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RESEARCH

Obesity Solutions for Patients over 65 Years of Age: Surgeon Perspectives on Anti-obesity Medications and Metabolic Bariatric Surgery — International Survey Study

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Abstract

Introduction The rising prevalence of obesity among the elderly poses unique challenges. While life expectancy has improved due to advancements in medical care, this increase in longevity does not necessarily correlate with an improved quality of life. Instead, the obesity epidemic, particularly in the later decades of life, is linked to a heightened demand for healthcare services and higher healthcare costs. This study aimed to analyze bariatric surgeons' perspectives on the role of anti-obesity medications (AOMs) in metabolic bariatric surgery (MBS) for patients over 65, focusing on treatment preferences in clinical scenarios. Additionally, an obesity treatment algorithm for older patients was proposed.

Material and Methods A survey was conducted among bariatric surgeons worldwide from September to October 2024, including questions on demographics, experience, and clinical scenarios. A questionnaire specifically designed for the purposes of this study was used.

Results Of 184 respondents from 53 countries, 77.2% reported prescribing AOMs. Sleeve gastrectomy is most preferred as the primary surgical option for patients over 65. Treatment preferences varied by *BMI*, with AOMs favored for a *BMI* of 30–35 kg/m^2, and MBS preferred for higher *BMI*s.

Conclusions This study highlights the integration of AOMs into obesity management for older adults, with sleeve gastrectomy as the primary surgical choice. Treatment choices were consistent across surgeon demographics, underscoring the need for tailored approaches in elderly obesity care.

Keywords Metabolic bariatric surgery · Anti-obesity medications · GLP-1 receptor agonists · GLP-1 · Elderly · Sleeve gastrectomy

Key Points
- Sleeve gastrectomy is the preferred primary surgical option for patients over 65 years of age.
- Anti-obesity medications are recommended for patients over 65 with a *BMI* below 35 kg/m^2, while metabolic bariatric surgery is preferred for those with a higher *BMI*.
- For patients with a higher *BMI*, it is advisable to prepare them for surgery using anti-obesity medications.

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Introduction

Obesity has emerged as a global epidemic over the past five decades. Currently, it is estimated that approximately one billion adults and adolescents are affected by obesity, with a pronounced impact on women and older populations [1].

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In the USA, data reveal that nearly 41% of individuals aged 65 to 74 years, as well as almost 28% of those over 75 years, are classified as obese [1, 2]. The extensive repercussions of obesity on health have been well-documented, as it is a significant risk factor for a myriad of diseases, including hypertension, stroke, obstructive sleep apnea, type 2 diabetes, and metabolic associated fatty liver disease [3]. These conditions contribute to increased morbidity and mortality rates, underscoring the urgent need for effective interventions. Furthermore, the rising prevalence of obesity among the elderly poses unique challenges. While life expectancy has improved due to advancements in medical care, this increase in longevity does not necessarily correlate with an improved quality of life [4, 5]. Instead, the obesity epidemic, particularly in the later decades of life, is linked to a heightened demand for healthcare services and higher healthcare costs [3]. This growing burden necessitates the identification and implementation of safe and effective therapeutic strategies that can be tailored to the needs of older patients suffering from obesity. As such, there is an imperative for continued research and innovation in the field of obesity management, particularly concerning approaches that consider the unique physiological and psychological needs of the aging population. [1–5].

The history of pharmacotherapy use in treating obesity dates back to the mid-twentieth century [6]. The discovery and introduction of glucagon-like peptide-1 (GLP-1) receptor agonists, which have become increasingly popular in the last decade, have revolutionized obesity pharmacotherapy [7]. Research on the pharmacological management of obesity in the elderly remains limited. Available evidence indicates that weight loss and cardiovascular outcomes in older adults may be comparable to those seen in younger populations [8]. However, it is crucial to recognize that the risk of gastrointestinal side effects and treatment interruptions is significantly higher [8]. Polypharmacy, which increases with age, should be taken into account when implementing pharmacological treatment for obesity in the elderly population [8–10]. Compared with surgery, the price, cost-effectiveness, availability of anti-obesity medications (AOMs)—especially in developing countries—and long-term outcomes may negatively impact their use in patients over age of 65 years [11–13].

The aim of our study was to analyze the opinions of bariatric surgeons on the impact of AOMs on MBS in patients over 65 years of age, particularly in treatment choices for specific clinical situations. Secondary, an obesity treatment algorithm was proposed for this group of patients.

Material and Methods

This study is a survey conducted among bariatric surgeons from around the world. The survey was collected from September to October 2024. A questionnaire specifically designed for the purposes of this study was used. The questionnaire was created and shared using the Google Forms platform (Google LLC, Mountain View, CA, USA). It consisted of 13 closed-ended questions, including 2 demographic questions, 3 related to the surgeons' experience, and 8 concerning clinical scenarios (Table 1). The survey was distributed in social media groups that bring together

Table 1 The questions of the survey

Question	Single choice answer
Age	< 40 years; 40–50 years; > 50 years
Country	*to fill in*
How many years have you been performing MBS?	< 5 years; 5–10 years; > 10 years
How many bariatric cases do you perform per year?	< 50; 50–100; > 100
Do you prescribe AOM?	Yes; No
Which surgery do you prefer for patients over 65 years of age?	SG; RYGB; OAGB; SASI; SADI-S; Other (*to fill in*)
Does the age of a patient over 65 years alone influence preoperative management decisions?	No; Yes, prolongation of the qualification process; Yes, shortening of the qualification process
Does the age of a patient over 65 years alone influence postoperative management decisions?	No; Other (*to fill in*)
For a patient over 65 with a *BMI* of 30–35, you would choose:	AOM; preparation with AOM before MBS; MBS
For a patient over 65 with a *BMI* of 36–40, you would choose:	AOM; preparation with AOM before MBS; MBS
For a patient over 65 with a *BMI* of 40–50, you would choose:	AOM; preparation with AOM before MBS; MBS
For a patient over 65 with a *BMI* > 50, you would choose:	AOM; preparation with AOM before MBS; MBS
Would the presence of obesity-related diseases (e.g., type 2 diabetes and hypertension) influence the above decisions?	Yes; No

AOM anti-obesity medications, *MBS* metabolic bariatric surgery, *SG* sleeve gastrectomy, *RYGB* Roux-en-Y gastric bypass, *OAGB* one-anastomosis gastric bypass, *SASI* single anastomosis sleeve-ileal bypass, and *SADI-S* single anastomosis duodeno–ileal bypass with sleeve gastrectomy

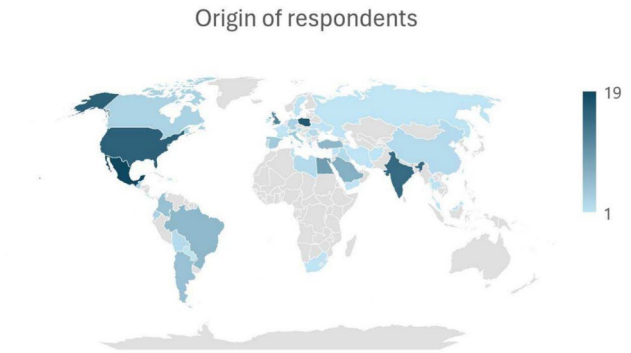


Fig. 1 Origin of respondents

bariatric surgeons as Facebook (Meta Platforms, Inc., Menlo Park, CA, USA) and WhatsApp (Meta Platforms, Inc., Menlo Park, CA, USA). The study was anonymous and voluntary. Completing the questionnaire was tantamount to signing consent to participate in the study.

Statistical analysis was performed using the TIBCO Statistica 13.PL (TIBCO Software Inc., Palo Alto, CA, USA) conducted, and response percentages were calculated. Relationships between qualitative variables were determined using the chi-square test. A p-value of <0.05 was considered statistically significant.

Results

General Characteristic

There were 184 respondents from 53 countries. There were 62 surgeons from Europe, 47 from South and Central America, 43 from Asia, 19 from North America, and 13 from Africa (Fig. 1).

Most of the surgeons were older than 40 years old (Fig. 2). More than 50% of respondents from Europe, America, and Asia declared having performed MBS for more than 10 years, more than 100 cases per year (Figs. 3 and 4). The surgeons from Africa declared slightly less experience; however, responses from this region were the fewest. There were no statistical significant differences between the origins of respondents and the age, duration of experience or number of cases per year ($p=0.051$, $p=0.765$, and $p=0.100$, respectively).

Fig. 2 Age of respondents

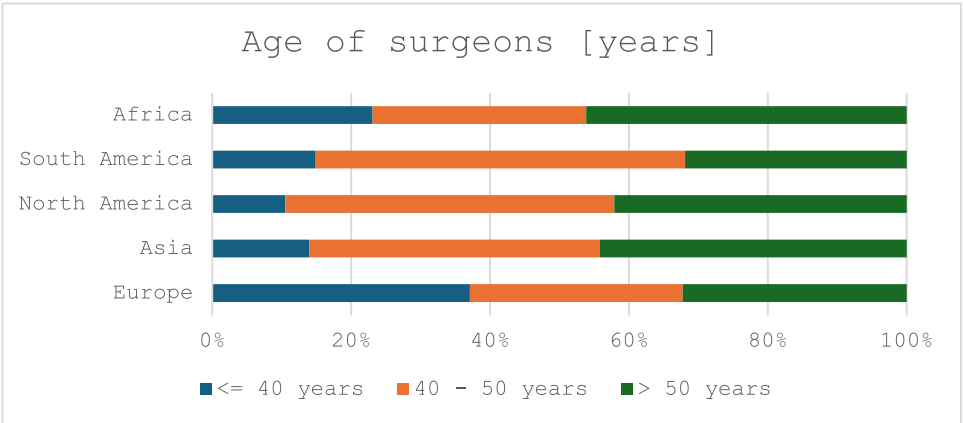
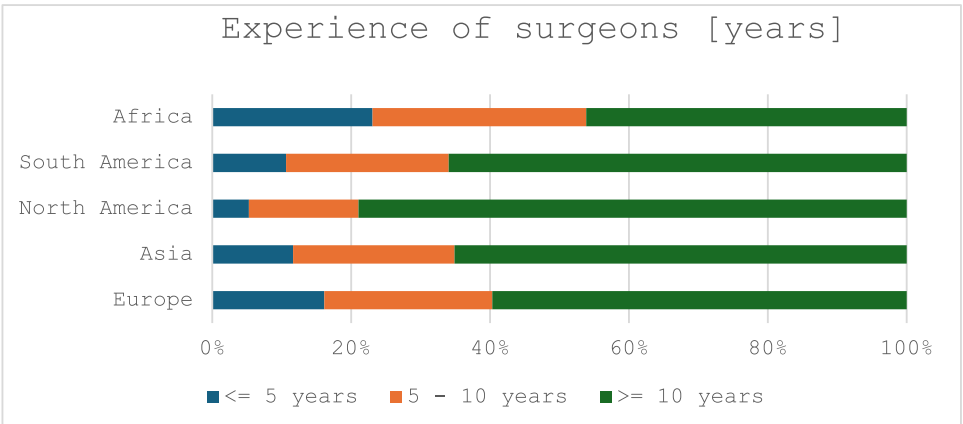


Fig. 3 Duration of experience of respondents



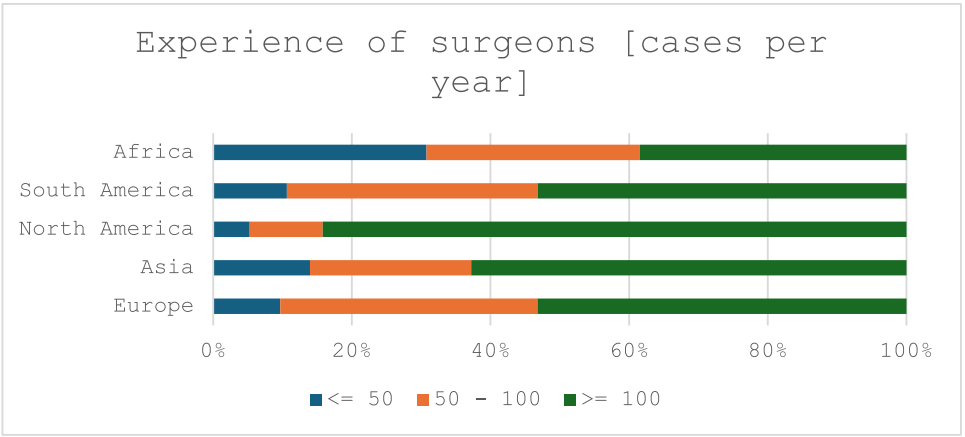


Fig. 4 Experience of respondents in cases performed per year

Table 2 Chi-square test for the different variables

	Origin	Age	Experience
Use of AOMs	0.252	0.169	0.748
Choice of procedure	0.060	0.322	0.211
Preoperative management	0.132	0.122	0.635
Postoperative management	0.302	0.364	0.209
The choice of the management:			
BMI 30–35	n/a*	0.373	0.996
BMI 36–40	n/a*	0.138	0.085
BMI 40–50	n/a*	0.090	0.317
BMI > 50	n/a*	0.800	0.277

AOMs anti-obesity medicaments, *BMI* body mass index

*The statistical test could not be conducted due to extreme results and a lack of assumptions for the test

Anti-obesity Medications

One hundred forty-two (77.2%) surgeons reported prescribing AOMs. The origin, age, duration of experience, and number of cases performed per year did not have a statistically significant impact on the use of medications as well as the origin of responders (Table 2).

Metabolic Bariatric Surgery in Patients over 65 Years of Age

One hundred thirty-one respondents (71.2%) chose sleeve gastrectomy (SG) as the first choice surgery for patients over 65 years of age. Twenty-eight (15.2%) chose RYGB; 14 (7.6%) chose OAGB; and 11 (6.0%) selected other procedure. One hundred seven (58.2%) surgeons would not alter preoperative management; 58 (31.5%) would extend it; and 19 (10.3%) would shorten it. One hundred sixty-nine (91.8%) surgeons would not modify postoperative management, while 15 (8.2%) would.

The origin and the experience of the respondents did not differ significantly in terms of procedure choice and pre- and postoperative management (Table 2).

Anti-obesity Medicaments and Metabolic Bariatric Surgery in Patients over 65 Years of Age

In questions regarding management in selected situations, the responses varied according to *BMI* (Fig. 5). For a *BMI* of 30–35 kg/m^2, respondents most frequently chose AOM, while for a *BMI* above 35 kg/m^2 MBS was preferred. However, the preference for MBS decreased in favor of preparing for AOM preoperatively as *BMI* increased. One hundred twenty-seven (69.0%) surgeons would alter their decision in case of occurrence of obesity-related diseases.

Whether surgeons prescribe AOMs did not significantly influence the decision regarding patient management in the four cases described ($p = 0.930$, $p = 0.126$, $p = 0.067$, and $p = 0.285$, respectively). Similarly, surgical experience did not significantly affect patient management decisions in these cases (Table 2).

Discussion

Our study presents the opinions of 184 bariatric surgeons from around the world. Despite the diversity of the group, no significant differences were found in the responses based on the surgeons' origin or experience. This may indirectly suggest consistent training and well-established guidelines in the field of bariatric surgery.

Obesity in Elderly Patients

According to data from the USA, obesity affects 37.1% of men and 33.6% of women aged over 60. Furthermore, nearly 70% of women and 80% of men within this age group are classified as overweight [14]. The prevalence of obesity

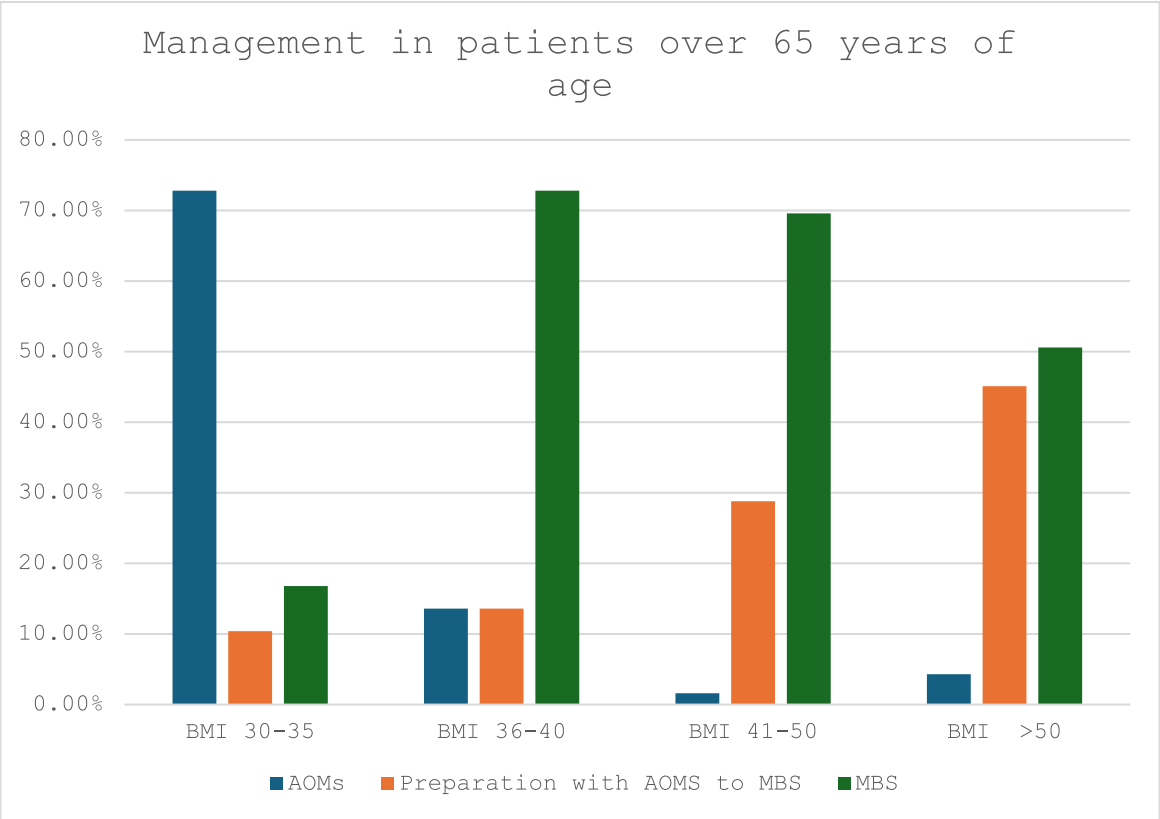


Fig. 5 The choice of the management

among the elderly is closely associated with various comorbidities and is linked to a diminished quality of life and functional status, which often results in reduced daily activities. This demographic also demonstrates a higher incidence of hospitalization and the need for surgical interventions.

Some studies have indicated that being overweight may actually reduce the overall risk of mortality in the elderly [15–17]. This phenomenon has been referred to as the *obesity paradox* [15]. Nonetheless, further investigation is warranted to fully elucidate the mechanisms underlying these observations and their clinical implications. However, in the general population, obesity of any degree is associated with increased mortality [18]. Therefore, the management of obesity in the geriatric cohort necessitates a differentiated approach, compared to younger individuals. Aggressive weight-loss therapies commonly applied in younger populations may not be appropriate for older adults, who often present with unique challenges such as comorbidities, frailty syndrome, sarcopenia, and decreased activity levels.

Physical activity with dietary counseling and supplementation, the use of AOMs and surgical treatment of obesity in a group of geriatric patients are considered safe and effective treatment methods [19]. Due to the presence of comorbidities, frailty syndrome, sarcopenia, and impaired activity status, the approach to the treatment of obesity in the elderly group should be careful and individualized in accordance with the best medical practice.

Metabolic Bariatric Surgery in Patients over 65 Years of Age

MBS was initially recommended for patients up to the age of 60, due to the mistaken belief that older patients faced significantly higher risks and had lower benefits from surgery [20]. However, over the years and through numerous studies on obesity in older patients, the latest IFSO/ASMBS guidelines no longer include an age limit [21]. It is recommended that biological age, or rather the general condition of the patient, should be the basis for qualifying for surgery, rather than chronological age. Furthermore, the safety of MBS has been demonstrated even in patients over 70 years of age [22, 23]. The current question being asked is not *whether* to treat but rather *what type of management* to apply in elderly patients. In our survey, we asked about the choice of surgery. Over 70% of respondents, the significant majority, chose SG as the preferred method for this patient group. The remaining respondents opted for a malabsorptive procedure (RYGB or OAGB) or did not base their procedure

selection on the patient's age. Similar results were observed in a study conducted within the Polish bariatric community, where nearly 70% also chose SG [24]. Moreover, while the percentage of SG worldwide is indeed the highest, it is still lower than 70%, which further indicates a preference for this method specifically in the group of older patients [25].

Anti-obesity Medicaments in Patients over 65 Years of Age

Almost 80% of respondents indicated that they use AOMs. The use of AOMs by surgeons demonstrates that they have become established in obesity management and can be integrated with surgical procedures, whether as adjuvant or neoadjuvant therapy. Currently used AOMs have a well-defined safety profile and therapeutic potential [15]. However, there is a lack of randomized studies specifically addressing patients over the age of 65 [26]. Commonly used are GLP-1 analogs such as liraglutide and semaglutide, and the recently approved tirzepatide, a GLP-1 and glucagon receptor analog. Daily injections of liraglutide show a positive effect on elderly patients with obesity, even preserving muscle tissue [27]. However, it is important to consider the increased potential for gastrointestinal side effects [15, 26]. Weekly doses of semaglutide have a similar safety profile and outcomes. However, the literature also highlights an increased risk of gastrointestinal side effects and headaches [15, 28]. Tirzepatide appears to be a promising option for older adults, as its side effect profile is improved [29]. This is largely because both glucose-dependent insulinotropic polypeptide (GIP) and GLP-1 receptor agonists can be administered at lower doses, compared to their use in monotherapy, potentially reducing adverse effects [29]. It is believed that three-receptor medications may have an even better benefit-to-risk ratio and lower incidence of side effects, compared to their predecessors, which certainly represents a potential opportunity for older patients [30]. This advancement could lead to more effective and safer treatment options for managing obesity in this age group.

Management of Patients over 65 Years of Age

We asked the respondents what management they would choose in specific clinical situations. According to the latest guidelines, MBS is recommended for patients with a body mass index (*BMI*) over 30 kg/m^2 in cases of obesity-related complications and over 35 kg/m^2 without comorbidities [21]. In line with this, over 70% of surgeons selected AOMs for patients with a *BMI* between 30 and 35 kg/m^2, while nearly 20% would still propose MBS as the first option. For patients with a *BMI* of 35–40 kg/m^2, the majority of surgeons (> 70%) would opt for MBS. Given that we can achieve long-term weight loss through non-surgical methods in patients with a *BMI* < 35 kg/m^2, the introduction of AOMs seems justified in this group [31]. However, in the case of individuals with obesity-related complications, which apply to most patients over the age of 65, we believe that considering MBS as a first option for these patients should not be regarded as an error [32]. This approach aligns with the evolving understanding of obesity treatment in older populations, where the benefits of surgery can outweigh the risks, especially in the presence of significant comorbidities. As the *BMI* increases further, MBS remains the first choice, with a growing trend towards using AOMs as preparation for MBS. This shows that with the availability of AOMs, we now have a wide range of treatment options. Knowing that MBS is an effective method for patients over the age of 65, we can utilize medications to prepare patients for surgery. Although the relationship between preoperative weight loss and complication risk is not definitively explained in the literature, we do know that weight loss brings several advantages [33–35]. Primarily, it can facilitate the technical conditions of the surgery, and as demonstrated by Roman et al., it can lead to better postoperative outcomes [35]. Therefore, it seems reasonable to prepare patients with higher *BMI*s, especially those over the age of 65 who often present with multiple comorbidities, for surgery using AOMs. We proposed a treatment selection algorithm for patients over the age of 65, based on available literature and the opinions of respondents (Fig. 6).

Limitations

The limitations of the study include a small group of respondents. However, considering the lack of statistical differences between the surgeons' origin and experience and their chosen options, we can assume that these results may be generalized to a broader population. Additionally, the respondents were individuals who engage in social media, which suggests that they are likely keeping up to date with the latest literature on the subject. The study is based on the subjective opinions of bariatric surgeons, which do not

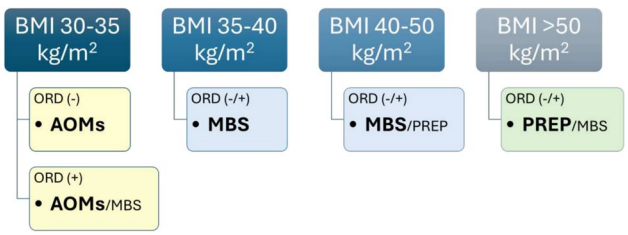


Fig. 6 Algorithm of management in patients over 65 years of age. Bolded preferred options. (*BMI* — body mass index, ORD — obesity-related diseases, AOMs — anti-obesity medicaments, MBS — metabolic bariatric surgery, and PREP — preparation with anti-obesity medicaments before metabolic bariatric surgery)

represent evidence-based medicine and cannot substitute for formal clinical guidelines. The survey reflects current clinical practice patterns rather than standardized protocols. However, due to the gap in the literature regarding specific management approaches for patients over 65 years of age, expert opinions are considered valuable. But these findings should be interpreted with caution. Our results highlight the need for further high-quality research to inform evidence-based recommendations and guide clinical decision-making in this growing patient population.

Conclusions

Our study gathered responses from 184 bariatric surgeons across 53 countries. Over 77% of respondents reported prescribing anti-obesity medications (AOMs), highlighting their integration into obesity management. For patients over 65 years of age, 71% of surgeons preferred sleeve gastrectomy (SG) as the primary surgical option. Treatment preferences varied by *BMI*, with AOMs favored for patients with a *BMI* of 30–35 kg/m^2, and MBS, often preceded by preparation with AOMs, preferred for higher *BMI* cases. No significant differences in treatment choices were observed based on the origin or experience of the surgeons. Based on these findings, an obesity treatment algorithm was proposed to guide clinical decision-making in patients over 65 years of age.

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Author Contribution N.D.-G. and C.P. created the concept of the study. P.J. and P.L. collected the data. N.D.-G. and M.W wrote the main manuscript text. N.D.-G. prepared figures and table. All authors reviewed the manuscript.

Data Availability No datasets were generated or analysed during the current study.

Declarations

Ethics Approval The study was conducted according to the guidelines of the Declaration of Helsinki.

Informed consent Informed consent was obtained from the participant included in the study.

Competing interests The authors declare no competing interests

References

1. Sørensen TIA, Martinez AR, Jørgensen TSH. Epidemiology of obesity. Handb Exp Pharmacol. 2022;274:3–27. https://doi.org/10.1007/164_2022_581.
2. Kloock S, Ziegler CG, Dischinger U. Obesity and its comorbidities, current treatment options and future perspectives: challenging bariatric surgery? Pharmacol Ther. 2023;251: 108549. https://doi.org/10.1016/j.pharmthera.2023.108549.
3. Iftikhar M, Jamal A, Shah MM, et al. Obesity in the elderly. Cases multimorbidity its impact elder patients [Internet]. 2021 Sep 19 [cited 2024 Oct 22];51–70. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532533/
4. Gu D, Andreev K, Dupre ME. Major trends in population growth around the world. China CDC Wkly. 2021;3:604–13. https://doi.org/10.46234/ccdcw2021.160.
5. Janssen F, Bardoutsos A, Vidra N. Obesity prevalence in the long-term future in 18 European countries and in the USA. Obes Facts. 2020;13:514–27. https://doi.org/10.1159/000511023.
6. Rodgers RJ, Tschöp MH, Wilding JP. Anti-obesity drugs: past, present and future. Dis Model Mech. 2012;5:621–6. https://doi.org/10.1242/dmm.009621.
7. Tchang BG, Aras M, Kumar RB, et al. Pharmacologic treatment of overweight and obesity in adults. Endotext 2024 [cited 2024 Oct 22]. https://www.ncbi.nlm.nih.gov/books/NBK279038/
8. Boyle LD, Akbas F, Yazıcı D, McGowan BM, Yumuk V. Pharmacotherapy for older people with obesity. Eur J Intern Med. 2024;S0953–6205(24):00192–4. https://doi.org/10.1016/j.ejim.2024.05.006.
9. Hosseini SR, Zabihi A, Jafarian Amiri SR, et al. Polypharmacy among the elderly. J Midlife Health. 2018;9:97–103. https://doi.org/10.4103/jmh.JMH_87_17.
10. Keine D, Zelek M, Walker JQ, et al. Polypharmacy in an elderly population: enhancing medication management through the use of clinical decision support software platforms. Neurol Ther. 2019;8:79–94. https://doi.org/10.1007/s40120-019-0131-6.
11. Levi J, Wang J, Venter F, Hill A. Estimated minimum prices and lowest available national prices for antiobesity medications: improving affordability and access to treatment. Obesity (Silver Spring). 2023;31:1270–9. https://doi.org/10.1002/oby.23725.
12. Pipek LZ, Moraes WAF, Nobetani RM, et al. Surgery is associated with better long-term outcomes than pharmacological treatment for obesity: a systematic review and meta-analysis. Sci Rep. 2024Apr;14:9521. https://doi.org/10.1038/s41598-024-57724-5.
13. Docimo S Jr, Shah J, Warren G, et al. A cost comparison of GLP-1 receptor agonists and bariatric surgery: what is the break even point? Surg Endosc. 2024. https://doi.org/10.1007/s00464-024-11191-1.
14. Malenfant JH, Batsis JA. Obesity in the geriatric population - a global health perspective. J Glob Health Rep. 2019;3: e2019045. https://doi.org/10.29392/joghr.3.e2019045.
15. Henney AE, Wilding JPH, Alam U, et al. Obesity pharmacotherapy in older adults: a narrative review of evidence. Int J Obes (Lond). 2024May 6. https://doi.org/10.1038/s41366-024-01529-z.

16. Dorner TE, Rieder A. Obesity paradox in elderly patients with cardiovascular diseases. Int J Cardiol. 2012;155:56–65. https://doi.org/10.1016/j.ijcard.2011.01.076.
17. Flegal KM, Kit BK, Orpana H, et al. Association of all-cause mortality with overweight and obesity using standard body mass index categories: a systematic review and meta-analysis. JAMA. 2013;309:71–82. https://doi.org/10.1001/jama.2012.113905.
18. Wattanachayakul P, Yanpiset P, Wannaphut C, et al. Association between obesity paradox in the all-cause mortality among patients with cardiac resynchronization therapy device. Pacing Clin Electrophysiol. 2024. https://doi.org/10.1111/pace.15069.
19. Winter JE, MacInnis RJ, Wattanapenpaiboon N, et al. BMI and all-cause mortality in older adults: a meta-analysis. Am J Clin Nutr. 2014;99:875–90. https://doi.org/10.3945/ajcn.113.068122.
20. Fried M, Yumuk V, Oppert JM, et al. International Federation for Surgery of Obesity and Metabolic Disorders-European Chapter (IFSO-EC); European Association for the Study of Obesity (EASO); European Association for the Study of Obesity Obesity Management Task Force (EASO OMTF). Interdisciplinary European guidelines on metabolic and bariatric surgery. Obes Surg. 2014;24:42–55. https://doi.org/10.1007/s11695-013-1079-8.
21. De Luca M, Shikora S, Eisenberg D, et al. Scientific Evidence for the updated guidelines on indications for metabolic and bariatric surgery (IFSO/ASMBS). Obes Surg. 2024Sep 25. https://doi.org/10.1007/s11695-024-07370-7.
22. Parmar C, Mahawar KK, Carr WRJ, et al. Bariatric surgery in septuagenarians: a comparison with <60 year olds. Obes Surg. 2017;27:3165–9. https://doi.org/10.1007/s11695-017-2739-x.
23. Nor Hanipah Z, Punchai S, Karas LA, et al. The outcome of bariatric surgery in patients aged 75 years and older. Obes Surg. 2018;28:1498–503. https://doi.org/10.1007/s11695-017-3020-z.
24. Dowgiałło-Gornowicz N, Jaworski P, Lech P, et al. Current trends in bariatric surgery in patients older than 65 years in Poland. Pol Przegl Chir. 2024;96:1–5. https://doi.org/10.5604/01.3001.0053.9871.
25. Brown WA, Liem R, Al-Sabah S, et al. IFSO Global Registry Collaboration. Metabolic bariatric surgery across the IFSO chapters: key insights on the baseline patient demographics, procedure types, and mortality from the Eighth IFSO Global Registry Report. Obes Surg. 2024;34:1764–1777. https://doi.org/10.1007/s11695-024-07196-3.
26. Pi-Sunyer X, Astrup A, Fujioka K, et al. SCALE Obesity and Prediabetes NN8022–1839 Study Group. A randomized, controlled trial of 3.0 mg of liraglutide in weight management. N Engl J Med. 2015;373:11–22. https://doi.org/10.1056/NEJMoa1411892.
27. Perna S, Guido D, Bologna C, et al. Liraglutide and obesity in elderly: efficacy in fat loss and safety in order to prevent sarcopenia. A perspective case series study. Aging Clin Exp Res. 2016;28:1251–1257. https://doi.org/10.1007/s40520-015-0525-y.
28. Wilding JPH, Batterham RL, Calanna S, et al. STEP 1 Study Group. Once-weekly semaglutide in adults with overweight or obesity. N Engl J Med. 2021;384:989–1002. https://doi.org/10.1056/NEJMoa2032183.
29. Jastreboff AM, Aronne LJ, Ahmad NN, et al. SURMOUNT-1 Investigators. Tirzepatide once weekly for the treatment of obesity. N Engl J Med. 2022;387:205–216. https://doi.org/10.1056/NEJMoa2206038.
30. Rosenstock J, Frias J, Jastreboff AM, et al. Retatrutide, a GIP, GLP-1 and glucagon receptor agonist, for people with type 2 diabetes: a randomised, double-blind, placebo and active-controlled, parallel-group, phase 2 trial conducted in the USA. Lancet. 2023;402:529–44. https://doi.org/10.1016/S0140-6736(23)01053-X.
31. Aminian A, Chang J, Brethauer SA, et al. American Society for Metabolic and Bariatric Surgery Clinical Issues Committee ASMBS updated position statement on bariatric surgery in class I obesity (BMI 30–35 kg/m2) Surg Obes Relat Dis. 2018;14:1071–1087. https://doi.org/10.1016/j.soard.2018.05.025.
32. Dowgiałło-Gornowicz N, Lech P, Major P, Collaborative Study Group. Bariatric and metabolic surgery in patients older than 65 years - a multicenter study. Obes Surg. 2023;33:3106–3111. https://doi.org/10.1007/s11695-023-06750-9.
33. Dowgiałło-Gornowicz N, Lech P, Katkowski B, et al. Risk factors for bariatric surgery in patients over 65 years of age-a multicenter retrospective cohort study. Langenbecks Arch Surg. 2024;409:115. https://doi.org/10.1007/s00423-024-03304-0.
34. Stefura T, Droś J, Kacprzyk A, et al. Influence of preoperative weight loss on outcomes of bariatric surgery for patients under the enhanced recovery after surgery protocol. Obes Surg. 2019;29:1134–41. https://doi.org/10.1007/s11695-018-03660-z.
35. Roman M, Monaghan A, Serraino GF, et al. Meta-analysis of the influence of lifestyle changes for preoperative weight loss on surgical outcomes. Br J Surg. 2019;106:181–9. https://doi.org/10.1002/bjs.11001.