pre-revision rule (§4.5): **≥6-month** supervised lifestyle trial before labeling inadequate loss/regain as surgical failure.



Revisional Metabolic & Bariatric Surgery — Decision Flow (Pre-op → Procedure Selection)

Taxonomy: Brethauer SA et al. Surg Obes Relat Dis 2014; Ma P & Higa KD Curr Atheroscler Rep 2016; 东亚共识 2018; 中国指南 2024

① Candidate Identification — Why consider revision?

Suboptimal clinical response or recurrent weight gain after index procedure (IFSO 2025: <20% TWL or comorbidity relapse)

Recurrent or de novo obesity-associated disease (refractory GERD, T2DM relapse)

Mechanical / anatomic complication (pouch dilation, gastrojejunal stoma enlargement, band erosion, fistula, stricture)

Life-threatening sequela (severe protein-calorie malnutrition, refractory micronutrient deficiency, post-RYGB hyperinsulinemic hypoglycemia)



② Preoperative MDT Evaluation (China 2024 Guideline; East Asia Consensus 2018)

Clinical & Metabolic

- BMI, %TWL/%EWL, nadir weight, regain pattern
- Comorbidity status: T2DM, HTN, OSA, GERD, NAFLD
- Medication review (GLP-1 RA, insulin)
- Exclude secondary obesity (Cushing, thyroid, PCOS)

Anatomy & Imaging

- Upper GI contrast (pouch/sleeve diameter, GJ stoma, limb length)
- EGD (GERD, H. pylori, ulcer, stenosis, band status)
- Abdominal CT/MRI if fistula, internal hernia, collection
- Review primary operative notes

Nutrition / Psychology / Risk

- Protein, albumin, Hb, Fe, B12, folate, Vit D/Ca, Zn
- Eating behavior (grazing, sweet eating, alcohol)
- Psychosocial fitness, adherence expectation
- Cardiopulmonary clearance, OSA, VTE, smoking cessation



③ Classify Revision Intent (Brethauer 2014 + Ma 2016)

CONVERSION Change index procedure to a different procedure with distinct mechanism (SG→RYGB, AGB→SG/RYGB)

CORRECTIVE Preserve index mechanism class · **Restorative**: rebuild intended anatomy (pouch/stoma reduce, re-sleeve) · **Augmentative**: add component (ring, intestinal adjunct)

REVERSAL Restore native GI continuity (RYGB takedown, AGB removal)

④ Procedure-Specific Revision Pathway

Index: AGB

- **Conv** Failed/regain → RYGB / SG
- **Corr** Slippage → reposition
- **Rev** Erosion → band removal (±staged conversion)

Index: SG

- **Conv** Refractory GERD → RYGB; regain w/o GERD → OAGB/SADI-S
- **Rest** Dilated sleeve → re-sleeve
- **Aug** Intact sleeve regain → proximal bypass adjunct

Index: RYGB

- **Rest** Pouch/GJ dilation → remodel + stoma reduce
- **Conv** Regain → distalization / BPD-DS
- **Rev** Severe PCM / hypoglycemia → takedown

Index: BPD-DS / OAGB

- **Rest** Malabsorption excess → lengthen limbs
- **Conv** OAGB + GERD → RYGB
- **Rev** Intractable deficiency → partial restoration





⑤ Key Principles for Final Decision-Making

Individualized decision-making — Guided by index procedure, failure etiology, anatomy, nutritional status, and comorbidities.

MDT assessment — Joint evaluation by surgeon, nutritionist, endocrinologist, and psychologist.

Laparoscopy preferred — Clear visualization, less trauma, lower wound infection/pain, faster recovery.

Reversal as last resort — Life-saving only; near-inevitable weight regain after restoring native anatomy.

References

1. Brethauer SA, Kothari SN, Kallies KJ, et al. ASMBS revision task force: revisional weight-loss surgery – consensus recommendations. *Surg Obes Relat Dis*. 2014;10(5):952-972.
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