



Patient Selection in One Anastomosis/Mini Gastric Bypass—an Expert Modified Delphi Consensus

Mohammad Kermansaravi¹ · Chetan Parmar² · Sonja Chiappetta³ · Shahab Shahabi¹ · Alaa Abbass⁴ · Syed Imran Abbas⁵ · Mohamed Abouzeid⁴ · Luciano Antozzi⁶ · Syed Tanseer Asghar⁷ · Ahmad Bashir⁸ · Mohit Bhandari⁹ · Helmuth Billy¹⁰ · Daniel Caina¹¹ · Francisco J. Campos¹² · Miguel-A. Carbajo¹³ · Jean Marc Chevallier¹⁴ · Amir Hossein Davarpanah Jazi¹ · Amador Garcia Ruiz de Gordejuela¹⁵ · Ashraf Haddad⁸ · Mohamad Hayssam ElFawal¹⁶ · Jacques Himpens¹⁷ · Aatif Inam¹⁸ · Radwan Kassir¹⁹ · Kazunori Kasama²⁰ · Amir Khan²¹ · Lilian Kow²² · Kuldeepak Singh Kular²³ · Muffazal Lakdawala²⁴ · Laurent abram Layani²⁵ · Wei-Jei Lee²⁶ · Enrique Luque-de-León²⁷ · Ken Loi²⁸ · Kamal Mahawar²⁹ · Tarek Mahdy³⁰ · Mario Musella³¹ · Abdelrahman Nimeri³² · Juan Carlos Olivares González³³ · Abdolreza Pazouki¹ · Tigran Poghosyan³⁴ · Gerhard Prager³⁵ · Arun Prasad³⁶ · Almino C. Ramos³⁷ · Karl Rheinwalt³⁸ · Rui Ribeiro³⁹ · Elena Ruiz-Úcar⁴⁰ · Robert Rutledge⁴¹ · Asim Shabbir⁴² · Scott Shikora⁴³ · Rishi Singhal⁴⁴ · Osama Taha⁴⁵ · Mohammad Talebpour⁴⁶ · Jose Sergio Verboonen⁴⁷ · Cunchuan Wang⁴⁸ · Rudolf Weiner⁴⁹ · Wah Yang⁴⁸ · Ramon Vilallonga⁵⁰ · Maurizio De Luca⁵¹

Received: 23 November 2021 / Revised: 20 May 2022 / Accepted: 25 May 2022

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Abstract

Purpose One anastomosis/mini gastric bypass (OAGB/MGB) is up to date the third most performed obesity and metabolic procedure worldwide, which recently has been endorsed by ASMBS. The main criticisms are the risk of bile reflux, esophageal cancer, and malnutrition. Although IFSO has recognized this procedure, guidance is needed regarding selection criteria. To give clinicians a daily support in performing the right patient selection in OAGB/MGB, the aim of this paper is to generate clinical guidelines based on an expert modified Delphi consensus.

Methods A committee of 57 recognized bariatric surgeons from 24 countries created 69 statements. Modified Delphi consensus voting was performed in two rounds. An agreement/disagreement among $\geq 70.0\%$ of the experts was considered to indicate a consensus.

Results Consensus was achieved for 56 statements. Remarkably, $\geq 90.0\%$ of the experts felt that OAGB/MGB is an acceptable and suitable option “in patients with Body mass index (BMI) > 70 , BMI > 60 , BMI > 50 kg/m² as a one-stage procedure,” “as the second stage of a two-stage bariatric surgery after Sleeve Gastrectomy for BMI > 50 kg/m² (instead of BPD/DS),” and “in patients with weight regain after restrictive procedures. No consensus was reached on the statement that OAGB/MGB is a suitable option in case of resistant *Helicobacter pylori*. This is likely as there is a concern that this procedure is associated with reflux and its related long-term complications including risk of cancer in the esophagus or stomach. Also no consensus reached on OAGB/MGB as conversional surgery in patients with GERD after restrictive procedures. Consensus for disagreement was predominantly achieved “in case of intestinal metaplasia of the stomach” (74.55%), “in patients with severe Gastro Esophageal Reflux Disease (GERD)(C,D)” (75.44%), “in patients with Barrett’s metaplasia” (89.29%), and “in documented insulinoma” (89.47%).

Key Points

- OAGB/MGB is a suitable option in elderly patients.
- OAGB/MGB is a suitable option for patients with low BMI (30–35 kg/m²) with associated metabolic problems.
- OAGB/MGB is a suitable option in patients with BMIs more than 50 kg/m² as one-stage procedure. OAGB/MGB can be a suitable procedure in patients with large/giant hiatal hernia with concurrent hiatal hernia repair.

Extended author information available on the last page of the article

Conclusion Patient selection in OAGB/MGB is still a point of discussion among experts. There was consensus that OAGB/MGB is a suitable option in elderly patients, patients with low BMI (30–35 kg/m²) with associated metabolic problems, and patients with BMIs more than 50 kg/m² as one-stage procedure. OAGB/MGB can also be a safe procedure in vegetarian and vegan patients. Although OAGB/MGB can be a suitable procedure in patients with large hiatal hernia with concurrent hiatal hernia, it should not be offered to patients with grade C or D esophagitis or Barrett's metaplasia.

Keywords OAGB/MGB · Patient selection · Metabolic surgery · Bariatric surgery

Introduction

One anastomosis/mini gastric bypass (OAGB/MGB) is the third most preformed primary bariatric and metabolic procedure worldwide and the numbers are rising [1]. Furthermore, OAGB/MGB is approved as a valuable revisional bariatric surgery in non-responders after restrictive procedures [2].

First experiences with OAGB/MGB were published 20 years ago [3]. One of the most important criticisms regarding OAGB/MGB was given by the YOMEGA trial published in 2019 [4]. Maud et al. concluded that OAGB/MGB was not inferior to RYGB regarding weight loss and metabolic improvement, but underlined the high incidences of diarrhea, steatorrhea, and nutritional adverse events. Furthermore, bariatric surgeons not currently performing OAGB/MGB expressed concerns that it will lead to an increased risk of gastric and esophageal cancers and that the OAGB/MGB is not recommended for patients with severe GERD or large hiatus hernia [5]. Even more, they declared that OAGB/MGB carried a higher early (30-day) and late mortality, respectively, in comparison with the RYGB [6]. On the other hand, the long-term risk of bile reflux-related adenocarcinoma of the esophagus appears to be small based on the current literature [7], although the study of Genco et al. showed that the prevalence of biliary-type reflux into the esophagus was highest in patients who underwent sleeve gastrectomy compared to OAGB/MGB [8].

Advantages such as technical simplicity, shorter learning curve, ease of revision and reversal, non-inferior weight loss, and associated medical problem resolution outcomes have prompted some surgeons to advocate a wider adoption of this procedure [5] and today it is the third most performed bariatric procedure worldwide [1]. Even more, it seems that perioperative morbidity is less in OAGB/MGB in patients with Edmonton Obesity Staging System 2 that means in patients with obesity and metabolic syndrome not having an end-stage disease [9].

Although the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) MGB/OAGB task force recognized OAGB as a bariatric/metabolic procedure [10] and recently this procedure has been endorsed by the American Society for Metabolic & Bariatric Surgery (ASMBS), non-consensus topics regarding the procedure,

patient selection, and intraoperative and postoperative factors exist [11].

Special clinical conditions of patients might be challenging in procedure selection, especially because evidence-based surgery is difficult to provide in certain clinical situations and long-term data is missing. In the clinical setting, patient selection remains our daily work, and if long-term data is missing, it is often difficult to take a proofed decision.

Therefore, the aim of this paper is to generate clinical guidelines based on an expert modified Delphi consensus regarding patient selection in OAGB/MGB, to give clinicians a tool that might help in the daily clinical practice.

Methods

A Delphi consensus building committee including 57 well-known metabolic and bariatric surgeons from 24 countries who generally perform OAGB participated in the study (Appendix 1). Some of the experts who were not performing OAGB/MGB routinely, but were performing other bariatric procedures, were asked to share their experiences without any conflict of interest to minimize the risk of bias for appropriate selection of patients for OAGB/MGB. Consensus statements among experts can help to reach recommendations in some clinical debates that there is no strong evidenced-based findings [12]. The Delphi consensus is an acceptable method for developing consensus among recognized experts [13] that can reach to statements through multiple rounds of voting to well-designed questionnaires.

This consensus building committee members included recognized leaders and presidents of the IFSO, IFSO-chapters or IFSO member societies, both introducer of MGB and OAGB, and recognized academic/private experts surgeons and opinion makers in OAGB/MGB according to their previous surgical practice. The first brainstorm about controversies of patient selection in OAGB/MGB was done in GLR international group and then was progressed with inviting more well-known experts. A WhatsApp group including all invited experts was created to discuss and have all the committee members' opinions to construct statements before voting. After almost 2 weeks, online active discussions among experts around six main axes of patient selection in OAGB/MGB included demographic characteristics, obesity-associated

medical problems, unrelated medical problems, OAGB/MGB in patients needing long-term medications, OAGB/MGB after previous gastrointestinal (GI) surgeries, and OAGB/MGB as conversional procedure. All suggested statements were collected and finally selected by the core scientific committee and put to the first round of voting (Appendix 2).

Finally, the committee established 69 statements in six sections to be discussed in two rounds of voting using the modified Delphi consensus method performed using Survey Monkey (<https://www.surveymonkey.com/r/OAGB-MGB>).

The first round of consensus building's link was sent out on the 22nd of May 2021 and was open till the 27th of October 2021. All committee members voted on all 69 statements with only agree or disagree choices and an agreement/disagreement $\geq 70.0\%$ was regarded as consensus.

The results of the first round were announced to all committee members and the items that were not reached by consensus were shared in the WhatsApp group and discussions were held before the second round voting. These statements mainly included items about which there was no strong evidence in the published studies or the available evidence was insufficient and sometimes contradictory. The committee members were invited to vote in second round of votes from experts on 31 statements with $< 70.0\%$ consensus after the first round. These 31 non-consensus results (percentages of agreement/disagreement) of the first round's votes were shared with committee members during the second round of consensus building which was started on 29 October 2021 and was finished on 6 November 2021.

Results

A total of 57 experts from 24 countries voted on the 69 statements proposed by the consensus building committee. Tables 1, 2, and 3 summarize the detailed results of first and second round's votes on each of the 69 statements. A consensus of $> 70\%$ was reached for 38 statements after the first round.

The non-achieved 31 statements were voted again in second round and finally experts reached consensus in 56 out of 69 statements after two rounds of modified Delphi consensus method (Tables 1, 2, and 3).

Remarkably, $\geq 90.0\%$ of the experts felt that OAGB/MGB is an acceptable and suitable option "in patients with BMI $> 70 \text{ kg/m}^2$, BMI $> 60 \text{ kg/m}^2$, BMI $> 50 \text{ kg/m}^2$ as a one-stage procedure," "as the second stage of a two-stage bariatric surgery after SG for BMI $> 50 \text{ kg/m}^2$ (instead of BPD/DS)," "in patients with weight regain after restrictive procedures," "in patients with previous gastric balloon," and "in patients with gallstones." Consensus for disagreement was achieved regarding that OAGB/MGB is a suitable option in "children (6–13 years)" (77.19%), "in patients who decide

to be pregnant soon (less than 12–18 months)" (73.68%), "in case of intestinal metaplasia of the stomach" (74.55%), "in patients with severe Gastro Esophageal Reflux Disease (GERD) (C,D)" (75.44%), "in patients with Barrett's metaplasia" (89.29%), "in documented insulinoma" (89.47%), "in patients with documented iron deficiency anemia" (70.18%), "in patients with Cirrhosis Child B" (70.91%), "in patients with gastric ulcers or duodenal ulcers" (72.22%), "to manage patients with leak of sleeve gastrectomy" (77.19%), and "for weight regain after Roux-en Y gastric bypass" (73.68%).

No consensus was achieved for 13 statements in which details are shown in Tables 1, 2, and 3.

Discussion

After concluding the study, totally 56 of 69 items reached consensus in two rounds with 18 statements reaching consensus after the second round. Further details of the statements are available in Tables 1, 2, and 3.

OAGB/MGB is an attractive primary as well as revisional bariatric procedure [14, 15]. At the same time, there are multiple areas of controversy and variation. There is insufficient evidence at present to allow us to draw a robust conclusion on these aspects of this procedure. Though expert opinion is graded as the lowest level of scientific evidence, it is often the only available evidence to inform clinical practice. A consensus among experts using a robust methodology can help drive up clinical standards. At the same time, it is important to make a distinction between a clinical guideline that is necessarily a synthesis of available evidence and a consensus statement, which is an attempt to get experts to agree on the correct choice, often in areas with no clear scientific evidence.

There was a high degree of agreement in most of the statements even in a first round, including aspects such as that OAGB/MGB can be an option for patients over 65 years, in BMI $> 50 \text{ kg/m}^2$ or more, as a single stage procedure compared to an eventual two-stages procedure. In the same way, in lower BMI (BMI between 30 and 35 kg/m^2), there are previous reports showing similar data and good results [16–18]. Interestingly, experts did not accept that OAGB/MGB should be a procedure choice in adolescent patients [14–19].

Globally, OAGB/MGB was identified as a good procedure and a suitable procedure for all patients including associated medical problems related to metabolic syndrome such as type 2 diabetes, non-alcoholic fatty liver disease, vegetarian patients and including special situations including chronic renal failure not on dialysis or patients with severe arthritis. These indications gained a high acceptancy among experts with its acceptance during the first round.

There was however direct consensus in avoiding this technique in patients with active smoking or even with alcoholic

Table 1 Consensus statements voting results, OAGB/MGB patient selection according to patient's demographic characteristics

NUMBER	STATEMENT	FIRST-ROUND, EXPERTS' RESULT %	SECOND-ROUND, EXPERTS' RESULT % (N=57)	FINAL VOTING RESULTS
1	OAGB/MGB is a suitable option in children (6-13 years years)	77.19%(n=44) Disagree	NA	<i>Consensus disagreement</i>
2	OAGB/MGB is a suitable option in adolescents (14-19 years)	54.39%(n=31) Disagree	56.14% (n=32)Disagree	<i>No consensus</i>
3	OAGB/MGB is a suitable option in above 65 years	80.7% (n=46)Agree	NA	<i>Consensus agreement</i>
4	OAGB/MGB is an acceptable option in patients with BMI >70, BMI> 60, BMI>50 as first stage of two-staged procedure	50.88% (n=29)Disagree	56.14%(n=32)Agree	<i>No consensus</i>
5	OAGB/MGB is an acceptable option in patients with BMI >70, BMI> 60, BMI>50 as One-stage procedure	91.23%(n=52)Agree	NA	<i>Consensus agreement</i>
6	OAGB/MGB is a suitable option in patients with low BMI (30-35) with associated medical problems	82.46%(n=47) Agree	NA	<i>Consensus agreement</i>
7	OAGB/MGB is a suitable option in patients with low BMI (30-35) without associated medical problems	57.89%(n=33)Disagree	64.91%(n=37)Disagree	<i>No consensus</i>
8	OAGB/MGB is a suitable and safe option in Type 2 Diabetics (BMI 26-30) in Asians	70.18%(n=40) Agree	NA	<i>Consensus agreement</i>
9	OAGB/MGB is an acceptable option in volume/binge eater patients	80.70%(n=46) Agree	NA	<i>Consensus agreement</i>
10	OAGB/MGB is a suitable and safe option in vegetarian patients	77.19%(n=44)Agree	NA	<i>Consensus agreement</i>
11	OAGB/MGB is a suitable and safe option in vegan patients	63.16%(n=36)Agree	70.18%(n=40)Agree	<i>Consensus agreement</i>
12	OAGB/MGB is not a suitable option in Smokers	80.70%(n=46)Agree	NA	<i>Consensus agreement</i>
13	OAGB/MGB is not a suitable option in chronic alcoholics	80.70%(n=46)Agree	NA	<i>Consensus agreement</i>
14	OAGB/MGB is a suitable option in patients with strong family history of colorectal cancer	75.44%(n=43) Agree	NA	<i>Consensus agreement</i>
15	OAGB/MGB is a suitable option in patients who decide to be pregnant soon (less than 12-18 months	73.68%(n=42) Disagree	NA	<i>Consensus disagreement</i>

Table 2 Consensus statements voting results, OAGB/MGB patient selection according to patient's associated medical problems and necessary medications

NUMBER	STATEMENT	FIRST-ROUND, EXPERTS' RESULT %	SECOND-ROUND, EXPERTS' RESULT % (N=57)	FINAL VOTING RESULTS
16	OAGB/MGB is a suitable and effective option in obese with Type I Diabetes	63.16%(n=36) Agree	75.44%(n=43) Agree	<i>Consensus agreement</i>
17	OAGB/MGB is a suitable option in case of resistant Helicobacter Pylori	50.88%(n=29) Agree	52.63%(n=30) Agree	<i>No consensus</i>
18	OAGB/MGB is a suitable option in case of intestinal metaplasia of stomach corpus	74.55%(n=41) Disagree	NA	<i>Consensus disagreement</i>
19	OAGB/MGB is a suitable option in patients with mild to moderate GERD (A,B)	80.70%(n=46) Agree	NA	<i>Consensus agreement</i>
20	OAGB/MGB is a suitable option in patients with severe GERD (C,D)	75.44%(n=43) Disagree	NA	<i>Consensus disagreement</i>
21	OAGB/MGB is a suitable option for non-erosive reflux disease (NERD)	73.68%(n=42) Agree	NA	<i>Consensus agreement</i>
22	OAGB/MGB is a suitable option in patients with small to medium size Hiatal Hernia	87.50%(n=49) Agree	NA	<i>Consensus agreement</i>
23	OAGB/MGB with concurrent hiatal hernia repair is a suitable	62.50%(n=35) Agree	71.93%(n=41) Agree	<i>Consensus agreement</i>

problems. These agreements showed that these could constitute clear contraindications for technique, more related to the same individual compared to the anatomical contraindication. These findings have also been previously reported for other techniques such as Roux-en-Y gastric bypass [19, 20].

Another interesting requested to experts was the role or even positioning of OAGB/MGB in the field of revisional surgery. As mentioned by other authors, revisional surgery can either be corrective, reversal, or conversional. OAGB/MGB could be an accepted option of treating insufficient weight loss after sleeve gastrectomy (SG), patients with weight regain after restrictive procedures. All experts reached consensus in the first round, showing the interest of the conversion from a previous bariatric procedure to OAGB/MGB as a technical and useful procedure. There are

reports related to these conversions, which have showed the impact of the conversion [19–22].

Some recommendations were accepted during the second round among experts. These recommendations included the use of OAGB/MGB to treat patients with obesity and concomitant HIV treatments, vegan patients, with concurrent giant hiatal hernia (≥ 5 cm) [23] repair, hiatal hernia, type one diabetes, esophageal dysmotility, gastroparesis or intestinal malrotation/non-rotation, Prader-Willy syndrome and BMI > 50 kg/m², patients with low ejection fraction (EF $< 30\%$) and patients with collagen vascular diseases. Some of these specific situations are uncommon and there is little evidence around them.

There were total of 9 statements where the experts disagreed that OAGB/MGB was operation of choice. Also, there were further 13 statements where no consensus was reached.

Table 2 (continued)

24	option in patients with large/giant Hiatal Hernia OAGB/MGB is a suitable option in patients with Barrett's metaplasia	89.29% (n=50)Disagree	NA	<i>Consensus disagreement</i>
25	OAGB/MGB is a suitable option in documented gastroparesis	58.18%(n=32) Agree	77.19%(n=44) Agree	<i>Consensus agreement</i>
26	OAGB/MGB is an acceptable option in documented intestinal malrotation/non-rotation	66.67%(n=36) Agree	80.70%(n=46) Agree	<i>Consensus agreement</i>
27	OAGB/MGB is an acceptable option in documented insulinoma	67.27%(n=37) Disagree	89.47%(n=50) Disagree	<i>Consensus disagreement</i>
28	OAGB/MGB is an acceptable option in patients with diagnosed esophageal motility disorders (treated/untreated)	55.56%(n=30)Agree	75.44%(n=43) Agree	<i>Consensus agreement</i>
29	OAGB/MGB is an acceptable option in patients with demyelinating diseases like Multiple sclerosis, optic neuromyelitis or other degenerative neurological diseases	56.36%(n=31) Disagree	64.91%(n=37) Disagree	<i>No consensus</i>
30	MGB / OAGB is an acceptable option in patients with Prader-Willi syndrome with a BMI greater than 50	69.09%(n=38) Agree	84.21%(n=48) Agree	<i>Consensus agreement</i>
	OAGB/MGB is an acceptable option in patients with craniopharyngioma	50%(n=27)Agree	68.42%(n=39) Agree	<i>No consensus</i>
32	OAGB/MGB is an acceptable option in non-disseminated endometriosis	87.27%(n=48) Agree	NA	<i>Consensus agreement</i>
33	OAGB/MGB is a suitable option in patients with documented iron deficiency anemia	53.36%(n=31) Disagree	70.18%(n=40) Disagree	<i>Consensus disagreement</i>
34	OAGB/MGB is a suitable option in	81.82%(n=45) Agree	NA	<i>Consensus agreement</i>

Table 2 (continued)

	patients with diagnosed Minor Thalassemia			
35	OAGB/MGB is a suitable option in patients with diagnosed irritable bowel syndrome symptoms	61.82%(n=34) Agree	68.42%(n=39) Agree	No consensus
36	OAGB/MGB is a suitable option in patients with non-alcoholic steatohepatitis (NASH) and Cirrhosis child A	81.82%(n=45) Agree	NA	Consensus agreement
37	OAGB/MGB is a suitable option in patients with Cirrhosis child B	70.91%(n=39) Disagree	NA	Consensus disagreement
38	OAGB is a suitable option in end stage renal disease (ESRD) patients (on dialysis)	50.91%(n=28) Agree	52.63%(n=30) Agree	No consensus
39	OAGB is a suitable option in chronic renal insufficiency, not on dialysis	74.55%(n=41) Agree	NA	Consensus agreement
40	OAGB/MGB is a suitable option in patients with ESRD as a bridge to kidney transplant (patients temporary contraindicated due to obesity)	50.91%(n=28) Agree	50.88%(n=29) Agree	No consensus
41	OAGB/MGB is a suitable option in patients before and after Organ Transplantation	54.55%(n=30) Agree	61.4%(n=35) Agree	No consensus
42	OAGB/MGB is a suitable option in patients with low ejection fraction (EF<30%)	66.67%(n=36) Agree	87.72%(n=50) Agree	Consensus agreement
43	OAGB is a suitable option in patients with collagen vascular diseases	63.64%(n=35) Agree	82.46%(n=47) Agree	Consensus agreement

Table 2 (continued)

44	OAGB/MGB is not a suitable option in patients with Crohn disease	78.18%(n=43) Agree	NA		Consensus agreement
45	OAGB/MGB is an acceptable option in patients with ulcerative colitis	56.36%(n=31) Agree	50.88%(n=29) Agree		No consensus
46	OAGB/MGB is a suitable option in patients with stable psychiatric disorders	81.82%(n=45) Agree	NA		Consensus agreement
47	OAGB/MGB is a suitable option in patients with HIV on retrovirals	67.27%(n=37) Agree	77.19%(n=44) Agree		Consensus agreement
48	OAGB/MGB is a suitable option in patients with chronic perianal problems(fistula, high grade hemorrhoid, etc	72.73%(n=40) Agree	NA		Consensus agreement
49	OAGB/MGB is a suitable option in patients with gastric ulcers or duodenal ulcers:	72.22%(n=39)Disagree	NA		Consensus disagreement
50	OAGB/MGB is a suitable option in patients with renal stones	70.91%(n=39) Agree	NA		Consensus agreement
51	OAGB/MGB is a suitable option in patients with gallstones	96.36%(n=53) Agree	NA		Consensus agreement
52	OAGB/MGB is an acceptable option in patients who need a subtle blood level of medications such as Lithium or Digoxin	67.27%(n=37) Agree	75.44%(n=43) Agree		Consensus agreement
53	OAGB/MGB is an acceptable option for patients who needs adjuvant chemo/radiotherapy after oncosurgery	54.55%(n=30) Disagree	59.65%(n=34) Disagree		No consensus
54	OAGB/MGB is an acceptable option in patients who need to use long term blood thinning agents ((Aspirin/Warfarin/ Enoxaparin/ Factor X inhibitors / NSAIDS (coronary stent ...))	69.09%(n=38) Agree	80.70%(n=46) Agree		Consensus agreement
55	OAGB/MGB is an acceptable option in patients with autoimmune arthritis (under steroid or immune agents)	60%(n=33) Agree	70.18%(n=40) Agree		Consensus agreement
56	OAGB/MGB is not an acceptable option in patients who need to use OCP pills	58.18%(n=32) Agree	73.68%(n=42) Agree		Consensus agreement

Table 3 Consensus statements voting results, OAGB/MGB patient selection according to patient's previous GI surgeries or as conversional procedure

NUMBER	STATEMENT	FIRST-ROUND, EXPERTS' RESULT %	SECOND-ROUND, EXPERTS' RESULT % (N=57)	FINAL VOTING RESULTS
57	OAGB/MGB is a suitable option after failed Nissen/Toupet Fundoplication/ N-sleeve	72.73%(n=40) Agree	NA	Consensus agreement
58	OAGB/MGB is a suitable option in patients with previous small bowel resection due to tumoral involvement, trauma, etc. in non-short bowel situations	70.91%(n=39) Agree	NA	Consensus agreement
59	OAGB/MGB is a suitable option as the second stage of a two-stage bariatric surgery after SG for BMI>50 (instead of BPD/DS)	90.91%(n=50) Agree	NA	Consensus agreement
60	OAGB/MGB is a suitable option in patients with weight regain after restrictive procedure (LAGB, SG, VBG, Plication)	90.91%(n=50) Agree	NA	Consensus agreement
61	OAGB/MGB is a suitable option in patients with previous endoscopic sleeve gastropasty	94.55%(n=52) Agree	NA	Consensus agreement
62	OAGB/MGB is a suitable option in patients with previous gastric balloon	98.18%(n=54) Agree	NA	Consensus agreement
63	OAGB is a suitable option to manage patients with leak of Sleeve gastrectomy	58.18%(n=32) Disagree	77.19%(n=44) Disagree	Consensus disagreement
64	OAGB/MGB is a suitable option for weight regain after RYGBP	61.82%(n=34) Disagree	73.68%(n=42) Disagree	Consensus disagreement
65	OAGB/MGB is a suitable option in patients with GERD after SG, VBG, Plication, LAGB	52.73%(n=29) Agree	63.16%(n=36) Agree	No consensus
66	OAGB/MGB is a suitable option as salvage technique for duodenal perforation during SADI-S	78.18%(n=43) Agree	NA	Consensus agreement
67	OAGB/MGB is a suitable option as salvage technique for early d-I anastomotic leak in SADI-S	74.55%(n=41) Agree	NA	Consensus agreement
68	OAGB/MGB is not a suitable option in mid-sleeve stricture	74.55%(n=41) Agree	NA	Consensus agreement
69	OAGB/MGB is a suitable option after Bariclip failure	89.09%(n=49) Agree	NA	Consensus agreement

Further details of the statements are available in Tables 1, 2, and 3. The experts disagreed that OAGB/MGB was a suitable option in children between 6 to 13 years of age. There is no published literature to support the safety of this operation in this age group [24]. Similarly, no consensus was reached whether OAGB/MGB was a suitable option in adolescents (14–19 years age). This was similar to the IFSO consensus statement published by Ramos A et al. [25].

The experts failed to reach consensus that OAGB/MGB is an acceptable option in patients with BMI > 70 kg/m², BMI > 60 kg/m², BMI > 50 kg/m² as first stage of two-staged procedure. This is because there is no literature published to establish role of OAGB/MGB as this. However, there is now published literature that OAGB/MGB is a safe and effective primary operation in patients with extreme obesity even in comparison to RYGB [26, 27].

Interestingly the experts could not reach a consensus that this operation is a suitable option in patients with low BMI (30–35 kg/m²) without associated medical problems. However, the experts reached a consensus that this procedure is of choice in patients with BMI 30–35 kg/m² with associated medical problems. There is systematic review that shows that OAGB/MGB is a safe and effective operation in patients with BMI < 35 kg/m² [16].

Experts had a consensus disagreement that this operation was a suitable option in patients who decide to be pregnant soon (less than 12–18 months). This is understandable as there are concerns about nutritional issues with this operation [24]. Interestingly, no consensus was reached on the statement that OAGB/MGB is a suitable option in case of resistant *Helicobacter pylori*. This is likely as there is a concern that this procedure is associated with reflux and its related long-term complications including risk of cancer in the esophagus or stomach.

These same concerns probably also led to the expert's disagreement that OAGB/MGB can be suitable option in case of intestinal metaplasia of stomach corpus, in patients with severe GERD (C, D) and in patients with Barrett's metaplasia. Similarly, the experts disagreed that OAGB/MGB is a suitable option in patients with gastric ulcers or duodenal ulcers.

The controversy and concerns regarding reflux also led to the experts reaching no consensus that OAGB/MGB is a suitable option in patients with GERD after SG, VBG, gastric plication, LAGB. This is in spite of systematic reviews showing that OAGB/MGB is safe as revisional operation with good resolution in patients with reflux [2, 21].

The expert disagreed that OAGB/MGB is an acceptable option in documented insulinoma. Also, the experts failed to reach a consensus that OAGB/MGB is an acceptable option in patients with demyelinating diseases like multiple sclerosis, optic neuromyelitis or other degenerative neurological diseases and similarly that OAGB/MGB is an acceptable

option in patients with craniopharyngioma. It is possible that concerns of malnutrition associated with longer limb length with this operation might be the cause [4].

There was no consensus that OAGB/MGB is a suitable option in patients with diagnosed irritable bowel syndrome or in patients with ulcerative colitis. This is likely because there are concerns of increased bowel frequency with this operation. This is obviously related to the bilio-pancreatic limb length. The longer the BPL, the higher the chance of diarrhea [4].

There was no consensus that OAGB/MGB is a suitable option in end-stage renal disease (ESRD) patients (on dialysis) or is a suitable option in patients with ESRD as a bridge to kidney transplant (patients who are temporary contraindicated due to obesity). There is no published evidence to support this, and this study highlights the need to publish such data.

Similarly, there was no consensus that OAGB/MGB is a suitable option in patients before and after organ transplantation and OAGB/MGB is an acceptable option for patients who needs adjuvant chemo/radiotherapy after oncosurgery. The experts disagreed that OAGB/MGB is a suitable option to manage patients with leak of SG. The basic principle of OAGB/MGB is the need to have a long gastric pouch and hence it is understandable that the suitability would depend on the site of leak in the SG [21]. There was disagreement that OAGB/MGB is a suitable option for weight regain after RYGB.

Limitations

Due to the young age of the technique, there is a lack of robust indications for OAGB/MGB. However, this report constitutes an expert opinion's guide for clinical decision-making. International experts are confront to use this methodology in order to state possible indications for the technique and request studies to incentive better approach to the patient. As previously used, [10] adopting a modified Delphi protocol allows experts to share their opinion anonymously and in areas of lack of agreement or consensus. Such an approach allows experts to vote independently as well as change their position without any loss of face. This consensus document focused on patients' selection is in conjunction with the previously published First Consensus Statement on OAGB/MGB, which aims to improve outcomes of patients undergoing OAGB/MGB. The authors would like to caution against over-interpretation of the findings reported in this paper. First, need to acknowledge that this consensus can only make grade D recommendations on the basis of expert opinion. Second, there could be a bias in the expert's selection due to their high expertise in OAGB/MGB. However, pooled from different countries with previous experience and

including some experts, who routinely perform other bariatric and metabolic surgeries rather than OAGB/MGB, would decrease the bias of individual expert opinion. Although due to the lack of evidence, it is important to make a distinction between a clinical guideline which is necessarily a synthesis of available evidence and a consensus statement. In this work, applying a modified Delphi methodology was aimed to analyze experts' degree of agreement, often in areas with no clear scientific evidence.

Conclusion

Patient selection in OAGB/MGB is still a point of discussion among specialists in obesity and metabolic surgery. This consensus aimed to suggest suitable patients for OAGB/MGB operation. Totally, 57 recognized bariatric surgeons from 24 countries participated in this consensus and reached consensus in 56 items in different aspects of patient selection for OAGB/MGB. There was consensus that OAGB/MGB is a suitable option in elderly patients, patients with low BMI (30–35 kg/m²) with associated medical problems, Asian patients with BMI 26–30 kg/m² and T2DM, and patients with BMIs more than 50 kg/m² as one-stage procedure. OAGB/MGB can also be a safe procedure in vegetarian and vegan patients. In addition, OAGB/MGB can be a suitable procedure in patients with large (giant) hiatal hernia with concurrent hiatal hernia repair. On the other hand, this consensus underlines that patients with GERD C and D and with Barrett's metaplasia should not undergo this procedure. There remain concerns regarding OAGB/MGB in children and adolescents that did not meet consensus.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11695-022-06124-7>.

Declarations

Ethics Approval This article does not contain any studies with human participants or animals performed by any of the authors.

Consent to Participate Informed consent does not apply.

Conflict of Interest The authors declare no competing interests.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Authors and Affiliations

Mohammad Kermansaravi¹ · Chetan Parmar² · Sonja Chiappetta³ · Shahab Shahabi¹ · Alaa Abbass⁴ · Syed Imran Abbas⁵ · Mohamed Abouzeid⁴ · Luciano Antozzi⁶ · Syed Tanseer Asghar⁷ · Ahmad Bashir⁸ · Mohit Bhandari⁹ · Helmuth Billy¹⁰ · Daniel Caina¹¹ · Francisco J. Campos¹² · Miguel-A. Carbajo¹³ · Jean Marc Chevallier¹⁴ · Amir Hossein Davarpanah Jazi¹ · Amador Garcia Ruiz de Gordejuela¹⁵ · Ashraf Haddad⁸ · Mohamad Hayssam ElFawal¹⁶ · Jacques Himpens¹⁷ · Aatif Inam¹⁸ · Radwan Kassir¹⁹ · Kazunori Kasama²⁰ · Amir Khan²¹ · Lilian Kow²² · Kuldeepak Singh Kular²³ · Muffazal Lakdawala²⁴ · Laurent abram Layani²⁵ · Wei-Jei Lee²⁶ · Enrique Luque-de-León²⁷ · Ken Loi²⁸ · Kamal Mahawar²⁹ · Tarek Mahdy³⁰ · Mario Musella³¹ · Abdelrahman Nimeri³² · Juan Carlos Olivares González³³ · Abdolreza Pazouki¹ · Tigran Poghosyan³⁴ · Gerhard Prager³⁵ · Arun Prasad³⁶ · Almino C. Ramos³⁷ · Karl Rheinwalt³⁸ · Rui Ribeiro³⁹ · Elena Ruiz-Úcar⁴⁰ · Robert Rutledge⁴¹ · Asim Shabbir⁴² · Scott Shikora⁴³ · Rishi Singhal⁴⁴ · Osama Taha⁴⁵ · Mohammad Talebpour⁴⁶ · Jose Sergio Verboonen⁴⁷ · Cunchuan Wang⁴⁸ · Rudolf Weiner⁴⁹ · Wah Yang⁴⁸ · Ramon Vilallonga⁵⁰ · Maurizio De Luca⁵¹

✉ Maurizio De Luca
nnwdel@tin.it

- ¹ Department of Surgery, Minimally Invasive Surgery Research Center, Division of Minimally Invasive and Bariatric Surgery, Rasool-E Akram Hospital, Iran University of Medical Sciences, Tehran, Iran
- ² Whittington Hospital, London, UK
- ³ Obesity and Metabolic Surgery Unit, Ospedale Evangelico Betania, Naples, Italy
- ⁴ Bariatric Surgery Unit, Faculty of Medicine, Ain Shams University, Cairo 11591, Egypt
- ⁵ Iranian Hospital, Al Wasl Road, Dubai, UAE
- ⁶ Centro de Cirugías Especiales, Bahía Blanca, Argentina
- ⁷ Capital Hospital, CDA, Islamabad, Pakistan
- ⁸ Minimally Invasive and Bariatric Surgery, Gastrointestinal Bariatric and Metabolic Center (GBMC)-Jordan Hospital, Amman, Jordan
- ⁹ Mohak Bariatrics and Robotics Center, Indore, India
- ¹⁰ Ventura Advanced Surgical Associates, Ventura, CA, USA

- ¹¹ Dr. Federico Abete Hospital for Trauma and Emergency, Obesity and Metabolic Center, Malvinas, Argentina
- ¹² Obesity Clinic, Mexico City, Mexico
- ¹³ Centre of Excellence for the Study and Treatment of Obesity and Diabetes, Valladolid, Spain
- ¹⁴ Université Paris 5, Paris, France
- ¹⁵ Vall d'Hebron University Hospital, Barcelona, Spain
- ¹⁶ Makassed General Hospital, Beirut, Lebanon
- ¹⁷ Bariatric Surgery Unit, Delta Chirec Hospital, Brussels, Belgium
- ¹⁸ Department of General Surgery, Pakistan Institute of Medical Sciences, Islamabad, Pakistan
- ¹⁹ Department of Digestive Surgery, CHU Félix Guyon, Saint Denis, La Réunion, France
- ²⁰ Weight Loss and Metabolic Surgery Center, Yotsuya Medical Cube, Tokyo, Japan
- ²¹ Walsall Healthcare NHS Trust, Walsall, UK
- ²² Flinders Medical Centre, Adelaide, Australia
- ²³ Kular Research Institute, Bija, India

- 24 Sir H N Reliance Foundation Hospital, Mumbai, India
- 25 Al Sharq Hospital, Fujairah, UAE
- 26 Min-Sheng General Hospital, Taoyuan City, Taiwan
- 27 The American British Cowdray Medical Center, Mexico City, Mexico
- 28 St George Surgery, Sydney, Australia
- 29 South Tyneside and Sunderland Foundation NHS Trust, Sunderland, UK
- 30 Mansoura Faculty of Medicine, Sharjah University Hospital, Sharjah, UAE
- 31 Advanced Biomedical Sciences Department, “Federico II” University, Naples, Italy
- 32 Atrium Health, Charlotte, NC, USA
- 33 Obesity Surgeons Mexico, Reynosa, Tamaulipas, Mexico
- 34 Hôpital Européen-Georges Pompidou, AP-HP, Université de Paris, Paris, France
- 35 Medical University of Vienna, Vienna, Austria
- 36 Apollo Hospital, New Delhi, India
- 37 Institute for Metabolic Optimization, Sao Paulo, Brazil
- 38 Department of Bariatric, Metabolic and Plastic Surgery, St. Franziskus Hospital, Cologne, Germany
- 39 Centro de Excelencia Para a Cirurgia Metabolica Grupo Lusiadas, Lisbon, Portugal
- 40 Bariatric and Metabolic Surgery Department, University Hospital of Fuenlabrada, Madrid, Spain
- 41 International Center for Laparoscopic Obesity Surgery, Punjab, India
- 42 National University of Singapore, Singapore, Singapore
- 43 Department of Surgery Brigham and Women’s Hospital, Harvard Medical School, Boston, MA, USA
- 44 University Hospital Birmingham NHS Foundation Trust, Birmingham, UK
- 45 Plastic and Obesity Surgery Department, Bariatric Unit, Assiut University Hospital, Assiut, Egypt
- 46 Department of General Surgery, Sina Hospital, Tehran University of Medical Sciences, Tehran, Iran
- 47 Obesity Goodbye Center, Tijuana, Mexico
- 48 Department of Metabolic and Bariatric Surgery, The First Affiliated Hospital of Jinan University, Guangzhou, China
- 49 Bariatric Surgery Unit, Sana Clinic Offenbach, Offenbach, Germany
- 50 Endocrine, Bariatric and Metabolic Surgery Department, Universitary Hospital Vall Hebron, Barcelona, Spain
- 51 Department of General Surgery, Rovigo Hospital, Rovigo, Italy