Bariatric Surgery Worldwide: Overview and Results

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16.1 Introduction

Bariatric surgery is actually considered the only therapeutic option in patients with morbid obesity affected by life-threatening comorbidities. A wide range of surgical options are offered. At this time, predictive factors influencing the final results are not clearly stated [1–3]. The standardization of some surgical techniques is a work in progress evolving with local specificities and according to the experience of surgical staff in each country. For these reasons, Buchwald suggests a periodic assessment of the state of metabolic/bariatric surgery to understand its role and its scope as a treatment modality [4]. The information obtained from the survey is important for several professional figures as well as for patients. The results are also valuable for other players and fields, as public health-care providers, budget impact, decision root analysis, government, and insurance companies. Finally, these data can be pertinent for all the people enrolled in the field of obesity and metabolic syndrome.

In 1998, Scopinaro published the first worldwide survey of metabolic/bariatric surgery [5]. In 2004 [6] and again in 2009 [7], and 2013 [4], Buchwald published follow-up reports for 2003, 2009, and 2011, respectively. Data were collected from the experiences of scientific societies and study group orbiting around the International Federation for the Surgery of Obesity and metabolic disorders (IFSO). In this chapter, we report an interim, preliminary survey with slight item modifications compared to the cited previous reports.

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Table 16.1 Questionnaire

Society/country: _____

Number and type of procedures performed in your country in 2012		
Procedures	**Number of patients**	
	Laparoscopy	**Laparotomy**
Adjustable gastric banding		
Roux-en-Y gastric bypass		
Sleeve gastrectomy		
Standard biliopancreatic diversion (Scopinaro)		
Duodenal switch diversion		
Gastric plication		
Mini gastric bypass		
Vertical banded gastroplasty		
Other procedure not listed above (please specify):		
Total		

Note: Revisions are to be considered and countedas aprimary procedure, (I.e., a lap band converted to bypass is counted as a bypass)

Number of centers	
Number of centers < 50 operations	
Number of centers 50–100 operations	
Number of centers >100 operations	
Total number of centres	

16.2 Methods

16.2.1 Survey

A simple questionnaire (Table 16.1) regarding data of 2012 was emailed to all members of bariatric societies belonging to the International Federation for the Surgery of Obesity and metabolic disorders (IFSO). If this first contact and request was left without answer, further reminders through email, telephone calls, and personal contacts were made.

16.2.2 Data Analysis

Data were collected in an MS Excel sheet and presented as mean or percentage in tables or figures. Data have been compared with similar presentations from previous Buchwald and Scopinaro papers [4–7]. The results do not intend to give detailed and exhaustive information about the worldwide diffusion of bariatric surgery, but only to refer about a trend or a suggestion or prevalence.

16.3 Results

16.3.1 Response Rate

Data collection at time is a work in progress. From the 53 national bariatric societies or groups contacted, there were 26 (47.16 %) responders. The experience of a single nation is allocated according to the bariatric procedure and listed in Tables 16.2, 16.3 and 16.4 for laparoscopy, laparotomy, or both procedures, respectively.

The largest number of bariatric procedures according to this survey is performed in the USA/Canada (121,051), followed by Brazil (70,000), France (37,928), and Australia/New Zealand (12,000). No other nation performed 10,000 or more operations. As regards the numbers of operations performed expressed as a percentage of the national population, no country reached 1 % with a trend comparing to 2011 [4].

16.3.2 Procedures Performed

The number of a specific metabolic/bariatric surgery procedure for each responder nation or national group is reported in Table 16.5, with the rate of laparotomic procedure. The most commonly performed procedure was Roux-en-Y gastric bypass (RYGB), 51.4 %, followed by gastric band (21.5 %), sleeve gastrectomy (20.1 %), and biliopancreatic diversion/DS (1.7 %).

16.3.3 Trends

Trend analyses from 2003 to 2008 to 2011 to 2012 are based on the current results and previously published data [3–6]. Current 2012 data collection is still a work in progress. The trends in percentage of RYGB, AGB, SG, and BPD diversion from 2003 to 2008 to 2012 worldwide are presented in Figs. 16.1 and 16.2. Data were compared to already published survey [4]. RYGB decreased from 2003 (65.1 %) to 2008 (49.0 %) and 2011 (46.6 %) with a rise in 2012 (51.4 %). LAGB peaked in 2008 (42.3 %), in 2011 fell to 17.8 %, and it rose to 21.5 % in 2012. Sleeve gastrectomy showed a marked rise over the three time intervals: 0 to 5.3 to 27.8 % until 2011, but fell to 20.1 % in 2012. A slow decrease was observed in BPD/DS: 4.8 to 2.0 to 2.2 to 1.7 %.

Table 16.2 Number of laparotomic and laparoscopic bariatric operations performed according to the kind of procedure from societies or groups responding to the questionnaire

	AGB	RYGB	SG	BPD	DS	GP	Mini GB	VBG	Other	*Total*
Austria	220	1,370	656	27	0	0	68	0	12	2,353
Australia/New Zealand	8,000	420	3,000	0	0	0	0	0	0	11,420
Belgium	994	5,888	1,780	0	0	0	100	0	0	8,762
Bolivia	0	63	153	0	0	73	44	0	9	342
Brazil	100	54,650	9,250	2,000	3,000	0	1,000	0	0	70,000
Chile	0	3	33	0	0	2	0	0	0	38
Czech Rep.	420	120	150	50	0	550	0	0	0	1,290
France	8,058	11,547	18,222	101	0	0	0	0	0	37,928
Germany	222	2,515	2,200	9	3	13	57	0	194	5,213
Guatemala	15	50	76	0	5	18	0	0	0	164
Italy	2,556	1,593	2,383	231	15	203	348	0	0	7,329
Japan	12	28	104	0	1	0	0	0	35	180
Lithuania	109	176	4	0	0	21	0	0	0	310
Philippines	153	29	50	0	0	0	0	0	0	232
Russia	299	179	429	11	53	9	0	0	22	1,002
Singapore	60	41	160	2	0	0	20	0	0	283
Slovenia	16	95	14	0	0	21	15	5	1	167
South Africa	35	358	43	0	62	0	0	0	6	504
Spain	47	1,302	1,029	323	74	40	178	0	67	3,060
Sweden	11	7,492	201	0	52	29	0	0	44	7,829
Switzerland	87	2,727	366	11	15	0	0	0	28	3,234
Taiwan	45	350	879	0	0	22	120	0	424	1,840
UK	2,274	3,816	587	0	14	0	0	0	285	6,976
Ukraine	9	53	22	21	28	0	0	0	20	153
USA/Canada	38,615	50,824	10,260	42	904	0	9	122	1,275	102,051
Total	62,357	145,689	52,051	2,828	4,226	1,001	1,959	127	2,422	272,660

Table 16.3 Number of laparotomic bariatric operations performed according to the kind of procedure from societies or groups responding to the questionnaire

	AGB	RYGB	SG	BPD	DS	GP	Mini GB	VBG	Other	*Total*
Austria	220	1,350	650	20	0	0	68	0	12	2,320
Australia/New Zealand	8,000	420	3,000	0	0	0	0	0	0	11,420
Belgium	994	5,888	1,780	0	0	0	100	0	0	8,762
Bolivia	0	20	95	0	0	58	0	0	9	182
Brazil	100	42,650	8,250	1,000	2,000	0	1,000	0	0	55,000
Chile	0	3	33	0	0	2	0	0	0	38
Czech Rep.	410	120	150	0	0	550	0	0	0	1,230
France	0	11,214	18,222	80	0	0	0	0	7,920	37,436
Germany	222	2,515	2,200	9	3	13	57	0	194	5,213
Guatemala	15	43	65	0	5	18	0	0	0	146
Italy	2,556	1,515	2,372	143	14	203	347	0	0	7,150
Japan	12	25	103	0	1	0	0	0	35	176
Lithuania	109	176	4	0	0	21	0	0	0	310
Philippines	153	29	50	0	0	0	0	0	0	232
Russia	298	136	403	0	2	9	0	0	18	866
Singapore	60	41	160	2	0	0	20	0	0	283
Slovenia	16	95	14	0	0	21	15	5	1	167
South Africa	34	345	41	0	53	0	0	0	0	473
Spain	47	1,302	1,029	323	74	40	178	0	67	3,060
Sweden	11	7,319	199	0	4	29	0	0	34	7,596
Switzerland	87	2,580	315	6	10	0	0	0	28	3,026
Taiwan	45	348	879	0	0	22	120	0	424	1,838
UK	2,274	3,502	580	0	10	0	0	0	285	6,651
Ukraine	9	48	11	0	0	0	0	0	0	68
USA/Canada	38,575	48,067	10,190	28	618	0	8	105	1,177	98,768
	54,247	129,751	50,795	1,611	2,794	986	1,913	110	10,204	252,411

Table 16.4 Number of laparotomic bariatric operations performed according to the kind of procedure from societies or groups responding to the questionnaire

	AGB	RYGB	SG	BPD	DS	GP	Mini GB	VBG	Other	*Total*
Austria	0	20	6	7	0	0	0	0	0	33
Australia/New Zealand	0	0	0	0	0	0	0	0	0	11,420
Belgium	0	0	0	0	0	0	0	0	0	0
Bolivia	0	43	58	0	0	15	44	0	0	160
Brazil	0	12,000	1,000	1,000	1,000	0	0	0	0	15,000
Chile	0	0	0	0	0	0	0	0	0	0
Czech Rep.	10	0	0	50	0	0	0	0	0	60
France	0	333	0	21	0	0	0	0	138	492
Germany	0	0	0	0	0	0	0	0	0	0
Guatemala	0	7	11	0	0	0	0	0	0	18
Italy	0	78	11	88	1	0	1	0	0	179
Japan	0	3	1	0	0	0	0	0	0	4
Lithuania	0	0	0	0	0	0	0	0	0	0
Philippines	0	0	0	0	0	0	0	0	0	0
Russia	1	43	26	11	51	0	0	0	4	136
Singapore	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0
South Africa	1	13	2	0	9	0	0	0	6	31
Spain	0	0	0	0	0	0	0	0	0	0
Sweden	0	173	2	0	48	0	0	0	10	233
Switzerland	0	147	51	5	5	0	0	0	0	208
Taiwan	0	2	0	0	0	0	0	0	0	2
UK	0	314	7	0	4	0	0	0	0	325
Ukraine	0	5	11	21	28	0	0	0	20	85
USA/Canada	40	2,757	70	14	286	0	1	17	98	3,283
	52	15,938	1,256	1,217	1,432	15	46	17	276	31,669

Table 16.5 Worldwide percentage distribution of the most performed bariatric procedures

Bariatric procedure	Number in 2012	%	% of laparotomic procedures
Roux-n-Y gastric bypass	129,751	51.4	10.9
Adjustable gastric banding	54,247	21.5	0.08
Sleeve gastrectomy	50,795	20.1	2.4
Biliopancreatic diversion/DS	4,405	1.7	39.2
Mini gastric bypass	1,913	0.7	2.3
Pacing	986	0.4	1.5
Vertical banded gastroplasty	110	0.04	13.4
Others	10,204	4.0	11.4
Total	252,411		11.6

The regional trend in Europe in the number of procedures is reported in Fig. 16.2. The percentage of AGB falls from 63.7 to 17.8 %, intersecting the rise of sleeve gastrectomy from 0.0 to 27.8 %. The RYGB rose from 11.1 to 39.0 % between 2003 and 2005 and then to 43.5 % in 2011.

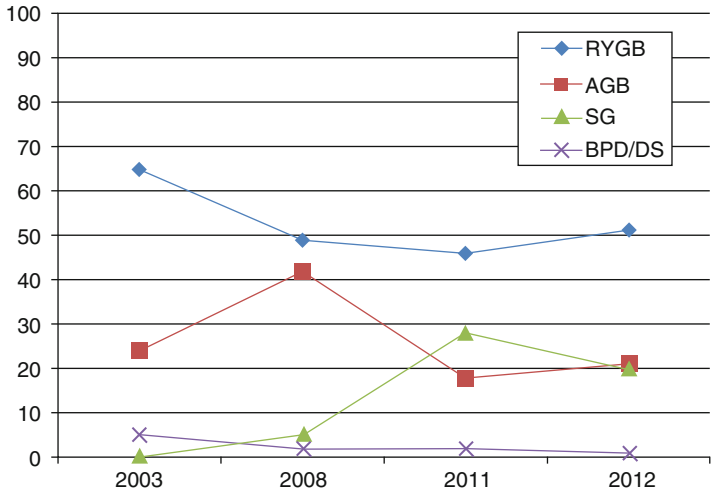

Fig. 16.1 Worldwide percentage trend of the most performed bariatric procedures

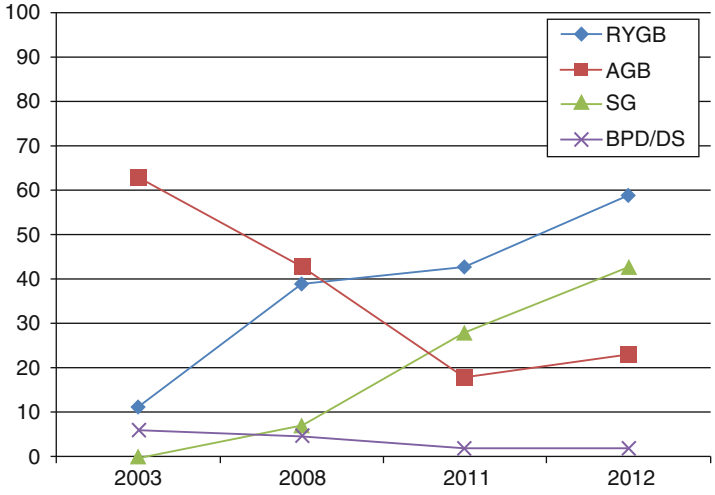

Fig. 16.2 European percentage trend of the most performed bariatric procedures

The regional trend in USA/Canada in the number of procedures is reported in Fig. 16.3. There was a marked decrease in RYGB from 2003 (85.0 %) to 2008 (51.0 %), with a plateau in 2001 (47.0 %). Over these three time intervals, AGB rose from 9.0 to 44.0 % and then fell to 27.2 %. The percentage of SG procedures steadily rose: 0.0 to 4.0 to 19.2 % as observed in Europe.

This survey confirms the observation of Buchwald and Olen that indicates that there has been no significant change in the number of bariatric procedures over the past 3–4 years, with a plateau of about 272,660 operations performed in 26 of the 53 IFSO national bariatric groups or societies in 2012 [4].

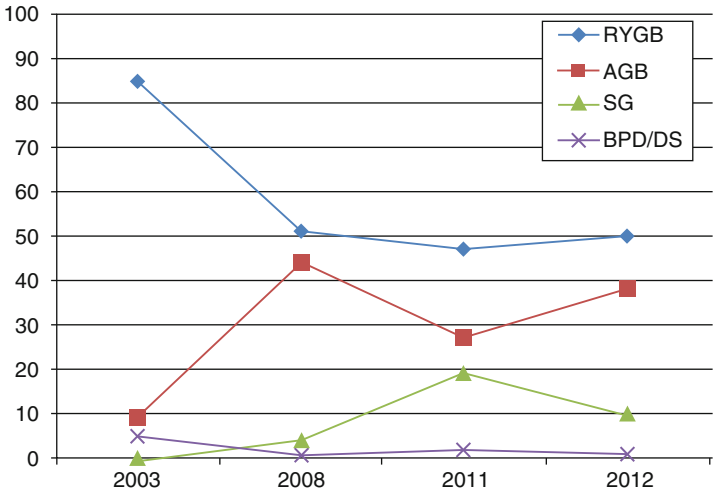

Fig. 16.3 USA/Canada percentage trend of the most performed bariatric procedures

Over the past years the Laparoscopic Adjustable Gastric Banding has a little decrease due to the concomitant diffusion of sleeve gastrectomy as individual bariatric procedure not followed by the duodenal switch. The diffusion of laparoscopic Roux-en-Y gastric bypass is slightly increased.

If we consider the different areas of bariatric diffusion, the reported observation is reliable worldwide, confirming the observations of Buchwald: the pattern is repeated with respect to AGB and SG in the four regions of IFSO – Europe, USA/Canada, Latin/South America, and Asia - Pacific. For RYGB, Europe increased, USA/Canada markedly decreased, Latin/South America markedly increased, and Asia - Pacific stayed constant and extremely low [4].

Some hypotheses, or rather speculations, can be drawn from the shifting percentages of the type of procedure being performed. Over time, a given operation's weight-loss efficacy decreases and long-term complications increase. The drop in LASGB in Europe, with the longest history of LASGB in the world, and the decrease in LRYGB in the USA/Canada bariatric centers, with the longest history of LRYGB in the world, is predictable. It could be explained with the overall number of operations essentially constant, a reduction in the number of a given operation must be balanced by an increase in the number of another. Worldwide, this increase has occurred in the number of sleeve gastrectomy performed, which rose from 0.0 % 8 years ago to over 25 % today.

Another factor in the global popularity of sleeve gastrectomy may be faddism; surgeons and patients are not exempt from gravitating toward the latest innovation, even in their choice of a surgical operation [4].

A reason rarely discussed in the choice of operations is the skill of the surgeon. The numbers of BPD/DS remain extremely low (<3 %) worldwide, even though this procedure has the best statistics for excess weight loss, lasting effect, and reversal

of comorbidities [4]. BPD/DS procedures are difficult to perform, possibly causing less experienced bariatric surgeons to avoid offering this operation to their patients. Further, BPD are time-consuming, and, in a climate of emphasis on speed, performing these procedures decreases the number of operations a surgeon can complete in a day and, thereby, the income the surgeon and the hospital can derive. Another reason that can influence the diffusion of different procedure is the cost/benefit rate and the third payer. In many countries the bariatric surgery is offered by the national sanitary system, while in other countries the costs are totally at charge of the patient.

This survey is a systematic attempt to provide and correlate global bariatric surgery data. The estimates given of numbers and trends for 2012 presented here are the best available today. The weaknesses of this survey are that not all nations performing bariatric surgery belong to IFSO and that the response rate was < 50 %. The number provided is the best estimates, and the estimation methods and the estimators, particularly in certain countries, have changed over the years.

The World Health Organization calculates that there are 500 million obese people in the world, representing 10 % of the population [8]. More than one-third of adults in the USA and other Western countries are obese (Body Mass Index >30 kg/m^2), and this trend is increasing in young population [9]. Bariatric surgery plays a very limited role in the management of this globesity reaching less than 1 % of obese individuals. Moreover the metabolic/bariatric surgery was a start-up for a vast clinical and laboratory study for the normal and pathologic neurohormonal digestive mechanisms, underlying abnormalities of certain metabolic diseases as type 2 diabetes. Indeed, by understanding the metabolic basis of obesity, it should be possible to understand and, thereby, successfully manage this disease without metabolic/bariatric surgery.

In conclusion, metabolic/bariatric surgery surveys are helpful and should be periodically, if not annually, performed to further our knowledge on what is happening in this, and the direction in which it is proceeding.

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References

1. Wykowski K, Krouse HJ (2013) Self-care predictors for success post-bariatric surgery: a literature review. Gastroenterol Nurs 36:129–135
2. Angrisani L, Di Lorenzo N, Favretti F, Furbetta F, and the Italian Group for Lap Band (GILB) (2004) Predictive value of initial body mass index for weight loss after 5 years of follow up. Surg Endosc 18:1524–1527
3. Adams ST, Salhab M, Hussain ZI, Miller GV, Leveson SH (2013) Roux-en-Y gastric bypass for morbid obesity: what are the preoperative predictors of weight loss? Postgrad Med J 89: 411–416
4. Buckwald H, Oien DM (2013) Metabolic/bariatric surgery worldwide 2011. Obes Surg 23:427–436
5. Scopinaro N (1998) The IFSO and obesity surgery throughout the world. Obes Surg 8:3–8
6. Buckwald H, Williams SE (2004) Bariatric surgery worldwide 2003. Obes Surg 14:1157–1164

7. Buchwald H, Oien M (2009) Metabolic/bariatric surgery worldwide 2008. Obes Surg 19:1605–1611
8. WHO (2000) Obesity: preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser 894:i–xii, 1–253
9. Centers for Disease Control and Prevention (CDC) (2013) Obesity prevalence among low-income, preschool-aged children – New York City and Los Angeles County, 2003–2011. MMWR Morb Mortal Wkly Rep 62:17–22