Preoperative management

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Preoperative management

- Indication
- Contraindication
- Pre-op. Evaluation
- Pre-op. Preparation
- Pre-op. Weight Reduction
- Case

Preoperative management

Indication

Contraindication

Pre-op. Evaluation

Pre-op. Preparation

Pre-op. Weight Reduction

Case

국내 건강보험 급여 기준

- **1) + 2) + 3) 동시 만족**

1) 18세 이상 또는 뼈 성장 종료가 확인된 경우

2) 비수술적 치료로 효과 얻을 수 없는 비만에서

3)

- BMI ≥ 35 kg/㎡ or
- BMI ≥ 30 kg/㎡ + Complication (T2DM, HTN, CAD, OSA, NAFLD, GERD..) or
- BMI 27.5–30 kg/㎡ + Uncontrolled T2DM

보건복지부 고시 제2018-281호

Who should be offered bariatric surgery

- **BMI>40 ㎏/㎡ (아시아: 35)**
- **BMI>35 ㎏/㎡ (아시아: 30)**
  + 주요 비만 동반질환
- **이차성 비만 제외**
- **6개월-1년간 비수술적 체중감량 프로그램을 충분히 제공받은 사람**
- **생활습관 변화가 필요한 환자**
- **초과 체중의 10% 생활습관 변화로 감량**
- **심리학적 평가 만족스러울 경우**
- **체중감량에 대해 동기 부여되고 수술에 대해 충분히 잘 이해하고 있는 환자**
- **사회적 / 가족적 지지 있는 환자**
- **전신마취 가능한 환자**
- **금연한 환자 또는 비흡연자**

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Preoperative management

Op. Indication

Contraindication

Pre-op. Evaluation

Pre-op. Preparation

Pre-op. Weight Reduction

Case

Contraindications

- There is no irreversible absolute contraindication to bariatric surgery
- All individual complicating factors should be dealt with prior to surgery

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

Extremes of Age

- **Original NIH guidelines specified adult age limit of 18-60 years for surgery**
  → subsequently relaxed
- **Children and Adolescents**
  - ↑ Numbers of adolescents are accepted as candidates
  - Should only be undertaken in specialist units & only after reached skeletal maturity
- **Elderly**
  - Risk-benefit profile needs to be scrutinized to determine **operative suitability**
  - Surgery can be performed safely and effectively in elderly

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

BMI

- ↑ BMI → ↑ op. mortality & perioperative complications
- In high BMI, abdominal wall is relatively thick compared to small abdominal cavity
  - ↑ intra-abdominal complications
  - ↑ thromboembolic complications
- In extreme obesity, preoperative weight loss has been used as a method of risk reduction

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

Medical & Surgical Factors

- **CVD**
  - **Optimization** of stable & **unstable** CV condition by cardiologist perioperatively
    → successful outcome
- **Malignancy**
  - Bariatric surgery being **successful** in patients with **history of cancer**
  - History of previous malignancy is **not** an **absolute contraindication**
- **Thromboembolic Risk**
  - About 20% of deaths after surgery result from **pulmonary embolism**
  - Previous history of clots **increase** the **risk** of mortality **threefold**
    → These patients may benefit from **prolonged prophylaxis**

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

Medical & Surgical Factors

- **Smoking**
  - **Smoking → Postop. marginal ulceration**
  - Smokers are **advised** to **stop smoking** before surgery
- **Immobility & Poor functional capacity**
  - **Risk factor** for **outcome**, **complication**
  - **In properly selected, motivated** patients, **risk** does **not exceed benefit**
  - **To set clear achievable objectives,** thorough **multidisciplinary approach** & understanding of **cause for immobility** needed

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

Medical & Surgical Factors

- **Previous abdominal surgery / Intestinal disease**
  - **Previous surgery** determine feasibility of surgical procedure + actual procedure

    Ex) Crohn's disease

    Not absolute contraindication to surgery

    Previous bowel resection would be **relative contraindication** for **malabsorptive op.**

- **Liver Cirrhosis**
  - **Surgery** may be **safely** performed in **stable cirrhosis**
  - **Cirrhosis** is incidental finding at surgery, proceed in **absence** of **portal hypertension**
  - If **portal hypertension** is encountered, **procedure** should be **aborted**

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

Psychological Factors

- **Active Psychiatric Disease, Suicidal Ideation, Personality Disorders, Drug / Alcohol Dependency**
  - **Not** suitable **candidates** for surgery **until appropriately treated**
  - **Surgery delayed and treatment initiated**
  - **Untreated, these are absolute contraindications to surgery**

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

Psychological Factors

- **Eating Disorders**
  - Need to be screened for eating disorders by dietitian
  - Appropriately assessed, **not** be **absolute contraindications** for surgery
- **Successful outcomes in patients with MDD, bipolar disorder, stable schizophrenia, binge eating**
- **Psychological evaluation** in **psychiatric illness** is beneficial in assessing **emotional stability**
- **Need to support in postop. period**

The ASMBS textbook of bariatric surgery: Springer; 2014.

Psychological Factors

- **Intelligence / Mental Capacity**
  - **Cannot comply with dietary changes** after surgery
    → **Complications** or malnutrition

    ⇒ Patients who are **unable to comply** are **probably unsuitable candidates**

  - Before **risk-benefit** is evaluated, adequate mental capacity should be carefully measured with available **familial** and **social support**

Sanjay Agrawal, Obesity, bariatric and metabolic surgery: Springer; 2015.

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Obesity Evaluation

- **비만 평가 : 기본적으로 BMI 사용**
  - **증가된 BMI** : **이환율과 사망률 증가시킨다는 여러 증거**

    → **체중과 BMI : 비만의 심각성과 영향 평가에 충분하지 않음**

- **비만으로 인한 이환율과 사망률 평가에 더 유용한 지표**
  - **EOSS** (Edmonton Obesity Staging system) **/ Kings' obesity staging criteria**

  ➢ **EOSS**

  의학적 컨디션, 정신건강상태, 기능적 상태 평가 → 4가지 stage

  ➢ **Kings' obesity criteria**

  수면 무호흡, 심혈관질환 위험, 당뇨, 경제적 문제, 기능적 제한점, 생식선 문제,
  인지된 건강상태 (우울정도, 신체 QoL), **신체 이미지, BMI** → 9가지 요소

Pre-op. Ev

☑ Complete H & P (obesity-related comorbidities, causes of obesity, weight, BMI, weight-loss history, commitment, and exclusions related to surgical risk)
☑ Routine labs (including fasting blood glucose and lipid panel, kidney function, liver profile, lipid profile, urine analysis, prothrombin time/INR, blood type, CBC
☑ Nutrient screening with iron studies, B_{12} and folic acid (RBC folate, homocysteine, methylmalonic acid optional), and 25-vitamin D (vitamins A and E optional); consider more extensive testing in patients undergoing malabsorptive procedures based on symptoms and risks
☑ Cardiopulmonary evaluation with sleep apnea screening (ECG, CSR, echocardiography if cardiac disease or pulmonary hypertension suspected; deep-venous thrombosis evaluation, if clinically indicated
☑ GI evaluation (*H. pylori* screening in areas of high prevalence; gallbladder evaluation and upper endoscopy, if clinically indicated)
☑ Endocrine evaluation (A1C with suspected or diagnosed prediabetes or diabetes; TSH with symptoms or increased risk of thyroid disease; androgens with PCOS suspicion (total/bioavailable testosterone, DHEAS, Δ_4-androstenedione); screening for Cushing syndrome if clinically suspected (1 mg overnight dexamethasone test, 24-hour urinary free cortisol, 11 PM salivary cortisol)
☑ Lifestyle medicine evaluation: healthy eating index; cardiovascular fitness; strength training; sleep hygiene (duration and quality); mood and happiness; alcohol use; substance abuse; community engagement
☑ Clinical nutrition evaluation by RD
☑ Psychosocial-behavioral evaluation
☑ Assess for individual psychological support/counseling
☑ Document medical necessity for bariatric surgery
☑ Informed consent
☑ Provide relevant financial information
☑ Continue efforts for pre-operative weight loss
☑ Optimize glycemic control
☑ Pregnancy counseling
☑ Smoking-cessation counseling
☑ Verify cancer screening by primary care physician

/ASMBS/OMA/ASA 2019 Guidelines

비만대사증후군연구회 춘계학술대회

Pre-op. Evaluation

지침	근거 수준	권고 등급
모든 환자는 수술 전 **미세영양소**를 포함한 **영양 상태**에 대해 적절한 평가가 이루어져야 한다.	**A**	**I**
모든 환자는 수술 전 **교정 가능한 비만의 원인**이 있는지에 대한 충분한 검토가 이루어져야 한다.	**A**	**I**
수술 전 검사에는 **수술의 안전성을 평가**하기 위한 **진단학적인 검사**와 함께 **과거 병력**에 대한 조사, **정신사회적** 병력 청취, **신체검사**를 반드시 시행하여야 한다.	**A**	**I**
수술 전 체중감량은 **간의 용량을 줄여 수술 시야 확보**에 도움이 된다.	**B**	**IIa**
금연은 수술 전 최소 6주 전에 시행한다.	**A**	**I**
환자의 **사전 동의서(Informed consent) 작성**을 통하여 **수술의 효과와 위험성**, 이득, 수술의 대안적 치료법, **수술의 방법**, **수술 후 관리** 등에 관하여 충분히 설명되어야 한다.	**D**	**IIa**

2018 대한비만대사외과학회 비만대사수술 진료지침

Diagnostic Test

Lab

• CBC c diff.count	• Iron	• Insulin	• ABO typing
• Electro-battery	• Ferritin	• LH	• Rh typing
• Chemical battery	• Folate	• FSH	• Coagulation battery
• Lipid battery	• Vitamin B12	• E2	• HBs Ag
• HbA1c	• Thiamine	• Testosterone, DHEA-SO4	• Anti-HBs Ab
• hs-CRP	• 25(OH)-Vitamin D3	• hGH	• Anti-HCV
• Calcium, Phosphorus	• TSH	• Routine urinalysis	• HIV Ag/Ab combo
• r-GT	• Free T4	• Albumin/Cr ratio	• VDRL quan

Diagnostic Test

Lab

• CBC c diff.count	• Iron	• Insu	• BO typing
• Electro-battery	• Ferritin	• LH	• n typing
• Chemical battery	• Folate	• FSH	• Coagulation battery
• Lipid battery	• Vitamin B12	• E2	• HBs Ag
• HbA1c	• Thiamine	• Testosterone, DHEA-SO4	• Anti-HBs Ab
• hs-CRP	• 25(OH)-Vitamin D3	• hGH	• Anti-HCV
• Calcium, Phosphorus	• TSH	• Routine urinalysis	• HIV Ag/Ab combo
• r-GT	• Free T4	• Albumin/Cr ratio	• VDRL quan

r/o Hypogonadotropic hypogonadism

Diagnostic Test

Lab

• CBC c diff.count	• Iron	• Insulin	• ABO typing
• Electro-battery	• Ferritin	• LH	• Rh typing
• Chemical battery	• Folate	• FSH	• Coagulation battery
• Lipid battery	• Vitamin B12	• E2	• HBs Ag
• HbA1c	• Thiamine	• Testosterone, DHEA-SO4	• Anti-HBs Ab
• hs-CRP	• 25(OH)-Vitamin D3	• hGH	• Anti-HCV
• Calcium, Phosphorus	• TSH	• Routine urinalysis	• HIV Ag/Ab combo
• r-GT	• Free T4	• Albumin/Cr ratio	• VDRL quan

r/o PCOS

Diagnostic Test

Lab

• CBC c diff.count	• Iron	• Insulin	• ABO typing
• Electro-battery	• Ferritin	• LH	• Rh typing
• Chemical battery	• Folate	• FSH	• Coagulation battery
• Lipid battery	• Vitamin B12	• E2	• HBs Ag
• HbA1c	• Thiamine	• r/o Growth hormone deficiency	• Anti-HBs Ab
• hs-CRP	• 25(OH)-Vitamin D3	• hGH	• Anti-HCV
• Calcium, Phosphorus	• TSH	• Routine urinalysis	• HIV Ag/Ab combo
• r-GT	• Free T4	• Albumin/Cr ratio	• VDRL quan

Diagnostic Test

Nutrient Absorption & Deficiency

Lab	Functional Anatomy Absorption	Nutrient Deficiency
Serum Calcium	Duodenum proximal jejunum	· 위산 생성 감소 제한식 수술, 십이지장 우회 흡수저하 수술 : **칼슘 흡수 감소**
Iron	Jejunum ileum	· 위산 형성 감소 · 십이지장과 근위부 소장 우회 수술 : **철 결핍 위험 증가**
Folate	Jejunum Ileum colon	· 식이 섭취와 장내 세균 합성으로 생성 · 대장은 비만수술에서 영향 받지 않으므로 **수술 후 결핍 일반적이지 않음** · **가임기 여성**의 경우 수술 후 **엽산 보충 중요성** 교육
Vitamin B12	Stomach distal ileum	· 위산 형성 감소 · parietal cell 수와 음식 노출 감소 수술에서 **결핍**
Thiamine (B1)	Jejunum ileum colon	· 음식물 통한 섭취 중요 · **흡수저하 비만수술에서 결핍**
25(OH)-Vitamin D3	Jejunum ileum	· 비만인 : **수술 전 Vit D 결핍** 흔함 · 비만수술 후 **흡수 저하**

Robert F. Kushner, Nutrition and bariatric surgery: CRC Press; 2015.

Diagnostic Test

기능·영상검사	
• Chest PA	• Abdomen / Pelvis CT
• EKG	• Polysomnography
• TTE	• Bone Densitometry
• PFT	• Abdomen Erect / Supine
• EGD	• Fat CT

골 손실

- Vit D 결핍, 칼슘 흡수 장애,
  이차성 부갑상선 항진증
- 체중감량 : 부하 감소로 뼈 밀도 감소 유발
- 비만수술 후 혈중 세로토닌 수치 증가
  (세로토닌: 조골세포 기능과 증식 억제)

Nutritional Evaluation

- **Nutrition-related medical diagnosis / problem**
- **Current intake**
  - Diet recall
  - Vitamin / mineral supplements
- **Patterns / Habits**
  - Is there a time of feeling “out of control” when eating?
  - Unplanned snacking
- **Physical activity patten**

Robert F. Kushner, Nutrition and bariatric surgery: CRC Press; 2015.

Nutritional Evaluation

- **Assess**
  - **Motivation** for healthy eating
  - Weigh loss **expectation**
  - Understanding of **post-op. diet changes, supplementation**
  - **Ability / willingness** to commit to all **pre- and post-op. appointments**
  - Need for **additional nutrition education, support, counseling**
  - Ability to **financially afford** vitamin and mineral supplements

Robert F. Kushner, Nutrition and bariatric surgery: CRC Press; 2015.

Preoperative management

Indication

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Case

After Initial Evaluation

- **The bariatric Multidisciplinary Team (MDT)**
  - All patients should be discussed by MDT
  - MDT can recommend **further assessment** or investigation,
    can decide on which **bariatric procedure** is to be performed,
    can recommend **discharge** if patient is **not a candidate** for surgery

다학제팀	
• 위장관외과	• 소화기내과
• 가정의학과	• 호흡기내과
• 내분비내과	• 순환기내과
• 영양팀	• 신경과
• 정신건강의학과	• 마취과

Medical management

Education / Counseling

- **비용 효과적** 프로그램 수립
- **술 전** 준비의 **신체·정신적 이점** 강조, **동기 부여**
- **술 후** 초기의 **생활양식 변화**에 대한 **환자의 예측 교정** → 장기적 성공에 도움 제공
- 수술 **위험과 합병증 교육**, 수술 전후 **위험 감소**에 **환자 역할** 강조
- **혈당, 혈압, 기타 합병증 안정화**
- **수술이 단·장기적으로 영양상태, 식습관에 미칠 영향에 대한 이해 도움**

Robert F. Kushner, Nutrition and bariatric surgery: CRC Press; 2015.

Medical nutrition management

Education / Counseling

- **카페인 제거**
  - 탈수에 기여 (갑작스런 제거 : 두통과 극심한 피로 포함 부작용 초래 → 점진적 감량)
- **신체활동**
  - 술 후 활동 위한 근력과 체력 증진, 술 후 정맥 혈전증 예방
- **수분 공급**
  - 술 후 초기 탈수 위험, 열량/탄수화물/카페인 없는 음료 마시는 습관
- **식사와 간식 구조화**
  - 식사와 간식 계획, 준비, 규칙적 식사 패턴 설정 중요성 교육
- **주의 기울인 식사**
  - 술 후 위산 및 소화효소 분비량 감소 → 음식 완전히 씹고, 식사 중간에 호흡, 포만감 체크하는 법
- **수술 날짜 확정 → 퇴원 식단**과 **비타민·무기질 보충**에 초점 둔 **사전 영양교육**

Robert F. Kushner, Nutrition and bariatric surgery: CRC Press; 2015.

Weight Reduction before surgery

- **수술 전 10% 체중감소** : 수술 후 합병증 감소
- 현재 체중의 **5~10% 감량**
- **수술 재원기간**에 긍정적 효과
- 일반적으로 **식사 대체 제품**과 **초저열량 식단** 포함하는 식이 요법
- **기간 가변적**, 일반적으로 **필요한 체중감량**이 기준

Robert F. Kushner, Nutrition and bariatric surgery: CRC Press; 2015.
Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Comorbidity management

T2DM

- **T2DM**
  - 비만수술 : T2DM 치료 알고리즘에 포함하여 당뇨병 관리
  - 비만수술 전 T1DM, T2DM 구분 중요
    - 제 2형 당뇨 : **수술로 관해 가능**
    - 제 1형 당뇨 : 수술 후에도 여전히 인슐린 치료 필요 (요구 인슐린 양 감소)
- **GLP-1RA, SGLT-2i 등 체중감소 효과 약물 > SU, insulin**
- **수술 전 최적 HbA1c <8% 유지 위해 당뇨 치료 확대**
- **당뇨 유병 기간, 현재 복용 약물, HbA1c 평가**

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Comorbidity management

- **고도비만인 : 지방간 → 기술적으로 수술 과정 복잡**

  ⇒ 술 전 간 크기 감소 위해

  초-저-칼로리, 초-저-탄수화물(100g 탄수화물 & 600 ㎉/d) 식이

- **술 전 식이 조절 → 인슐린 민감도 증가, 혈당조절제로 인해 저혈당 유발 가능**

  ⇒ 혈당조절제 적절히 변경

  (GLP-1RA, DPP-4i, SGLTi 중단 / 인슐린 기존 용량의 50% 감량)

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Comorbidity management

- **OSA**
  - **술 전 임상적으로 수면 무호흡에 대해 Screening**
  - **STOP BANG Tool**

Snore, **T**ired, **O**bserved (you stop breathing during sleep), high B**P**, **B**MI>35, **A**ge>50, **N**eck circumference>40㎝, **G**ender male

→ score 1 point for each positive response

→ 0-2 Low risk; 3-4 Intermediate risk; **≥5** High risk

- **Home CPAP 치료**
  - **전신마취 위험도 감소**
  - **적절한 OSA 진단과 치료 : 마취과적 합병증 감소**

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Comorbidity management

HTN

- **HTN**
  - 교감신경계 및 신세뇨관 나트륨 재흡수 증가 등 다양한 기전으로 비만과 관련
  - 장기간 고혈압 : LVH, HF, A.fib 등 비만수술 결과에 영향 주는 합병증과 관련

- **술 전 항고혈압제 최적화**

- **술 후 항고혈압제 감소되도록 계획**

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Comorbidity management

Men-Hypogonadotropic hypogonadism

- **Hypogonadotropic hypogonadism**
  - Male **obesity**-associated **secondary hypogonadism**
  - **Prevalent** in **men with obesity** (up to 40%)
  - **Low level of testosterone** in obese men with an **inverse relationship** with **BMI**

- Incompletely understood & underdiagnosed
  - ↑ **Aromatase activity** within adipocyte → ↑ Peripheral conversion of **Testosterone (T) into E2** → ↑ **Serum E2**
    ⇒ **Negative feedback** effect on **LH secretion** → **Suppression** of hypothalamic-pituitary-gonadal axis → ↓ **T level**
  - **Hypogonadism** → ↑ **Fat mass** → Further Hypogonadism → **Vicious cycle of worsening obesity**

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Comorbidity management

Men-Hypogonadotropic hypogonadism

- Investigate **all men with obesity for hypogonadism**
- **Treat with T replacement** before surgery
- **Rule out OSA** because T replacement could make OSA worse
- **No evidence** to show **T replacement** will result in significant **weight reduction by itself**
    - Improve mood & energy, reduce fatigue, higher motivation to adhere to diet & exercise regimens

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Other Medical Problem management

Women-Pregnant

- **Guidelines** recommend to **avoid pregnancy for 12-24 mon** following surgery
  - **Counsel** about **contraception** during **preparation period** for surgery
  - **83%** of bariatric surgeries were done for **women reproductive age group** (by one Review)
  - During rapid weight loss phase,
    chances of **maternal and fetal malnutrition**, and **risk of 'small for age babies'** are high
  - Post-bariatric surgery period will make it **difficult** for women to **meet with nutritional requirements**

Jolanta U. Weaver, Practical Guide to Obesity Medicine: Elsevier; 2018.

Preoperative management

Indication

Contraindication

Pre-op. Evaluation

Pre-op. Preparation

Pre-op. Weight Reduction

Case

Pre-op. Weight Reduction

- **Theoretically, ↓ BMI would result in..**
  - ↓ Periop. & postop. **complication** such as bleeding, wound infection
  - **Shorter operative time** and **hospital stays**

- **Many insurance companies** added **pre-op. weight loss as prerequisite**

The ASMBS textbook of bariatric surgery: Springer; 2014.

Pre-op. Weight Reduction

- **Few data** was presented to demonstrate **difference** with **outcome after surgery** with or without **pre-op. weight reduction**

The ASMBS textbook of bariatric surgery: Springer; 2014.

Post-op. Weight Reduction

No Beneficial

- **72 with 13-week dietary counseling program vs. 252 without**
  - Both groups were similar preoperatively
  - **Weight loss group**

    50% higher dropout rate before surgery

    Lower %EWL following surgery

    Higher BMI following surgery

The ASMBS textbook of bariatric surgery: Springer; 2014.

Post-op. Weight Loss

Inadequate data

Review article

Effect of preoperative weight loss in bariatric surgical patients: a systematic review

- **17** studies including 4,611 patients that pre-op. weight loss **beneficial**
- **20** studies with 2,075 patients showing **no benefits** to pre-op. weight loss
  - **Results**

Follow-up after surgery	Non pre-op. wt. loss group	Pre-op. wt. loss group
12-month **%EWL**	**70.7±5.7**	**69±7.1**
24-month **%EWL**	**72±6.3**	**66.7±2.7**

- **Conclusion** : **Inadequate data** to support mandated pre-op. weight loss

Surg Obes Relat Dis. 2011 7(6)

Post-op. Weight Loss

Beneficial

Outcomes of Preoperative Weight Loss in High-Risk Patients Undergoing Gastric Bypass Surgery

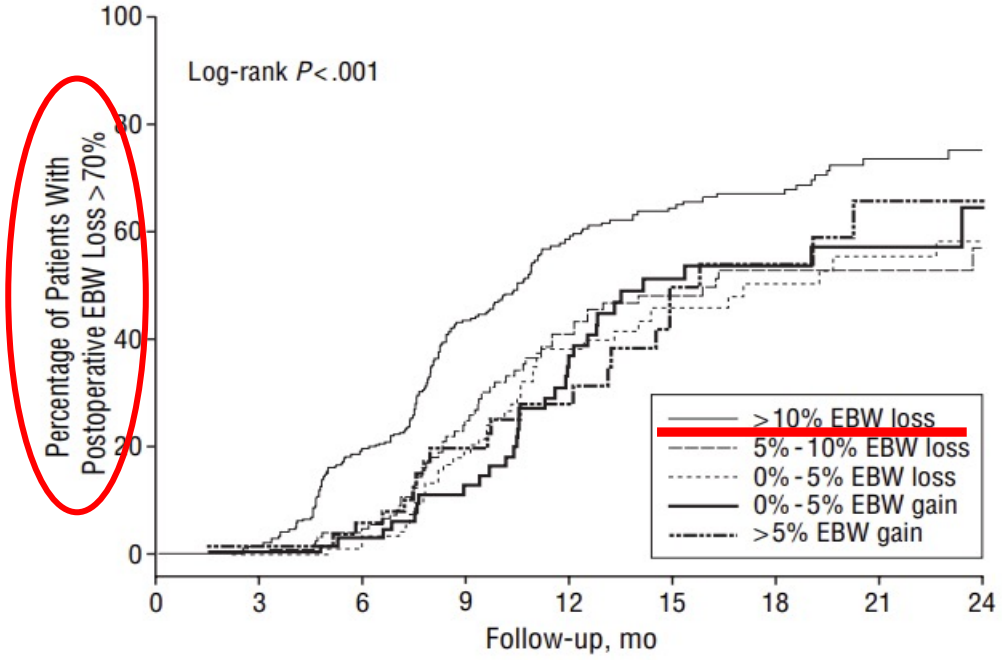


Table 3. Adjusted Hazard Ratios (HRs)[a] for Chance of >70% EBW Loss by Preoperative Weight Loss and Initial BMI[b]

	HR for >70% EBW Loss					
	All Patients		Patients With Initial BMI <50		Patients With Initial BMI ≥50	
Preoperative Weight Loss, %	No.	Adjusted HR (95% CI)	No.	Adjusted HR (95% CI)	No.	Adjusted HR (95% CI)
>5 EBW gain	67	1.16 (0.68-1.98)	44	1.09 (0.57-2.09)	23	0.72 (0.24-2.17)
0-5 EBW gain	86	1.08 (0.67-1.73)	36	1.00 (0.52-1.94)	50	1.34 (0.66-2.73)
0-5 EBW loss	137	1 [Reference]	63	1 [Reference]	74	1 [Reference]
5-10 EBW loss	189	1.20 (0.79-1.81)	80	1.00 (0.57-1.77)	89	1.64 (0.86-3.10)
>10 EBW loss	425	2.12 (1.50-3.01)	203	2.94 (1.81-4.77)	222	1.86 (1.09-3.18)

- **Conclusion : High-risk obese pt. who achieve pre-op. excess wt loss of 5-10% have more rapid post-op. wt loss**

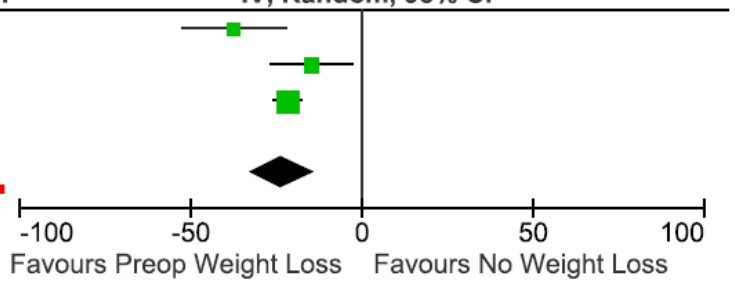
Arch Surg. 2007 142

Operative Time

- **Saving operation time of 12.5-23 min with pre-op. weight loss**

Study or Subgroup	Preop Weight Loss Mean	SD	Total	No Preop Weight Loss Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Alami 2007	220.2	31.5	26	257.6	27.8	35	22.6%	-37.40 [-52.61, -22.19]
Harnisch 2008	104.9	39.1	88	119.7	48.4	115	28.8%	-14.80 [-26.84, -2.76]
Huerta 2008	161.1	5.7	15	182.9	7.6	25	48.6%	-21.80 [-25.95, -17.65]
Total (95% CI)			**129**			**175**	**100.0%**	**-23.31 [-32.81, -13.80]**

Heterogeneity: Tau² = 43.91; Chi² = 5.32, df = 2 (P = 0.07); I² = 62%
Test for overall effect: Z = 4.81 (P < 0.00001)



- **Not** properly **distinguish**ed **how op. time** is **measure**d

  → **Discrepancy** in what is a **standardized op. time**

- **No** study has demonstrated that **time saving** has contributed to **improved** patient **safety** and **outcomes**

Surg Obes Relat Dis. 2009 5(6)

Operative Complications

No difference

- **Does weight loss immediately before bariatric surgery improve outcomes: a systematic review**
  - There was **no significant difference** in post-op. complications between groups

- **Effect of preoperative weight loss in bariatric surgical patients: a systematic review**
  - **Complication rates** : **18.8±10.6%** (pre-op. wt loss group) vs. **21.4±13.1%** (control)
  - **No real difference** in two groups

Surg Obes Relat Dis. 2009 5(6)
Surg Obes Relat Dis. 2011 7(6)

Operative Complications

Beneficial

Preoperative Very Low-Calorie Diet and Operative Outcome After Laparoscopic Gastric Bypass

A Randomized Multicenter Study

Table 3. Complications Recorded at 30 Days After Surgery in Patients Undergoing Laparoscopic Gastric Bypass[a]

	Study Group, No. of Patients	
Complication[b]	Control (n=136)	VLCD (n = 137)
Wound hemorrhage	1	0
Deep wound hemorrhage	1	0
GI tract hemorrhage	1	1
Pulmonary infection	2	1
Urinary tract infection	1	1
Wound infection	7	4
Pyrexia of unknown origin	3	1
Wound dehiscence	1	0
Anastomotic leak	1	0
All Complications[c]	**18**	**8**

- **Conclusion**

Reduced post-op. complication rates suggests that **VLCD** should be recommended **before bariatric surgery**

Arch Surg. 2011 146

Hospital Stay

Inconclusive / No difference

- **Although there was a trend in support of pre-op. weight loss, the data are inconclusive**

- **Effect of preoperative weight loss in bariatric surgical patients: a systematic review**
  - **Length of hospital stay** : **3.34±0.83%** (pre-op. wt loss group) vs. **3.98±1.49%** (control)
  - **No significant difference** in two groups

Surg Obes Relat Dis. 2011 7(6)
The ASMBS textbook of bariatric surgery: Springer; 2014.

Hospital Stay

Beneficial

- **Outcomes of preoperative weight loss in high-risk patients undergoing gastric bypass surgery**

Table 4. Odds Ratios[a] and 95% Confidence Intervals for a Length of Stay of 4 Days or Longer by Preoperative Weight Loss

Preoperative Weight Loss, %	No. of Patients	Length of Stay >4 d, %[b]	Adjusted Odds Ratio (95% Confidence Interval)
>5 EBW gain	67	18	1.19 (0.53-2.64)
0-5 EBW gain	86	19	1.06 (0.51-2.18)
0-5 EBW loss	137	18	1 [Reference]
5-10 EBW loss	189	9	0.44 (0.22-0.88)
>10 EBW loss	425	11	0.48 (0.27-0.84)

- **Conclusion**

High-risk obese pt. who achieve **pre-op. excess wt loss** of 5-10% **have shorter length of hospital stay**

Arch Surg. 2007 142

Liver Reduction

- **Preoperative weight loss with a very-low-energy diet: quantitation of changes in liver and abdominal fat by serial imaging**

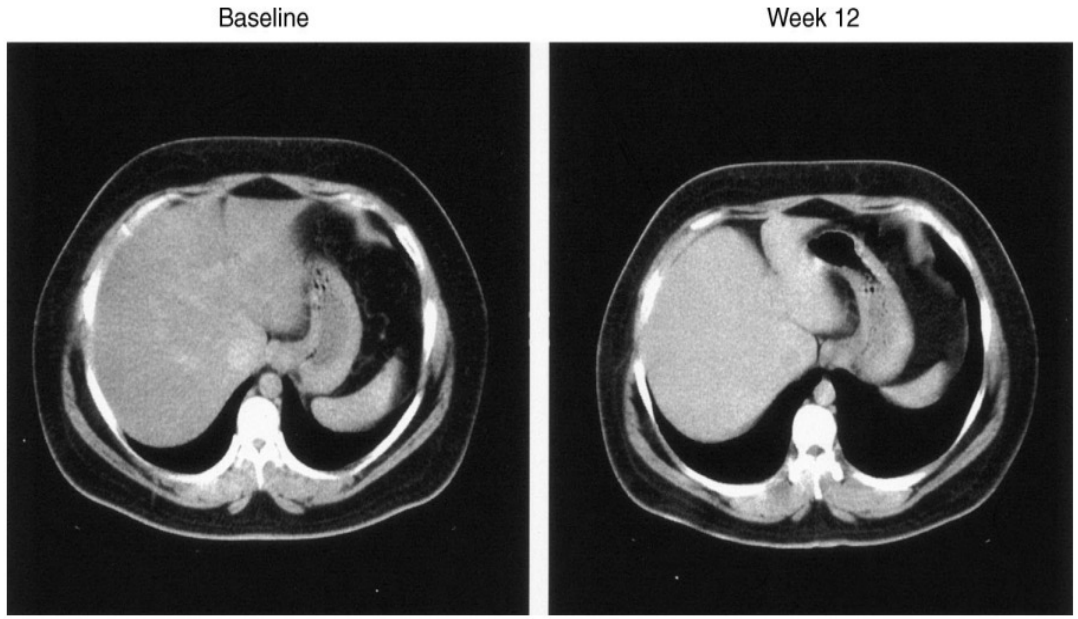


FIGURE 1. Single cross-sectional images of the liver performed by computed tomography at baseline and week 12 of a very-low-energy diet. The images, taken from within a series of contiguous 8-mm slices used to calculate total liver volume, illustrate the extent of the change in liver volume with weight loss in a 35-y-old man with an initial liver volume of 3.7 L and a final liver volume of 2.4 L. A 35% reduction in liver size and a weight loss of 18 kg were observed.

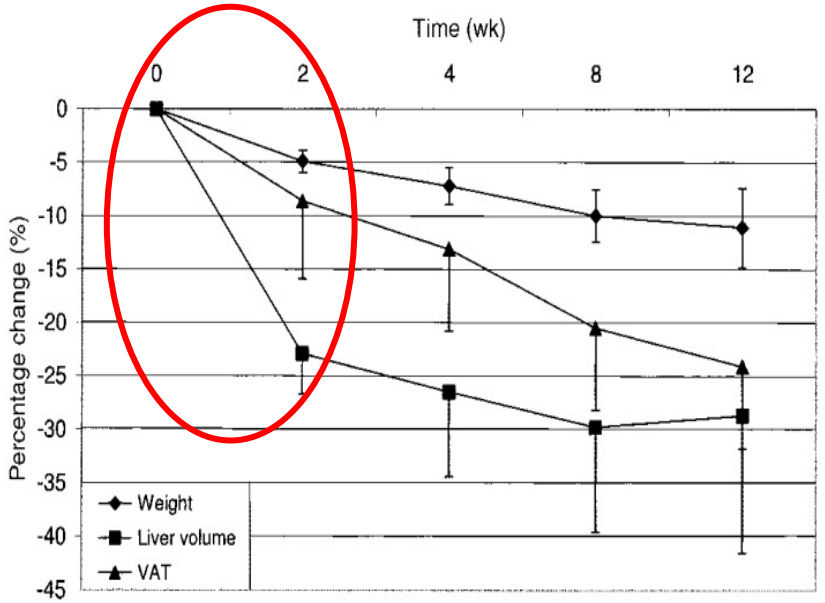


FIGURE 2. Relative change in liver volume, visceral adipose tissue (VAT) area, and body weight during a 12-wk very-low-energy diet as measured by serial magnetic resonance imaging ($n = 9$). An immediate reduction

➢ **Duration** should be **6 weeks** to achieve **maximal LV reduction**, significant **reductions in VAT, body weight** without compromising **compliance** and **acceptability**

Am J Clin Nutr. 2006 84(2)

Super Obese

- **Preoperative weight loss in high-risk superobese bariatric patients: a computed tomography-based analysis**
  - **30 patients** (27 men and 3 women) with mean age of 53 years
  - Mean **BMI** : **56** kg/㎡ (50-69) → **49** kg/㎡ (43-60) after 9 weeks of low-calorie diet
  - **Liver volume** was reduced by **18%**
  - **All co-morbidities** were well **controlled**

➢ **Conclusion**

- **Pre-op. weight loss** is **safe and effective** tool to decrease in liver volume, abdominal wall depth, visceral adipose tissue
- Improves **short-term surgical outcomes** in **high-risk superobese** patients

Surg Obes Relat Dis. 2011 7(4)

Preoperative management

Indication

Contraindication

Pre-op. Evaluation

Pre-op. Preparation

Pre-op. Weight Reduction

Case

Case

Patient Information

M / 33

Morbid Obesity
HTN on med
h/o Depression without medication (고등학교 때 항우울제 간헐적으로 복용)

어릴 적부터 통통한 체격이었고, 20대 초반 90 kg 유지
꾸준히 체중 증가하여 128 kg로 수술적 치료 원해 위장관외과 내원.
Op. 하기로 함 → 수술 전 evaluation 목적으로 FM 의뢰됨

이전 체중감량 경험 : 5년 전 운동 및 지방흡수억제제 복용 하였으나 체중감량 실패

흡연 : 0.5갑 x 10년
음주 : 3-4회/년 (소주 2병)

Case

Pre-op. Evaluation

BMI 41.4 / Wt. 128.3kg / Ht. 166.8cm / % Body fat 50.6%
V/S **166/95 mmHg** - 98/min
Initial Lab (2019.01.29)

CBC	12400 - 14.9 - 281k			**electrolyte**	142 - 4.4 - 105		
Glucose	102	[70-99]	mg/dL	**AST/ALT**	58/103	[<40/<40]	IU/L
Creatinine	0.89	[0.70-1.40]	mg/dL	**T bilirubin**	0.7	[0.2-1.2]	mg/dL
Albumin	4.0	[3.5-5.2]	g/dL	**HbA1c**	6.0	[4-6]	%
Cholesterol	184	[<199]	mg/dL	**TSH**	2.6	[0.35-4.94]	uU/mL
TG	121	[<199]	mg/dL	**fT4**	1.5	[0.93-1.7]	ng/dL
HDL-C	41	[>40]	mg/dL	**Vit B12**	359	[211-911]	pg/dL
LDL-C	140	[<129]	mg/dL	**folate**	6.4	[>5.4]	pg/dL

Case

2019.01.29 **Pre-op. evaluation**
EKG : sinus tachycardia
CXR : normal / **APCT** : Fatty liver

2019.02.08 **TTE** : normal LV function

2019.02.12 **Wt. loss 위해 Saxenda start**
혈압 조절 위해 Sevikar HCT 1T qd

2019.02.17 **Polysomnography** : Obstructive sleep apnea, severe

2019.02.25 **정신건강의학과** 진료

2019.02.26 **PFT** :normal
EGD : Superficial gastritis, DU S2

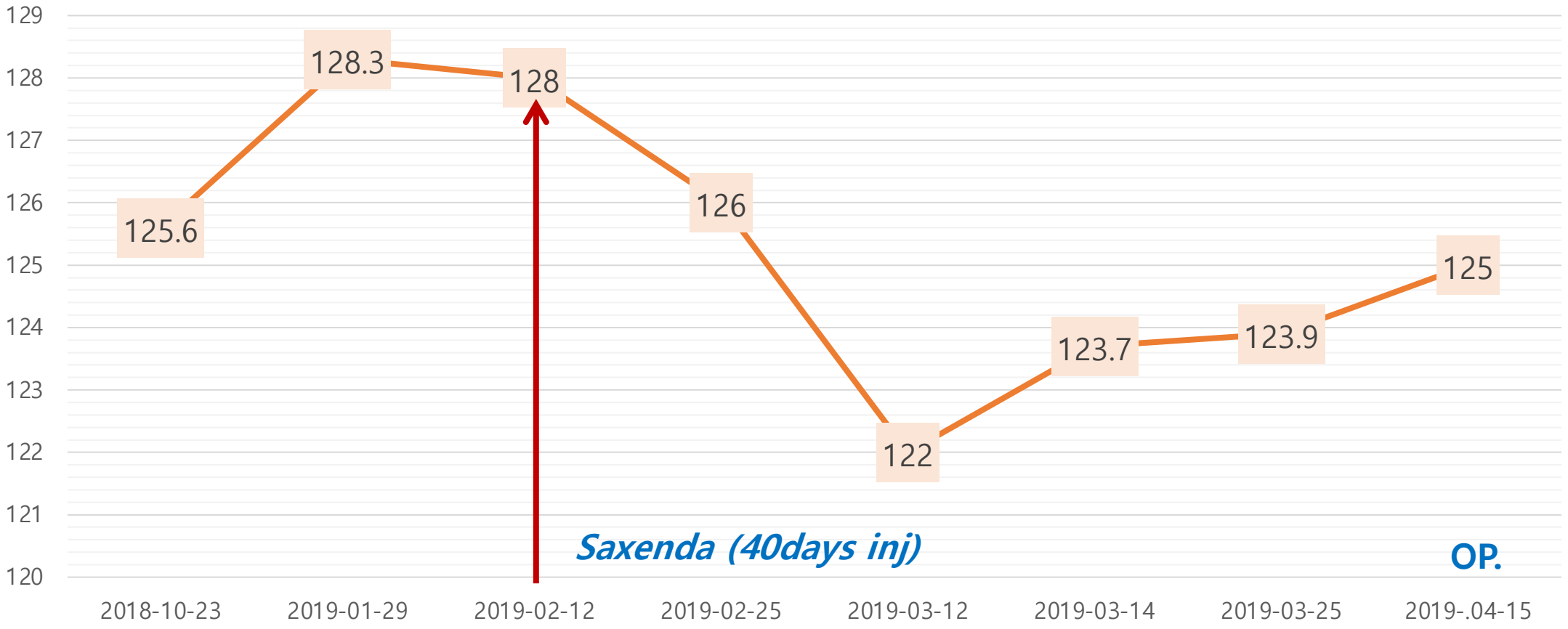
2019.03.14 **호흡기내과** 진료 → OSA로, 수술 후 CPAP titration

2019.04.15 Laparoscopic Sleeve gastrectomy 시행

Case

Flow Chart

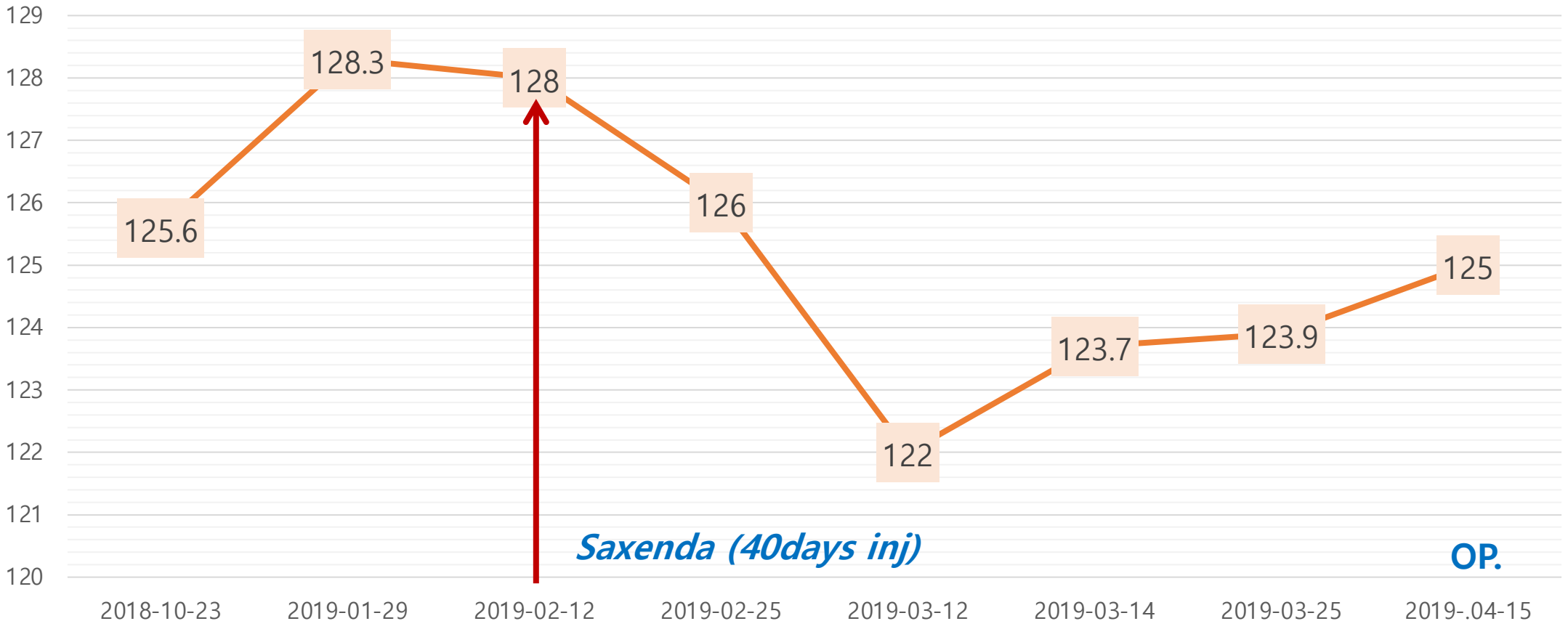
Pre-op. Wt. loss **- 6 kg /mon**



Case

Flow Chart

Pre-op. Wt. loss **- 6 kg /mon**



Take Home Message

- **No irreversible absolute contraindication** to bariatric surgery
- **All individual factors should be dealt with prior** to surgery
- **Obesity evaluation, Diagnostic test, Nutritional evaluation**
- **Medical & Comorbidity management**
- **Pre-op. Weight Reduction**
  - Inconclusive data, but it is beneficial to high-risk obese patient


THANK
YOU