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Bariatric and Metabolic Surgery for Asians

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1. Introduction

Over the past few decades, there has been a dramatic increase in the prevalence of obesity in many countries. The World Health Organization (WHO) estimates that more than 1 billion adults worldwide are overweight; of these, at least 300 millions are obese. (1) Obesity is associated with multiple chronic diseases, including type 2 diabetes, hypertension, coronary heart disease, stroke and several cancers.(2)

Definitions of overweight (BMI >25) and obesity (BMI>30) are based essentially on criteria derived from studies that involved populations of European origin. The validity of these criteria in Asian populations has yet to be determined. It has been suggested that the associations of BMI with body composition and health outcomes may differ between Asian and European populations. Studies have shown that for a given BMI, Asians generally have a higher percentage of body fat than do Europeans. Asian populations have also been shown to have elevated risks of type 2 diabetes, hypertension, and hyperlipidemia at a relatively low level of BMI.(3)

2. Obesity in Asia

In most Asian countries, the prevalence of overweight and obesity have increased many times over in the past few decades, and the magnitude varies between countries (4,5,6). Southeast Asia and the Western Pacific region are currently facing an epidemic of diseases associated with obesity such as diabetes and CVD. India has the highest number of people with diabetes in the world and China occupies the second position (7).

Table 1 (8) shows the prevalence of overweightness and obesity in Asian countries in comparison with the United States. Many Asian countries have rates which are not very different from that of the U.S.

The highest rate of obesity in Asia is in Thailand(9) and the lowest is in India (6) followed by Philippines (10). China, which once had the leanest of populations, is now rapidly catching up with the West in terms of prevalence of overweight and obesity which had occurred in a remarkably short time (11,12)

The obesity pandemic was restricted to developed, high-income countries until a few decades ago, but recently it has penetrated even the poorest of nations. Asia has undergone considerable socioeconomic transition in the last three decades, which has resulted in

increased availability of food, better transport facilities and better health care facilities. The changing trend was seen first in urban populations and in recent years, with improving socioeconomic scenarios in rural areas, the changes were seen even among the urbanizing rural populations. The recent epidemiological data among urban and semi urban southern Indian populations illustrates the changing scenario (13). In addition, reduced physical activity at work due to mechanization, improved motorized transport and preferences for viewing television and video games to outdoor games during leisure time, have resulted in positive energy balance in most Asian countries (14).

	Survey year	Prevalence of overweight adults (%)	Prevalence of obese adult (%)
United States	2007-2008	34.0	0.2
India	1998-1999	10.0	2.2
Malaysia	1996-1997	16.6	4.4
Philippines	1998	16.9	3.3
Taiwan	1993–1996	21.1	4.0
Japan	2001	23.0	3.0
Singapore	1998	24.4	6.0
China	1999-2000	25.0	4.0
Hong Kong	1996-1997	25.1	3.8
South Korea	2001	27.4	3.2

Table 1. Comparison of prevalence of adult obesity in Asian countries versus the United States.

In parallel with the increase in adult obesity, obesity in children is also increasing. Childhood obesity has reached more than 25% in many developing countries. The etiological factors for childhood obesity include genetic, metabolic, and behavioral components. An imbalanced energy intake versus energy expenditure due to consumption of energy dense food and increase in sedentary habits has mainly contributed to increases in childhood obesity, both in developed and developing countries (15).

Asian populations generally have a lower BMI than many other ethnic groups, but the association between BMI and glucose intolerance is as strong as in any other population (16). The risk of diabetes (odds ratio) was significant for urban Indian populations with a BMI of >23kg/m2 (17). This has been confirmed by studies from other parts of India (18), by studies in migrant Indians and in other Asian populations (19). According to WHO recommendations, a BMI of 18.5–22kg/m2 is considered healthy for Asian populations (20). Insulin resistance is one of the major etiological factors for diabetes and the risk association between obesity and diabetes is mediated through insulin resistance.

Many Asian populations have a higher total and central adiposity for a given body weight when compared to matched Caucasian populations. A higher prevalence of metabolic syndrome in south Asians is mostly attributed to the higher prevalence of central adiposity.

The IDF criteria for metabolic syndrome recommends use of ethnic specific thresholds for waist circumference, which includes ≥ 90 cm in men, and ≥ 80 cm in women of Asian origin (21). The Japanese population is an exception.

It has also been noted that for a given BMI, Asians have higher body fat percentage compared with Caucasians (22,23). Higher insulin resistance and an increased risk of diabetes may be partially attributed to this feature. The differences in anthropometric characteristics are evident even in Asian children who are shown to have higher body fat percentage at lower levels of body weight (24,25) and also a tendency for abdominal obesity (26).

In the cohorts of East Asians(27), including Chinese, Japanese, and South Koreans, the lowest risk of death was seen among persons with a BMI in the range of 22.6 to 27.5. The risk was elevated among persons with BMI levels either higher or lower than that range — by a factor of up to 1.5 among those with a BMI of more than 35.0 and by a factor of 2.8 among those with a BMI of 15.0 or less. A similar U-shaped association was seen between BMI and the risks of death from cancer, cardiovascular diseases and other causes.

A WHO expert consultation concluded in 2004 that Asians generally have a higher percentage of body fat than Caucasian people of the same age, sex, and BMI. Also, the proportion of Asians with risk factors for type 2 diabetes and cardiovascular disease is substantial even below the existing WHO BMI cut-off point of 25 kg/m2. Thus, WHO cut-off points did not provide an adequate basis for taking action on risks related to overweight and obesity in many populations in Asia. The WHO recommended for many Asian populations additional trigger points for public health action, which were identified as 23 kg/m2 or higher, representing increased risk, and 27·5 kg/m2 or higher, as representing high risk. The suggested categories are as follows: less than 18·5 kg/m2 underweight; 18·5–23 kg/m2 increasing but acceptable risk; 23–27·5 kg/m2 increased risk; and 27·5 kg/m2 or higher high risk. (3)

3. Diabetes in Asia

Type 2 diabetes is now a global health priority.(28) The International Diabetes Federation has predicted that the number of individuals with diabetes will increase from 240 million in 2007 to 380 million in 2025, with 80% of the disease burden in low- and middle-income countries.(29) More than 60% of the world's population with diabetes will come from Asia, because it remains the world's most populous region. The number of individuals with diabetes and impaired glucose tolerance (IGT) in each Asian country will increase substantially in coming decades (Table 2).(30)

	Diabetes		Impaired Glucose Tolerance	
Country	2007	2025	2007	2025
India	40850	69882	35906	56228
China	39809	59270	64323	79058
Japan	6978	7171	12891	12704
Bangladesh	3848	7416	6819	10647
Korea	3074	4163	3224	4240
Total Asia	113536	179742	157067	213218

All values are in thousands

Table 2. Top 5 Countries in Asia With the Highest Number of Persons With Type 2 Diabetes and Impaired Glucose Tolerance in the Age Group 20 to 79 Years in 2007 and Projected Data in 2025 (30)

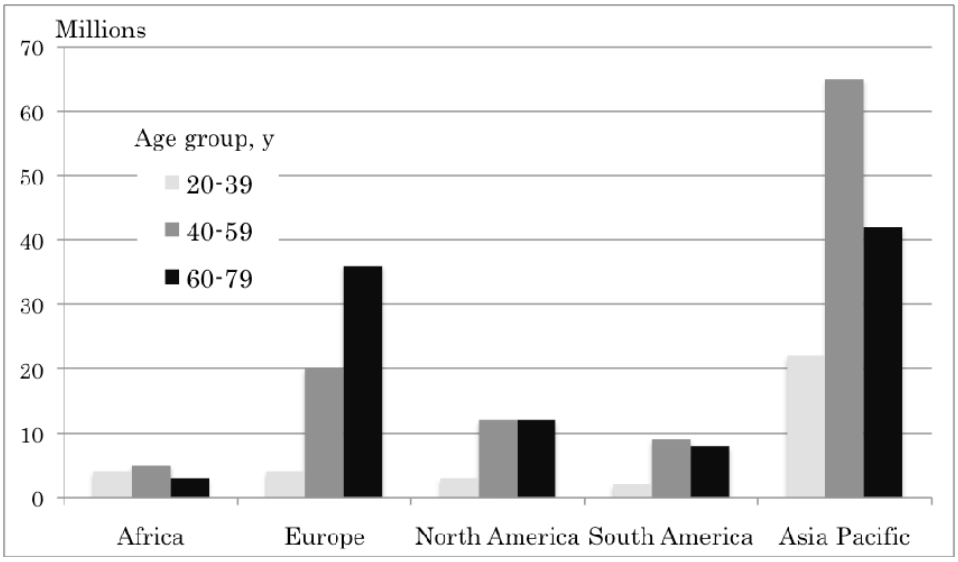
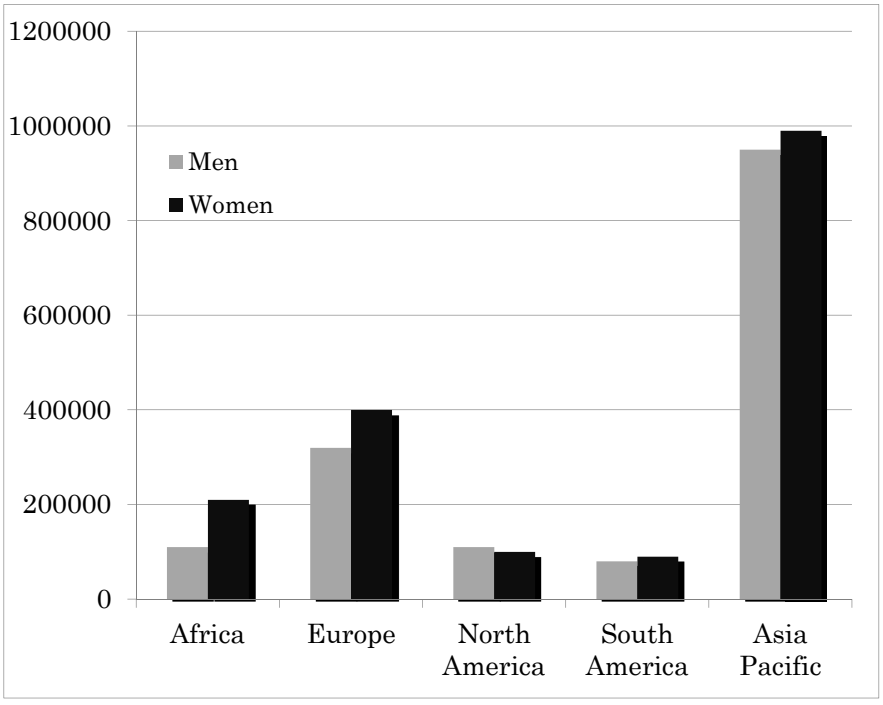


Fig. 1. Number of persons with diabetes in different age group (30)



Deaths attributable to diabetes , Age 20~79 years.

Fig. 2. Number of Deaths Attributable to Diabetes in Different Regions of the World in 2007 (30)

Unlike in the West, where older populations are most affected, the burden of diabetes in Asian countries is disproportionately high in young to middle-aged adults. (Figure 1) And also the number of deaths attributable to diabetes in Asian Pacific region is extremely high.(Figure 2) (30)

Amid this global epidemic of diabetes, Asian countries undergoing economic and nutritional transitions have experienced a particularly notable increase.(30) In China, the prevalence of diabetes increased from 1% in 1980 to 5.5% in 2001(31), with much higher rates in urban areas such as Shanghai(32). Nearly 10% of Chinese adults residing in affluent regions such as Hong Kong and Taiwan have diabetes (33). Among individuals with diabetes, two-thirds in mainland China and one-half in Hong Kong and Taiwan remain undiagnosed.

In urban Indian adults, diabetes prevalence increased from 3% in the early 1970s to 12% in 2000, with a narrowing rural-urban gradient (34). In 2006, the rate of type 2 diabetes in rural south India was 9.2%, compared with an increase from 13.9% in 2000 to 18.6% in 2006 in urban south India. (35)

Asians have lower rates of overweightness and obesity than their Western counterparts, using conventional definitions. Despite lower BMI, some Asian countries have similar or even higher prevalence of diabetes than Western countries.(36) These data confirm that the risk of type 2 diabetes starts at a lower BMI for Asians than for Europeans.(37)

Asian populations, especially those of South Asian descent, are more prone to abdominal obesity and low muscle mass with increased insulin resistance compared with their Western counterparts. (38,39,40,41,42,43,44) Thus, waist circumference reflecting central obesity is a useful measure of obesity-related risk of type 2 diabetes, especially in individuals with normal BMI values. (38,45)

Data suggest that the increased risk of type 2 diabetes in Asian populations may be attributed to increased abdominal and visceral adiposity for a given BMI.(46)

In Asian populations, the amount of visceral fat (including mesenteric fat) and fatty liver was significantly associated with subclinical atherosclerosis.(47) In addition, increased waist circumference has been associated with substantially increased risk of developing diabetes (48,49) as well as increased risk of cardiovascular and all-cause mortality, independent of BMI.(50,51,52,53)

In the 1980s, Japanese researchers first revealed that reduced early insulin response was an independent predictor for diabetes.(54) Fukushima et al (55) found that at all stages of glucose intolerance, Japanese individuals had reduced early and late phases of insulin responses. In Japanese men with normal glucose tolerance, even a small increase in BMI produced a decrease in beta cell function disproportionate to that in insulin sensitivity. (56) In a sample of Chinese patients with type 2 diabetes, 50% were of normal weight, with low BMI correlating with low levels of fasting plasma C-peptide and high glycated hemoglobin levels.(57) In a prospective survey of Japanese Americans, visceral fat area and reduced incremental insulin response were independent predictors for diabetes. (58) Taken together, in some Asian populations, inadequate beta cell response to increasing insulin resistance results in a loss of glycemic control and increased risk of diabetes, even with relatively little weight gain.

Among lean, healthy individuals matched for age, BMI, waist circumference, birth weight, and current diet, Asians had higher levels of postprandial glycemia and lower insulin sensitivity than Caucasians in response to a 75-g carbohydrate load.(59) These findings raise the possibility that Asians are more genetically susceptible to insulin resistance and diabetes than Caucasians.

Asian patients with diabetes continue to exhibit high risk for renal complications. (60) In observational studies as well as clinical trials, Asian patients with diabetes were more likely to develop end stage renal disease (ESRD) than their Caucasian counterparts. In a 25-year prospective survey, 60% of young Japanese patients with type 2 diabetes diagnosed before age 35 became blind or had developed ESRD at a mean age of 50. (61)

4. Bariatric and metabolic surgery in Asia

The history of bariatric surgery started when Taiwan adopted the JI bypass as the first bariatric surgery in Asia in the 1970s. (62) The first gastric partitioning was performed at Taiwan in 1981. (63) The first gastric bypass was introduced into Japan in 1982 and the VBG into Singapore in 1987. (64,65)

With the development of laparoscopic surgery, bariatric surgery has entered the realm of minimally invasive surgery. Laparoscopic VBG (LVBG) was successfully performed in Taiwan in 1998 and emerged as an alternative to the conventional VBG. (66) After the success of laparoscopic adjustable gastric banding (LAGB) in Europe and Australia, Asian countries also started to perform LAGB since 1999, first in Singapore.(13) Further, laparoscopic Roux-en-Y gastric bypass (LRYGBP) was also introduced into Taiwan in 2000(67) and subsequently proven to be a more effective but complicated bariatric operation than LVBG.(68) LRYGBP has also been developed in Japan 2002 and other Asian countries. (69). Laparoscopic Sleeve Gastrectomy was introduced into South Korea in 2002 (70)

Asian Pacific Bariatric Surgery Group (APBSG), which was founded in 2004 and officially changed its name to Asian Pacific Metabolic and Bariatric Surgery Society (APMBSS) in 2008, held a consensus meeting in 2005 and modified the indication for bariatric surgery for Asian.

Consensus in Asia-Pacific 2005 (63)

1. Obese patients with a BMI >37
2. Obese patients with a BMI >32 and the presence of diabetes or two significant obesity-related co-morbidities.
3. Have been unable to lose or maintain weight loss using dietary or medical measures.
4. Age of patient >18 years and <65 years. Under special circumstance and in consultation with a pediatrician, bariatric surgery may be used on children under 18.

Because bariatric surgery currently is the most effective treatment for type 2 diabetes, APBSG not only modified the indications for bariatric surgery but also emphasized its role in diabetic treatment. It was the first bariatric guideline of the world to mention a focus especially on diabetes.

In the national report session at the 2nd congress of the International Federation for Surgery of Obesity and Metabolic Disorders Asian Pacific Chapter (IFSO-APC), which was held in Hokkaido, Japan, in 2011, the representatives of Asian countries reported on their respective

situations. According to the session reports, more than 5,500 cases of bariatric and metabolic surgery were performed in Asia 2010. India had 3000 cases followed by Taiwan (Figure 3).

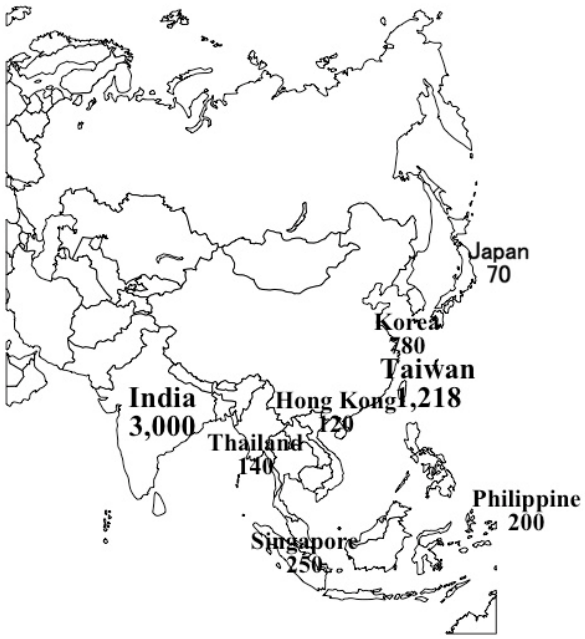


Fig. 3. Bariatric and Metabolic Surgery Cases in 2010 (IFSO-APC 2011 National Report)

Laparoscopic Gastric bypass still formed the majority of the procedures and LSG was rapidly increasing.

A systematic review of bariatric surgery in Asia with citation of 160 papers from Asia was also reported IFSO-APC 2011 by Seki Y, et al. The report summarized as Table3.

		Asian (Seki et al)	All
RYGBP	%EWL	74.8%	61.6% a
	Mortality	0%	0.5% in Open, 0.2% in laparoscopic
LAGB	%EWL	59.1%	45.5% a
	Mortality	0.07%	0.1%
LSG	%EWL	67.9%	55.4% b
	Mortality	0.32%	0.19%

a) Buchwald et al. (n=22094, pre-OP mean BMI 46.9 kg/m2),
b) Brethauer et al. (n=2570, pre-OP mean BMI 51.2 kg/m2)
RYGBP: Roux en Y Gastric Bypass, LAGB: Laparoscopic Adjustable Gastric Banding, LSG: Laparoscopic Sleeve Gastrectomy

Table 3. Systemic review results of bariatric surgery for Asians.

From the current evidence, including 14 studies and 4,257 patients, bariatric surgery for Asians is an effective weight loss procedure although long-term data are limited. The postoperative mortality rates have been acceptably low.

Regarding the anti-diabetic effect of bariatric surgery for Caucasians, LRYGB and LSG showed similar results. (71) But for East Asians, a prospective randomized control study for type 2 diabetes patients by Lee WJ et al.(72) suggested different results. Gastric bypass was far superior to LSG on remission of diabetes and metabolic disorders. Duodenal exclusion would play significant role in remission of type 2 diabetes for East Asian populations. Limitation of remission of diabetes after LSG was also reported (73). Patients with fasting C-peptide over 6ng/ml could have a very good remission of diabetes and patients with c-peptide less than 3ng/ml could only have 14% of remission rate of diabetes after LSG. The problem is that a majority of East Asian diabetes patients are more prone to having a beta cell dysfunction than Caucasians and with fasting C-peptide less than 3 ng/ml (74). These results provide us with data showing that Asians, at least East Asians including Taiwanese, Chinese, South Korean and Japanese, have a higher rate of remission from type 2 diabetes after bypass surgery than with LSG.

4. IFSO-APC consensus statement 2011

According to the ethnicity of Asians, the IFSO-Asian Pacific chapter (APC) consensus statement was established in 2011. Forty four bariatric experts from the Asia Pacific and other regions were chosen to have voting privileges for the IFSO-APC consensus at 2nd IFSO APC congress on 24th February 2011 in Rusutsu, Hokkaido, Japan. All voting delegates represented their respective societies or countries. The IFSO-APC consensus based upon the antecedent statements and guidelines regarding bariatric and metabolic surgery, especially in the Asian Pacific region, including the National Institute of Health (NIH) statements (75), Obesity Surgery Society of India (OSSI), Japan Society for Surgery of Obesity (JSSO), Asian Consensus Meeting on Metabolic Surgery (ACMOMS)(76), Obesity Surgery Society of Australia and New Zealand (OSSANZ), APMBSS(63), Diabetes Surgery Summit (DSS)(77) and Asian Diabetes Surgery Summit (ADSS). Before voting on the consensus, representatives from each society presented their statements or guidelines. These statements and guidelines were used to establish the consensus of the IFSO-APC. A computerized audience-response voting system was used to analyze agreement or disagreement with the wording of the consensus.

"Consensus" was established with the agreement of over 75% of delegates and a "Viewpoint" was recognized with an agreement between 66% and 75%.

Results: Ninety five percent of the delegates agreed with the necessity of establishment of the IFSO-APC consensus statement, and 98% agreed with the necessity of new indicators for Asian patients.

IFSO-APC Consensus statements 2011

- Bariatric surgery should be considered for the treatment of obesity for acceptable Asian candidates with BMI > 35 regardless of the existence of co-morbidities
- **Agree 75% Consensus**

- Bariatric/ GI metabolic surgery should be considered for the treatment of T2DM or metabolic syndrome for patients who are inadequately controlled by lifestyle alternations or medical treatment for acceptable Asian candidates with BMI > 30
- **Agree 76.7% Consensus**
- The surgical approach may be considered as a non-primary alternative to treat inadequately controlled T2DM or metabolic syndrome for suitable Asian candidates with BMI > 27.5.
- **Agree 67.5% Viewpoints**
- Any surgery for T2DM or metabolic syndrome for Asian patients with a BMI < 27.5 should be strictly performed only under clinical study protocols with the informed consent of the patient and prior approval from an ethics committee.
- **Agree 88.1% Consensus**
- Any surgery for T2DM or metabolic syndrome for Asian patients with a **BMI < 27.5** should be strictly performed only under clinical study protocols with the informed consent of the patient and prior approval from the ethics committee.
- **Agree 88.1% Consensus**
- IFSO-APC generally recommends the procedures below for Bariatric and GI metabolic surgery for Asians, currently
- Gastric bypass, Sleeve gastrectomy, Gastric banding, BPD/DS
- **Agree 95.3% Consensus**
- Although novel GI surgical procedures show promising results for Asians other than the four mentioned previously, currently these should be used only in the context of IRB approval.
- **Agree 97.6% Consensus**
- Clinical study should be organized by highly experienced bariatric surgeons, with experience in over **100** cases of bariatric surgery
- **Agree 80% Consensus**

And another three sentences were agreed to by a majority of the voting delegates to form IFSO-APC consensus statements.

Furthermore, an International Diabetes Federation (IDF) position statement in 2011 March (78) also concluded surgery should be considered as an alternative treatment option in Asian patients with a BMI between 27.5 and 32.5 kg/m2 when diabetes cannot be adequately controlled by an optimal medical regimen, especially in the presence of other major cardiovascular disease risk factors.

These results indicate the progress of the Asian region differs from other regions and that it will play significant role in progression of metabolic surgery not only in Asia but also all over the world.

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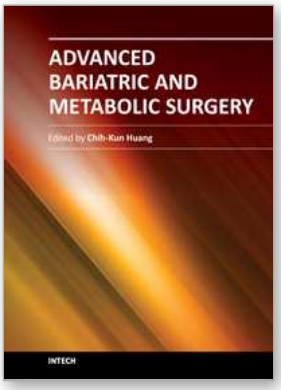

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Bariatric surgery has gained importance in the last 20 years because of the high prevalence of global obesity, and the vast understating of the physiological and pathological aspects of obesity and associated metabolic syndromes. This book has been written by a number of highly outstanding authors and pioneering bariatric surgeons from all over the world. The intended audience for this book includes all medical professionals involved in caring for bariatric patients. The chapters cover the choice of operation, preoperative preparation including psychological aspect, postoperative care and management of complication. It also extends to concept and result of metabolic surgery and scarless bariatric surgery.

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