



Bariatric/Metabolic Surgery in the Asia-Pacific Region: APMBSS 2018 Survey

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Abstract

Introduction The Asia-Pacific Metabolic and Bariatric Surgery Society (APMBSS) held its congress in Tokyo at the end of March, 2018, and representatives from Asia-Pacific countries presented the current status of bariatric/metabolic surgery in the “National Reports” session. The data are summarized here to show the current status and problems in the Asia-Pacific region in 2017.

Methods A questionnaire including data of 2016 and 2017 and consisting of eight general questions was prepared and sent to representatives in 18 Asia-Pacific countries by e-mail before the congress. After the congress, the data were analyzed and summarized.

Results Seventeen of 18 countries responded to the survey. The frequency of obesity (BMI ≥ 30) in the 4 Gulf countries was $> 30\%$, much higher than that in the other countries. In total, 1640 surgeons and 869 institutions were engaging in bariatric/metabolic surgery. In many East and Southeast Asian countries, the indication for bariatric surgery was BMI ≥ 35 or ≥ 37 , whereas in many Gulf countries and Australia, it was BMI ≥ 40 or ≥ 35 with obesity-related disease. Ten of the 17 countries (58.8%) but only one of the 5 Southeast Asian countries (20.0%) had public health insurance coverage for bariatric surgery. In 2017, 95,125 patients underwent bariatric/metabolic surgery, with sleeve gastrectomy accounting for 68.0%, bypass surgery for 19.5%, and others for 12.5%. Current problems included public insurance coverage, training system, national registry, and lack of awareness and comprehension.

Conclusion This summary showed that bariatric/metabolic surgery is rapidly developing along with various problems in Asia-Pacific countries.

Keywords Bariatric/metabolic surgery · Sleeve gastrectomy · Bypass surgery · Indication · Insurance coverage

Introduction

The 2014 International Federation for the Surgery of Obesity and Metabolic Surgery of Obesity and Metabolic Disorders (IFSO) survey showed that the number of bariatric/metabolic surgeries performed in the Asia-Pacific Chapter (APC) was smaller and about 1/3 that of the other three chapters [1]. However, the number had rapidly increased by up to 2.5-fold between 2011 and 2014 [1, 2]. Especially, the increase in the Middle East countries was remarkable due to the burden of obesity, diabetes, and metabolic syndrome [3], and the IFSO-Middle East North Africa Chapter was established in 2017.

On October 6, 2004, the Asian-Pacific Bariatric Surgery Group (APBSG) was organized in Seoul for the promotion

and training of bariatric surgery in the Asia-Pacific region [4]. In 2005, the APBSG held its first Asia-Pacific Bariatric Surgery Conference with a consensus meeting in Taipei. Considering that the onset of obesity-related complications in Asian people occurs at a much lower body mass index (BMI) compared with that in Western people, the indications for bariatric surgery for Asian people were modified in the consensus meeting as follows: (1) obese patients with a BMI ≥ 37 kg/m² and (2) obese patients with a BMI ≥ 32 in the presence of diabetes or two significant obesity-related comorbidities. Afterward, the congress was held annually by the APBSG until 2008. Because the IFSO-APC was organized in 2008, the congress has been held biannually by the APBSG after 2008. In 2010, the APBSG was renamed to

the Asia-Pacific Metabolic and Bariatric Surgery Society (APMBSS).

On March 29–31, 2018, APMBSS 2018 was held in Tokyo, where the current status of bariatric/metabolic surgery in Asia-Pacific countries was presented in the special session called “National Reports.” The data presented at that session are summarized here.

Methods

Questionnaire

A questionnaire and template for the presentation slides were prepared and sent to the representatives in 18 Asia-Pacific countries by e-mail three times before the congress. The 18 countries were Japan, Korea, China, Taiwan, Hong Kong, Philippines, Malaysia, Singapore, Indonesia, Thailand, India, Australia, Kingdom of Saudi Arabia (KSA), Oman, United Arab Emirates (UAE), Qatar, Kuwait, and Turkey. The questionnaire included data of 2016 and 2017 and consisted of the following eight general questions:

- 1) What are the percentages of obese (BMI \geq 30) and diabetes patients in your country?
- 2) When did open and/or laparoscopic bariatric/metabolic surgeries start in your country?
- 3) How many bariatric surgeons and institutions are present in your country?
- 4) What are the indications for bariatric and metabolic surgeries in your country?
- 5) Are bariatric and/or metabolic surgeries covered by public health insurance in your country?
- 6) How many patients received bariatric/metabolic surgery in 2016 and 2017 in your country?
- 7) What percentage did each bariatric/metabolic procedure account for in the total number of procedures performed in your country?
- 8) What are the current problems and future perspective on bariatric/metabolic surgery in your country?

Populations with obesity and with diabetes were quoted from the World Health Organization database in each country except for Taiwan and Hong Kong [5, 6], where the populations were quoted from other databases and documents [7–10]. If the data of 2017 were not available, it was decided that only the data of 2016 would be presented in the program. The procedure categories of bariatric/metabolic surgery were classified to three groups: sleeve gastrectomy (SG), bypass surgery, and others. The category of bypass surgery included Roux-en-Y gastric bypass (RYGB), mini gastric bypass-one anastomosis gastric bypass (MGB-OAGB), SG with

duodenojejunal bypass (SG-DJB), and biliopancreatic diversion/duodenal switch (BPD/DS).

All data were discussed in the session. Each representative signed an agreement to write down this manuscript using the provided slide template. After the congress, data were calculated and summarized. Repeated e-mails were sent to the representatives if there were questions, and the data were revised based on the replies. The order of the countries in the tables and Fig. 1 was arranged according to the subgroups of East Asia, Southeast Asia, South Asia, Oceania, and Western Asia.

Data Analysis

The frequency of bariatric/metabolic procedures in the total population was calculated using the United Nations database [11]. The frequency of bariatric/metabolic procedures in the obese population (BMI \geq 30) was also calculated using the databases of the World Health Organization and United Nations [5, 12].

Results

The representative from Oman could not come to Tokyo due to some trouble just before the congress. Therefore, the remaining 17 representatives presented the current status of bariatric/metabolic surgery in their own countries via a slide presentation, and those data were analyzed and summarized.

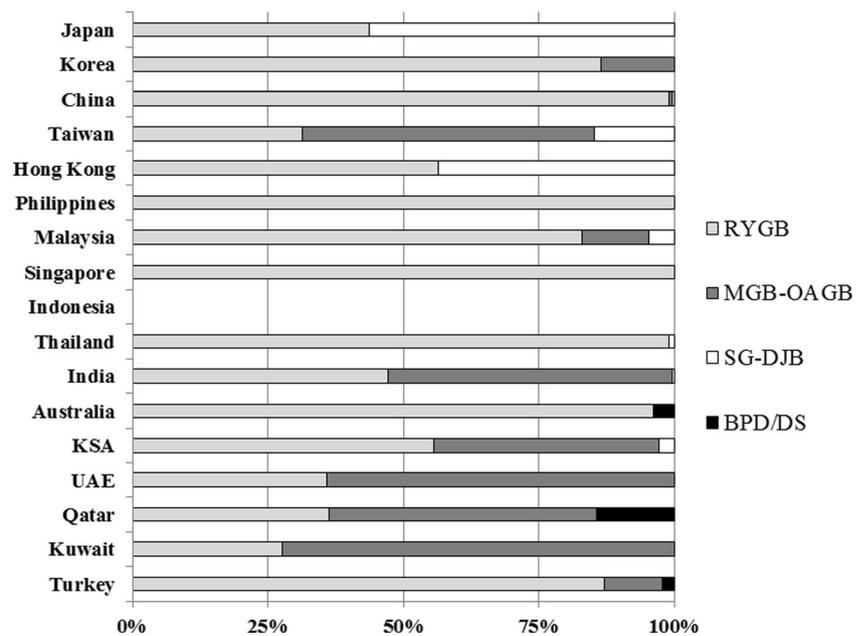
Frequency of Obesity and Diabetes, Start Year of Bariatric/Metabolic Surgery, and Number of Bariatric Surgeons and Institutions

The frequency of obesity (BMI \geq 30) in the Gulf countries was greater than 30% and much higher than that in the other countries (Table 1). However, the frequency of diabetes in those countries ranged from 8.0 to 14.7%, which was only slightly higher than that in the other countries. In contrast, in most of the East, Southeast, and South Asian countries, the frequency of diabetes was higher than the frequency of obesity.

Taiwan and Australia started bariatric/metabolic surgery before 1980, and Japan, China, Singapore, and KSA began it in the 1980s (Table 1). Laparoscopic procedures started in Taiwan, Australia, and KSA in the 1990s, and Japan, China, and India began them in 2000.

In the Asia-Pacific countries including Turkey, 1640 surgeons and 869 institutions overall were engaging in bariatric/metabolic surgery (Table 1). At the time, more than 100 surgeons were working in China, Taiwan, India, Australia, and Turkey, whereas less than 30 surgeons were working in Hong Kong, Singapore, Indonesia, and Qatar.

Fig. 1 Percentages of bypass procedures in the category of bypass surgery in the 17 Asia-Pacific countries. KSA, Kingdom of Saudi Arabia; UAE, United Arab Emirates; RYGB, Roux-en-Y gastric bypass; MGB-OAGB, mini gastric bypass–one anastomosis gastric bypass; SG-DJB, sleeve gastrectomy with duodenojejunal bypass; BPD/DS, biliopancreatic diversion/duodenal switch



Indications and Public Health Insurance Coverage for Bariatric and/or Metabolic Surgeries

In many East and Southeast Asian countries, the indication for bariatric surgery was BMI ≥ 35 or ≥ 37 , and that for metabolic surgery was BMI ≥ 27.5 or ≥ 32 in patients with diabetes or two other obesity-related diseases (Table 2). The indications in India were almost the same. However, in many Gulf countries and Australia, the indication for bariatric surgery was BMI ≥ 40 or ≥ 35 with obesity-related disease, and there was not always an indication defined for metabolic surgery.

Public health insurance coverage for bariatric surgery was in place in 10 of the 17 Asia-Pacific countries (58.8%), whereas only 3 of the 17 countries (17.6%) provided coverage for metabolic surgery (Table 2). Among the 5 East Asian countries, Japan had insurance coverage for bariatric surgery performed by SG, and Taiwan provided partial coverage for bariatric surgery. In the 5 Southeast Asian countries, only Singapore provided insurance coverage for bariatric surgery. In contrast, bariatric surgery was covered by public health insurance in India, Australia, the 4 Gulf countries, and Turkey.

Number of Bariatric/Metabolic Surgeries in 2017 and Percentages of Procedure Categories

Because the data for 2017 were not available in Korea and the UAE, the data for 2016 were used instead (Table 3). In Kuwait, percentages of procedure categories were calculated using 654 patients who underwent surgery in government

hospitals. In total, 95,125 patients underwent bariatric/metabolic surgery in the 17 Asia-Pacific countries (Table 3). In the total population, bariatric/metabolic surgery was performed most frequently in Australia, KSA, UAE, and Kuwait, and, conversely, least frequently in Japan, China, Philippines, and Indonesia. The countries with the highest obese populations were also Australia, KSA, UAE, and Kuwait, whereas those with the lowest obese populations were Japan, Philippines, Indonesia, and Thailand. Comparing the data of 2017 with those of 2016, the numbers decreased only in Hong Kong but increased in all of the other countries. The countries with a greater than 1.4-fold increase in number in 2017 compared with 2016 were Japan, China, Indonesia, and Turkey.

In terms of the percentages of each procedure category, SG accounted for 68.0%, bypass surgery for 19.5%, and others, including revision surgery, for 12.5% (Table 3). SG accounted for more than 50% of the procedures in almost all countries except for Korea. Bypass surgery accounted for more than 30% only in Thailand and India. The percentages of bypass procedures including RYGB, MGB-OAGB, SG-DJB, and BPD/DS in the category of bypass surgery are shown in Fig. 1. In the bypass category, MGB-OAGB was predominant in Taiwan, India, and the Gulf countries, whereas SG-DJB was predominant only in Japan. RYGB was the main procedure among the four bypass procedures in the other countries.

Current Problems and Future Perspective on Bariatric/Metabolic Surgery

Many countries had several problems, which are summarized below. In 13 countries, including the 6 countries that provided

Table 1 Frequency of obese and diabetes patients, start year of bariatric/metabolic surgery, and number of bariatric surgeons and institutions in the 17 Asia-Pacific countries

Country	Frequency		Start year (laparoscopic)	Number	
	BMI \geq 30	Diabetes		Surgeons	Institutes
East Asia			1974 (1998)	562 (34.3%)	324 (37.3%)
Japan	4.3%	10.1%	1982 (2000)	41	36
Korea	4.7%	9.5%	2003 (2003)	87	31
China	6.2%	9.4%	1982 (2000)	300	200
Taiwan	8.2%	11.8%	1974 (1998)	114	47
Hong Kong	3.7%	10.3%	2002 (2002)	20	10
Southeast Asia			1996 (2001)	123 (7.5%)	86 (9.9%)
Philippines	6.4%	5.8%	2001 (2004)	30	20
Malaysia	15.6%	9.8%	1996 (2001)	31	28
Singapore	6.1%	9.1%	1987 (2001)	25	9
Indonesia	6.9%	7.0%	2002 (2002)	7	6
Thailand	10.0%	9.6%	2003 (2005)	30	23
South Asia					
India	3.9%	7.8%	2000 (2000)	341 (20.8%)	37 (4.3%)
Oceania					
Australia	29.0%	7.3%	1962 (1992)	250 (15.2%)	151 (17.4%)
West Asia			1985 (1995)	364 (22.2%)	271 (31.1%)
KSA	35.4%	14.4%	1985 (1995)	70	30
UAE	31.7%	8.0%	2001 (2001)	76	28
Qatar	41.0%	12.8%	2011 (2011)	8	3
Kuwait	38.3%	14.7%	1997 (1999)	60	10
Turkey	27.0%	13.2%	1990 (1995)	150	200
			Total	1640	869

KSA, Kingdom of Saudi Arabia; UAE, United Arab Emirates

public insurance coverage for bariatric surgery, insurance coverage and the medical funding system were cited as problems. The training system and standardization of bariatric/metabolic procedures were also cited in 11 of the 17 countries. Other problems included lack of awareness and comprehension of bariatric/metabolic surgery among physicians and the general public in 7 countries and lack or incompleteness of a national registry in 6 countries. Various other problems were also reported, such as the small number of procedures, guidelines, indications for revision surgery and metabolic surgery, the bariatric society, the number of bariatric surgeons, and the accreditation system for insurance coverage.

Discussion

Sequential IFSO surveys of bariatric/metabolic surgery showed that in the Asia-Pacific region, the numbers of surgeries were 2770 in two countries in 2003; 13,210 in three countries in 2008; 23,296 in 7 countries in 2011; 46,110 in 11 countries in 2013; and 59,744 in 11 countries in 2014 [1, 2, 13–15]. The number of participating countries increased year after year, as did the number of surgeries performed. The main

procedure had been laparoscopic adjustable gastric banding until 2008, but since then, SG has accounted for half or more of the procedures performed in the Asia-Pacific region. The number of bariatric/metabolic surgeries was still quite small compared to that in the North America, Europe, and Latin/South America regions. However, the number in the Asia-Pacific region has been expected to increase more rapidly because the population in this region accounts for more than half of the world's total population.

The APBSG and APMBSS had performed two surveys of bariatric/metabolic surgery until 2017. The first survey was performed in 2004, and 11 Asian countries including Japan, Korea, China, Taiwan, Hong Kong, Philippines, Malaysia, Singapore, Brunei, Thailand, and India participated [4]. At that time, 663 operations were performed annually by 61 bariatric surgeons. Comparing these data from 14 years ago with the data of 2017 in the 10 countries except for Brunei, the number of operative cases has increased by up to 63.1-folds (41,838 cases), and the number of surgeons rose by 16.7-fold (1019 surgeons) in 2017. The second survey was performed in 2010, and 11 Asian countries including Japan, Korea, Taiwan, Hong Kong, Philippines, Malaysia, Singapore, Vietnam, Indonesia, Thailand, and India participated [16]. Over the

Table 2 Indications of bariatric and metabolic surgeries, and public health insurance coverage of bariatric and/or metabolic surgeries

Country	Indication		Public health insurance coverage	
	Bariatric surgery (BMI)	Metabolic surgery (BMI)	Bariatric surgery	Metabolic surgery
East Asia				
Japan	≥ 35	≥ 32 with DM or other two diseases	Covered (only LSG)	Not covered
Korea	≥ 35 or ≥ 30 with disease	≥ 27.5 with DM	Not covered	Not covered
China	≥ 32.5	≥ 27.5 with DM or other two diseases	Not covered*	Not covered*
Taiwan	≥ 37 or ≥ 32 with diseases	≥ 32.5 or ≥ 27.5 with DM or other diseases	Partially covered	Not covered
Hong Kong	≥ 35 or ≥ 30 with two diseases	≥ 27.5 with uncontrolled DM	Not covered	None
Southeast Asia				
Philippines	≥ 37	≥ 32	Not covered	Not covered
Malaysia	≥ 35	≥ 32 with DM or other two diseases	Not covered	Not covered
Singapore	≥ 37.5 or ≥ 32.5 with disease	≥ 27.5	Covered	Not covered
Indonesia	≥ 35	≥ 30 with uncontrolled DM or MS	Not covered	Not covered
Thailand	≥ 35	≥ 32 with DM or other two diseases	Not covered	Not covered
South Asia				
India	≥ 37.5 or ≥ 32.5 with diseases	≥ 27.5	Covered	Not covered
Oceania				
Australia	≥ 40 or ≥ 35 with disease	≥ 30 with disease or bad family history or Asian	Covered**	Covered**
West Asia				
KSA	≥ 40	≥ 35 with DM or other diseases	Covered#	Covered#
UAE	≥ 40 or ≥ 35 with diseases	None	Covered	None
Qatar	≥ 40 or ≥ 35 with disease or ≥ 30 with uncontrolled DM	None	Covered	None
Kuwait	≥ 40	≥ 35 with DM or other diseases or ≥ 30 with severe MS	Covered#	Covered#
Turkey	≥ 35	None	Covered	None

DM, diabetes mellitus; MS, metabolic syndrome; LSG, laparoscopic sleeve gastrectomy

*Covered in some provinces; **Covered in government hospitals and partially covered in private hospitals; #Covered only in government hospitals

5 years from 2005 to 2009, operations for 6598 cases were performed by 155 bariatric surgeons. In 2009, operations for 2091 cases were performed in the 11 countries, and adjustable gastric banding accounted for 35.6%, RYGB for 27.7%, SG for 24.8%, and MGB-OAGB for 6.7%.

This survey clearly showed that bariatric/metabolic surgery is rapidly developing in the Asia-Pacific countries. The number has increased by about 1.4-fold between 2014 and 2017. In addition, SG now accounted for about 70% of the procedures and bypass surgery for about 20%. Because of the higher frequency of obesity in the Gulf countries, the indication was little higher than that in other Asian countries, and these countries may focus on bariatric surgery more than metabolic surgery. Newly discovered is the finding that more than half of the Asia-Pacific countries had public health insurance coverage for bariatric surgery, but only less than 20% had it for metabolic surgery.

Current problems of bariatric/metabolic surgery in the Asia-Pacific region included public insurance coverage and the medical funding system, the training system and procedure

standardization, lack of awareness and comprehension among physicians and the general public, and lack or incompleteness of a national registry. Especially, training was one of the funding aims in the APBSG. Although the APMBSS has not yet established an accredited training program, the society continues to hold international hands-on training workshops for bariatric/metabolic surgery at regular intervals in cooperation with IRCARD-Taiwan and the Thai Society for Metabolic and Bariatric Surgery. In addition, a pre-congress hands-on training workshop has also been held just before every congress of the APMBSS. It is considered that such training is more necessary in the countries that infrequently perform these procedures, as indicated in Table 3. The special session “Education/Training/Fellowship: Collaboration in Asia” at the APMBSS 2018 was also programmed as one of the main topics, and the representatives from Asia-Pacific countries discussed development and the future perspective of the training system.

Bariatric/metabolic surgery has been cost-effective compared to nonsurgical interventions [17, 18], and realization

Table 3 Number and frequency of bariatric/metabolic surgery in 2017 and percentages of procedure categories

Country	Bariatric/metabolic surgery in 2017			Percentages of procedure categories		
	Total	F/TP	F/OP	SG	Bypass surgery	Others
East Asia	12,808 (13.5%)					
Japan	471	0.0004%	0.0103%	89.8%	6.4%	3.8%
Korea	438 (2016)*	0.0009%	0.0225%	43.6%	13.5%	42.9%
China	8850	0.0006%	0.0131%	61.3%	20.8%	17.9%
Taiwan	2834	0.0120%	0.1803%	65.1%	12.2%	22.7%
Hong Kong	215	0.0029%	0.0930%	77.5%	11.2%	11.2%
Southeast Asia	1741 (1.8%)					
Philippines	55	0.00005%	0.0014%	63.6%	16.4%	20.0%
Malaysia	625	0.0020%	0.0188%	67.5%	23.5%	9.0%
Singapore	428	0.0075%	0.1548%	68.2%	25.7%	6.1%
Indonesia	62	0.00002%	0.0005%	98.4%	0%	1.6%
Thailand	571	0.0008%	0.0108%	56.4%	40.5%	3.1%
South Asia						
India	14,543 (15.3%)	0.0011%	0.0436%	55.0%	41.2%	3.8%
Oceania						
Australia	24,237 (25.5%)	0.0991%	0.4492%	65.9%	10.4%	23.7%
West Asia	41,796 (43.9%)					
KSA	17,000	0.0516%	0.2147%	72.4%	21.2%	6.4%
UAE	6342 (2016)*	0.0675%	0.2586%	70.0%	20.6%	9.4%
Qatar	1454	0.0551%	0.1649%	79.9%	16.6%	3.5%
Kuwait	5000	0.1209%	0.4241%	82.4%#	12.2%#	5.3%#
Turkey	12,000	0.0149%	0.0814%	82.5%	9.3%	8.3%
Total	95,125	0.0027%	0.0571%	68.0%	19.5%	12.5%

F/TP, frequency in total population; *F/OP*, frequency in obese population; *SG*, sleeve gastrectomy

*In Korea and UAE, the data of 2017 were not available, and the data of 2016 were used

In Kuwait, percentages of procedure categories were calculated using 654 patients who received operation in the government hospitals

of public insurance coverage for bariatric/metabolic surgery seems to be associated with clarification of this cost-effectiveness. Evidence of the cost-effectiveness of bariatric/metabolic surgery has been shown in Korea, China, and Australia [19–21], but there has been little evidence of this in the other countries. Although it was unknown whether such evidence was an influential factor, the representative from Korea announced at the APMBSS 2018 that bariatric surgery will be covered by public health insurance from November 2018.

Lack of awareness and comprehension in physicians and the general public remains problematic in the Asia-Pacific countries. The situation seems to be related to culture and/or religion. Much evidence of the safety and effectiveness of bariatric/metabolic surgery has been published worldwide, and new guidelines from the 2nd Diabetes Surgery Summit have also been announced [22]. However, physicians and the general public have not always been aware of this evidence until now. A survey of current practices for counseling by healthcare professionals in the USA found that obstetrics-gynecological physicians and nurse practitioners are more

averse to recommending bariatric surgery than are primary care physicians [23]. A survey of the knowledge of Polish medical students showed a low level of knowledge on the possibility of applying bariatric/metabolic surgery to treat morbid obesity [24]. A recent manuscript on a survey of current knowledge among doctors in a suburban area of Greece also showed that although half of the participants knew the definition of morbid obesity, less than 10% learned to perform bariatric surgery and less than 25% knew of the existence of a bariatric center in the area [25]. In addition, only about 20% of the doctors had referred patients to the bariatric center, with the main reasons for non-referral being lack of interest, patient refusal, expensive operation fee, and lack of confidence. Therefore, although it is not easy to promote educational activities among physicians and the general public, we nevertheless must continue to promote them positively.

In this study, the frequency of diabetes was higher than the frequency of obesity in most of the East, Southeast, and South Asian countries. These Asian people are known to have a higher percentage of body fat for a given weight and are

predisposed to abdominal fat adiposity [26]. The accumulation of visceral fat occurs at lower BMI and results in the early onset of obesity-related comorbidities including diabetes [27–29].

The weaknesses of this survey included incomplete data and data that were not updated because several countries did not have registries. The situations in bariatric/metabolic surgery were different between the Asian-Pacific countries due to different races, cultures, religions, health systems, and comprehension. However, this study clearly showed that bariatric/metabolic surgery is rapidly developing along with various associated problems in the Asia-Pacific countries. The APMBSS remains dedicated to the goals of the promotion of and training for bariatric/metabolic surgery in the Asia-Pacific region and also hopes to celebrate with the IFSO-APC.

In conclusion, bariatric/metabolic surgery is rapidly developing in Asia-Pacific countries along with various problems that remain to be solved.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Standard of Informed Consent This is a survey in which there is no direct involvement with human subjects; it is limited to an analysis of population and bariatric/metabolic procedures in the Asia-Pacific region.

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