

Current Status of Bariatric and Metabolic Surgery in Daejeon and Chungcheong Province: Early Experiences after Public Medical Insurance Coverage in 2019

¹Department of Surgery, Dankook University Hospital, Cheonan, ²Department of Surgery, Chungbuk National University Hospital, Cheongju, ³Department of Surgery, The Catholic University of Korea, Daejeon St. Mary's Hospital, Daejeon, ⁴Department of Surgery, Soonchunhyang University Cheonan Hospital, Cheonan, ⁵Department of Surgery, Cheongju St. Mary's Hospital, Cheongju, ⁶Department of Surgery, Eulji University Hospital, Daejeon, ⁷Department of Surgery, Konyang University Hospital, ⁸Department of Surgery, Daejeon Sun Hospital, ⁹Department of Surgery, Chungnam National University Hospital, Daejeon, Korea

Dong-Wook Kim¹, Dae Hoon Kim², Jeong Goo Kim³, Myoung Won Son⁴, Geum Jong Song⁴, Seong-il Oh⁵, Han Mo Yoo³, Moon-Soo Lee⁶, Sang Kuon Lee³, Sang Eok Lee⁷, Ye Seob Jee¹, Seong Ho Hwang⁸, Si Eun Hwang⁸, Sang-Il Lee⁹

Purpose: This study aimed to investigate the current status of bariatric and metabolic surgery in Daejeon and Chungcheong province and to describe the early experiences after public medical insurance coverage in 2019. **Materials and Methods:** Between January 2019 and August 2019, 64 cases of bariatric and metabolic surgery were performed in patients with morbid obesity or uncontrolled type 2 diabetes. We prospectively collected and analyzed data regarding the patients' demographics and comorbidities, surgical results, and early complications. The patient information before and after the insurance coverage was also compared. **Results:** The number of surgeries in 9 years has been caught up only in the last 8 months after insurance coverage (58 vs. 64 patients). The mean body mass index was 37.7 ± 5.8 kg/m² (range, 22.7-52.1 kg/m²). The most frequently performed surgery was sleeve gastrectomy (53 cases, 82.8%), followed by Roux-en-Y gastric bypass (9 cases, 14.1%), and adjustable gastric banding (2 cases, 3.1%). Postoperative complications occurred in 6 patients (9.4%), and there was no mortality. The mean operation time (225.3 ± 85.4 vs. 156.1 ± 61.8 min, $P < 0.001$) and postoperative stay (5.9 ± 4.5 vs. 4.3 ± 2.0 days, $P = 0.013$) after the insurance coverage were significantly shorter than those before the insurance coverage. **Conclusion:** We could assess the patients who had bariatric and metabolic surgery in Daejeon and Chungcheong province after public medical insurance coverage in 2019.

Key Words: Bariatric and metabolic surgery, Public medical insurance coverage, Early experiences

INTRODUCTION

Bariatric and metabolic surgery was finally included in the insurance coverage and was reimbursed through the national health insurance in January 2019 in Korea.

Patients with body mass index (BMI) ≥ 35 kg/m² or BMI ≥ 30 kg/m² with comorbidities can benefit from the public medical insurance coverage, so the demand for bariatric and metabolic surgery is now increasing noticeably. The announcement of insurance coverage means two things.

Received: February 4, 2020, Revised: March 9, 2020, Accepted: April 6, 2020
Corresponding author: Sang-Il Lee, 282 Munhwa-ro, Jung-gu, Daejeon 35015, Korea
Department of Surgery, Chungnam National University Hospital
Tel: +82-42-280-7180, Fax: +82-42-257-8024, E-mail: mr231@cnu.ac.kr

© This is an open access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

First, there have been enough evidences of bariatric and metabolic surgery. Despite consistent efforts, none of the conservative treatments, including medication, could successfully achieve long-lasting weight control [1,2]. However, the long-term effectiveness of bariatric and metabolic surgery in weight loss and remission of diabetes has been proven through well-designed studies [3–6]. Second, sufficient safety has been secured in bariatric and metabolic surgery. The safety of this surgery has been a sensitive issue, which caused social problems in Korea. The advances in the latest surgical instruments and anesthetic technology have played an important role in the establishment of safety of bariatric and metabolic surgery. Moreover, the Korean Society for Metabolic and Bariatric Surgery has introduced the accreditation system (for both surgeons and institutions) of bariatric and metabolic surgery for systematic supplementations of safety [7].

The Society of Chungcheong Obesity and Metabolic Surgery (SCOMS) was the first organized local research society in Korea, operating since 2015, and we have already reported our early experiences of bariatric and metabolic surgery before its inclusion in the insurance coverage [8]. This study aims to investigate the current status of bariatric and metabolic surgery in Daejeon and Chungcheong province after its inclusion in the public medical insurance coverage and describes the roles and necessity of a research society in our province.

MATERIALS AND METHODS

Between January 2019 and August 2019, 64 bariatric and metabolic surgeries were performed in patients with morbid obesity or uncontrolled type 2 diabetes at 7 institutions (9 surgeons) in Daejeon and Chungcheong province. All patients were suitably indicated for the surgery according to the national insurance coverage in Korea. We prospectively collected and analyzed data regarding the patients' demographics and comorbidities, surgical results, and early complications. Furthermore, patient demographics and surgical results as well as postoperative morbidity were compared according to the time of surgery. The patients who underwent surgery before the insurance coverage (from 2010 to 2018) were

included in group A (n=58), whereas those who underwent the surgery after the insurance coverage were included in group B (n=64). Most of the patients in group A underwent surgery before the establishment of the research organization (45/58, 77.6%).

This study was approved by the Institutional Review Board (IRB) of each institution from where the data were collected (IRB Number 201911013 at the institution of the first author) and was conducted in line with the Declaration of Helsinki. Written informed consent was waived by the IRB. Categorical data were assessed using the χ^2 test or Fisher's exact test. In addition, we used the t-test or the Mann-Whitney U test for continuous variables. A $P < 0.05$ was considered statistically significant. All statistical analyses were performed using the SPSS software package for Windows, version 22.0 (IBM, Chicago, IL, USA).

Table 1. Patients demographics and baseline characteristics (n=64)

Age (year)	39.3±11.0 (21–68)
Sex	
Male	14 (21.9%)
Female	50 (78.1%)
Height (meter)	1.65±0.09 (1.45–1.90)
Weight (kilogram)	103.7±20.6 (54.3–145.0)
BMI (kg/m ²)	37.7±5.8 (22.7–52.1)
ASA score	
1	35 (54.7%)
2	22 (34.4%)
≥3	7 (10.9%)
Number of comorbidities	
0	2 (3.1%)
1	20 (31.2%)
2	9 (14.1%)
≥3	33 (51.6%)
Diabetes control (n=23)	
OHA	14 (60.9%)
OHA+insulin	9 (39.1%)
Smoking	
Yes	15 (23.4%)
No	49 (76.6%)
Alcohol consumption	
Yes	41 (64.1%)
No	23 (35.9%)
History of abdominal operation	
Yes	45 (70.3%)
No	19 (29.7%)

BMI = body mass index, ASA = American Society of Anesthesiologists, OHA = oral hypoglycemic agent.

RESULTS

1. Patient demographics and baseline characteristics

In total, 64 patients (14 men and 50 women; average age, 39.3 ± 11.0 years) were included in this study. The baseline characteristics of the patients are summarized in Table 1. The mean body weight was 103.7 ± 20.6 kg (54.3–145.0 kg), and the mean BMI was 37.7 ± 5.8 kg/m² (22.7–52.1 kg/m²). Fig. 1 shows the distribution of BMI. The patients with BMI > 35 kg/m² and < 40 kg/m² were most common (37.5%), and 3.1% of the patients were super morbidly obese with BMI > 50. Most of the patients (62/64, 96.9%) had one or more comorbidities. The most common comorbidities were liver disease and hypertension followed by diabetes and dyslipidemia (Fig. 2).

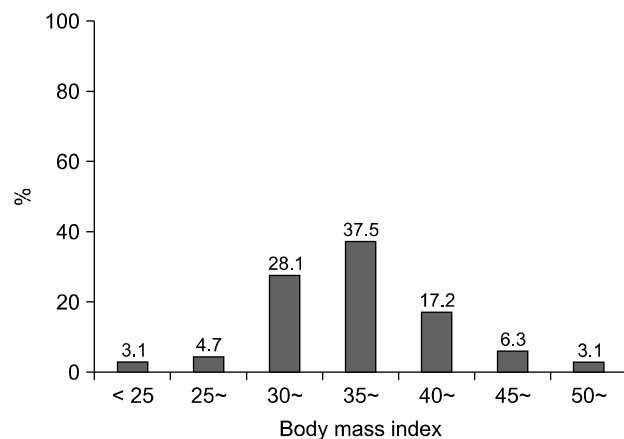


Fig. 1. Distribution of patients' body mass index.

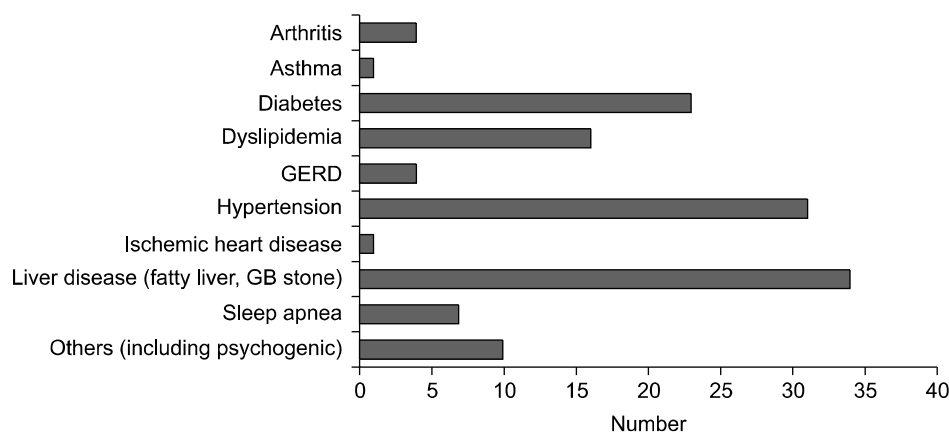


Fig. 2. Patients' comorbidities. GERD = gastroesophageal reflux disease, GB = gallbladder.

2. Surgical results

The most frequently performed surgery was sleeve gastrectomy (53 cases, 82.8%), followed by Roux-en-Y gastric bypass (9 cases, 14.1%), and adjustable gastric banding (2 cases, 3.1%). All the surgeries were performed with laparoscopic procedures. The mean operation time was 156.1 ± 61.8 min, and mean postoperative stay was 4.3 ± 2.0 days. Drainage was performed (38 cases, 59.4%) depending on the operators' preference and surgical situation (Table 2).

3. Postoperative morbidity and mortality

Table 3 shows the postoperative morbidity and mortality. The surgical morbidities occurred in 6 patients (9.4%). Three patients developed a staple line leakage that was successfully managed with percutaneous drainage procedure (Clavien-Dindo grade IIIa). One patient corresponded to a Clavien-Dindo grade IIIb. This patient had distal esophageal injury, which was found on postoperative day 1. He was fully recovered after primary closure of perforation site. There was no mortality in this study.

4. Comparison before and after public medical insurance coverage

The patient information before and after the public medical insurance coverage was compared. The mean operation time (225.3 ± 85.4 vs. 156.1 ± 61.8 , $P < 0.001$) and postoperative stay duration (5.9 ± 4.5 vs. 4.3 ± 2.0 , $P = 0.013$) were significantly shorter in group B patients than in group A patients. However, no difference in the surgical

Table 2. Surgical result

Type of surgery	
Laparoscopic adjustable gastric banding	2 (3.1%)
Laparoscopic sleeve gastrectomy	53 (82.8%)
Laparoscopic Roux-en-Y gastric bypass	9 (14.1%)
Operation time (minute)	156.1±61.8
Postoperative stay (day)	4.3±2.0
Estimated blood loss (mL)	34.4±36.9
First SFD	2.2±1.3
Drainage	
Yes	38 (59.4%)
No	26 (40.6%)
Transfusion	
Yes	63 (98.4%)
No	1 (1.6%)
Number of trocars	
≤3	8 (12.5%)
4	15 (23.4%)
5	19 (29.7%)
≥6	22 (34.4%)

SFD = semi-fluid diet.

Table 3. Postoperative morbidity and mortality (n=6, 9.4%)

	Number	Clavien-Dindo grade
Postoperative morbidity		
#1. Intra-abdominal bleeding→transfusion	1	II
#2. Staple line leakage→PCD insertion	3	IIIa
#3. Wound complication→wound repair	1	I
#4. Esophageal injury→re-operation ^a	1	IIIb
#5. Medical complication	0	
Postoperative mortality	0	

^aPrimary closure of perforation site (distal esophagus).

PCD = percutaneous drainage.

morbidity rate (5.2% vs. 9.4%, P=0.375) was observed between both the groups (Table 4).

DISCUSSION

The demand for bariatric and metabolic surgery has considerably increased after its inclusion in the national insurance coverage in Korea. In Daejeon and Chungcheong province, only 58 patients underwent this surgery during 9 years before the insurance coverage, whereas 64 surgeries were performed after the insurance coverage. The number of surgeries in 9 years has been caught up only in the last 8 months. Although some patients who wanted surgery

Table 4. Comparison of patients' information before and after insurance coverage

	Group A ^a (n=58)	Group B ^b (n = 64)	P-value
Age (year)	36.9±11.4	39.3±11.0	0.247
Sex			0.246
Male	8 (13.8%)	14 (21.9%)	
Female	50 (86.2%)	50 (78.1%)	
Height (meter)	1.64±0.08	1.65±0.09	0.320
Weight (kilogram)	105.6±20.8	103.7±20.6	0.613
BMI (kg/m ²)	39.2±6.9	37.7±5.8	0.207
Comorbidities			<0.001
Yes	37 (63.8%)	62 (96.1%)	
No	21 (36.2%)	2 (3.9%)	
Operation type			0.018
Adjustable gastric banding	8 (13.8%)	2 (3.1%)	
Roux-en-Y gastric bypass	2 (3.4%)	9 (14.1%)	
Sleeve gastrectomy	48 (82.8%)	53 (82.8%)	
Operation time (minute)	225.3±85.4	156.1±61.8	<0.001
Postoperative stay (day)	5.9±4.5	4.3±2.0	0.013
Postoperative morbidity	3 (5.2%)	6 (9.4%)	0.375

^aOperations from 2010 to 2018, ^boperations in 2019 (after insurance coverage).

have flocked because of monetary benefits, this can be interpreted that the public perception of bariatric and metabolic surgery is gradually changing. Bariatric and metabolic surgery is now a well-established treatment, which is one of the best option for patients with morbid obesity and uncontrolled diabetes [3–6].

However, bariatric and metabolic surgery is not a simple procedure that any surgeon can easily access. Patients with morbid obesity who have considerable underlying diseases are usually at a high risk for general anesthesia, and this can be a significant burden on the designated surgeons. In addition, surgeons should be sufficiently accustomed to laparoscopic techniques with gastrointestinal anastomosis overcoming the resistance of thick abdominal wall and obstacles of visceral fat. Finally, patients undergoing bariatric and metabolic surgery tend to think that it is a cosmetic or plastic surgery; hence, when the results are not satisfactory, they complain more seriously. Is there any way to reduce this difficulty and burden of bariatric and metabolic surgery for surgeons with early experiences? There are several ways to solve this problem, but joining a local research society to discuss and learn from each other can be a good option. Through

this study, we could show that bariatric and metabolic surgery was performed safely and efficiently in Daejeon and Chungcheong province. Although the postoperative morbidities did not decrease statistically, the mean operation time and postoperative stay were significantly shorter in cases after the public medical insurance coverage than in those before the insurance coverage (Table 4).

As reported earlier last year [8], the Society of Chungcheong Obesity and Metabolic Surgery (SCOMS) actively conducts academic and social activities in the province. First, we prospectively collected data of patients. Our committee selected academic members after discussion, and they revised the data form thoroughly. Subsequently, data collection, which was differently performed for each institution, was integrated into a multi-center data form where important information could be recorded without missing data. Second, we shared our initial experiences frankly. All of our members are general surgeons specialized in gastrointestinal or hepatobiliary division, so we have sufficient experience of basic laparoscopic technique. However, most are inexperienced in bariatric and metabolic surgery because they work at low-volume center in local hospitals. We discussed and shared tips for the surgery, including optimal position of trocars, position of patient, and selection of energy device or linear stapler. Occasionally, non-edited videos were shared to improve surgical techniques, and we often coped with postoperative complications together. Lectures and advices of experienced surgeons also made it easy for the beginners to get started for bariatric and metabolic surgery.

After experiencing early cases of bariatric and metabolic surgery, our society considered some discussion points for becoming advanced in this technique. First is the problem of patient consultation. Most of the morbidly obese patients were young women who had suffered socially or mentally because of their external appearance. They were quite a different patient group compared with common patients in general surgery. We think that the relationship and rapport with patients have a significant effect on the prognosis, including weight loss. Consequently, we should make time for in-depth consultation and to explain the questions one by one. A multidisciplinary approach was

also an important factor for managing patients. We met patients who had several underlying diseases acquired secondarily rather than genetic diseases. For better treatment, various departments should collaborate with each other. For example, sophisticated diabetes control, management of sleep apnea, and postoperative medical management should be consulted to respective specialist at any time. As for the surgery, we should not dwell on the time of the surgery and the number of trocars. Accurate and safe procedure is essential for the beginners until overcoming the learning curve. We need to take time for the surgery with precision. In the same context, it will be better to use sufficient trocars until surgeons are accustomed to bariatric and metabolic surgery.

In conclusion, we could investigate the patients who had bariatric and metabolic surgery in Daejeon and Chungcheong province in 2019. The most noticeable changes was the significant increase in the number of surgery after public medical insurance coverage. Our research society will continue to work hard to ensure the safety of the surgery and management of morbidly obese and metabolic patients in our community.

ACKNOWLEDGMENTS

The authors wish to thank the members of our society for data collection and sharing in this study (Dankook University Hospital, Catholic University Daejeon St. Mary's Hospital, Soonchunhyang University Cheonan Hospital, Eulji University Hospital, Chungnam National University Hospital, Daejeon Sun Hospital, Konyang University Hospital).

CONFLICT OF INTEREST

None.

REFERENCES

1. Park JY, Heo Y, Kim YJ, et al. Long-term effect of bariatric surgery versus conventional therapy in obese Korean patients: a multicenter retrospective cohort study. *Ann Surg Treat Res* 2019;96:283-9.
2. Heo YS, Park JM, Kim YJ, et al. Bariatric surgery versus conven-

- tional therapy in obese Korea patients: a multicenter retrospective cohort study. *J Korean Surg Soc* 2012;83:335–42.
3. Sjöström L, Peltonen M, Jacobson P, et al. Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications. *JAMA* 2014;311:2297–304.
 4. Carlsson LM, Peltonen M, Ahlin S, et al. Bariatric surgery and prevention of type 2 diabetes in Swedish obese subjects. *N Engl J Med* 2012;367:695–704.
 5. Mingrone G, Panunzi S, De Gaetano A, et al. Bariatric–metabolic surgery versus conventional medical treatment in obese patients with type 2 diabetes: 5 year follow-up of an open-label, single-centre, randomised controlled trial. *Lancet* 2015;386:964–73.
 6. Schauer PR, Bhatt DL, Kirwan JP, et al. Bariatric surgery versus intensive medical therapy for diabetes – 5-year outcomes. *N Engl J Med* 2017;376:641–51.
 7. Kim JH. The current status and necessity of metabolic and bariatric surgery accreditation system in foreign country. *J Metab Bariatr Surg* 2016;5:18–27.
 8. Kim DW, Kim DH, Kim JG, et al. Current status of metabolic and bariatric surgery in Daejeon/Chungcheong area. *J Metab Bariatr Surg* 2018;7:54–7.