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# Endoscopic management of intragastric balloon related gastric outlet obstruction: A case report

O'Neill RS *et al*. Gastric outlet obstruction from IGB

**Abstract**

BACKGROUND

Obesity remains a significant global health concern, and intragastric balloons (IGBs) offer a minimally invasive weight loss option for patients who fail lifestyle and pharmacotherapy interventions. IGBs can cause complications ranging from mild symptoms to severe issues like gastric outlet obstruction (GOO). This report discusses a 39-year-old woman who presented with clinical and radiological features of GOO post Silimed IGB placement.

CASE SUMMARY

A 39-year-old woman presented to our institution with two-week history of abdominal pain, nausea and vomiting post prandially. This was in the context of a Silimed IGB placement two weeks prior to presentation for weight loss in the context of obesity. A computed tomography of the abdomen demonstrated the IGB device in the body and prepyloric region, with proximal dilatation of the body and fundus of the stomach which contained gastric contents. Due to concerns for GOO, the IGB was removed endoscopically with subsequent symptom alleviation. In addition to this, we performed a literature search of cases of IGB related GOO using the PubMed and Web of Science databases from inception date to the August 26, 2024. A total of 27 articles were included in the analysis, identifying 29 cases of IGB-related GOO. These patients commonly presented with nausea, vomiting and abdominal pain, with symptom onset varying from 3 days to 18 months. Abdominal computer tomography was the primary diagnostic tool and endoscopic removal was the standard treatment modality.

CONCLUSION

This is the first reported case of GOO caused by Silimed IGB. While effective for weight reduction, IGB-related GOO is a rare but serious complication requiring endoscopic retrieval. Future research should aim to identify patient factors linked to this complication to enhance clinical-decision making and outcomes.

**Key Words:** Gastroenterology; Obstruction; Endoscopy; Gastric outlet obstruction; Intragastric balloon; Case report

O'Neill RS, Goh LH, Lee C, Jia K, Feller R. Endoscopic management of intragastric balloon related gastric outlet obstruction: A case report. *World J Clin Cases* 2025; In press

**Core Tip:** Gastric outlet obstruction (GOO) secondary to intragastric balloon insertion for obesity management is a rare and severe complication with significant patient morbidity. The onset of symptoms of GOO secondary to IGB is variable with the management usually endoscopic. We present the case of a 39-year-old woman who presented with clinical and radiological features of GOO secondary to Silimed intragastric balloon insertion which was successfully managed with endoscopic removal. The article reveals a predilection for this complication in women with endoscopic removal being the most commonly utilized modality in treatment.

## INTRODUCTION

Obesity is a complex, chronic disease and is a leading yet largely preventable cause of morbidity and mortality worldwide[1,2]. The prevalence of the disease continues to rise globally, affecting both developed and developing nations. It is predicted that by 2030, the number of people suffering from obesity will have doubled since 2010, reaching over 1 billion adults worldwide[3]. Obesity is characterized as a multifactorial condition influenced by a combination of genetic predisposition, environmental, and behavioural factors. This intricate interplay contributes to the challenges for effective management and places a significant strain on healthcare systems worldwide. Notably, obesity is associated with a spectrum of serious comorbidities, including type 2 diabetes mellitus, cardiovascular disease, and metabolic-associated steatotic liver disease. Additionally, it has also been linked to a heightened risk of obstructive sleep apnea, osteoarthritis, and several malignancies such as colorectal, breast and endometrial cancers[3,4].

Lifestyle modification (LM) is the first-line treatment for obesity. Despite intensive LM that includes calorie restriction, increased physical activity and structured behavioural programs, weight loss is typically minimal to moderate[5]. Most patients struggle to maintain a long-term weight loss of at least 5%[6]. Newer anti-obesity medications, particularly the glucagon-like peptide-1 receptor agonist, have shown greater outcomes compared to older therapies and are increasingly prescribed for those who do not respond adequately to LM[7,8]. However, their use is limited by high costs, supply shortages, insurance coverage issues, and potential side effects[9]. There are also concerns about long-term safety, including the possibility of irreversible gastrointestinal motility disorders[10]. Often considered the most effective treatment for class II and class III obesity [body mass index (BMI) ≥ 35 kg/$m^2$ and BMI ≥ 40 kg/$m^2$ respectively] is bariatric and metabolic surgery[3,11,12]. This is a surgical procedure carried out to modify the anatomy of the stomach or the intestine to achieve weight loss. Common bariatric surgery includes gastric sleeve and gastric bypass. The rationale for these surgeries is to reduce the size of the stomach resulting in easy satiation with a smaller amount of food intake. While this is a well-established method for effective and sustained weight reduction, it is an invasive procedure and is associated with significant costs and potential lifelong adverse effects[13]. As such, bariatric surgery is often considered only after non-surgical options have been exhausted.

These factors have prompted further research into less-invasive alternatives that could potentially be more acceptable to the general population, notably endoscopic bariatric and metabolic therapies (EBMTs). These therapies have been developed and refined over the past three decades and are now increasingly performed worldwide[14,15]. Examples of EBMTs are intragastric balloons (IGBs), endoscopic gastric remodelling, and endoscopic sleeve gastroplasty[16]. IGB have emerged as an effective yet minimally invasive, temporary method of inducing weight loss, with previous studies demonstrating a mean absolute weight loss of 6.12 kg and mean percentage of excess weight loss of 17.98%[17]. Since their inception, IGBs have evolved and with this, the complication rate associated with their insertion has reduced

dramatically. Although IGBs offer a less invasive approach to weight loss, complications can still occur. The reported complication rates are approximately 0.7% and 6.37% for major and minor complications respectively, with early removal (before 6 months) required in 3.62% of cases[18]. Common adverse events include abdominal pain, nausea and vomiting. Significant complications, namely spontaneous deflation and IGB migration, and gastric outlet obstruction (GOO) are relatively rare entities with the literature only limited to case reports. Regarding IGB related intestinal or gastric obstruction, it is reported that approximately 0.8% of balloons insertion results in this complication[19]. Although the incidence of this complication is low, early recognition and timely intervention are crucial to reduce the risk of gastric ulceration and subsequent perforation.

Here we present a case of a 39-year-old woman who presented to our institution with clinical and radiological features suggestive of a GOO two weeks after the insertion of a Silimed IGB. Additionally, the article was conducted to further characterize and analyse this complication in the context of IGB insertion. To investigate the incidence of GOO with IGB insertion, we conducted a literature search to identify studies relevant to the aericle. A PubMed literature search was conducted using the search strategy {["balloon" (All Fields)] AND ["gastric" (All Fields)] AND ["obstruction" (All Fields)]}. We subsequently performed a more focused search on Web of Science with the search strategy [All = (Intragastric balloon) AND (Gastric outlet obstruction)]. The search was performed by two of the authors (O'Neill RS and Goh LH). All article types discussing GOO resulting from IGB insertion were considered for inclusion in the article. The time frame for inclusion extended from inception until the August 26, 2024. The inclusion criteria required the articles to be published in English, either as full texts or abstracts, and fall within the specified date range. Moreover, each article had to document at least one case of GOO in relation to IGB placement. Any articles where the abstract or full text was unavailable for review were excluded from the analysis. Articles that were not published in English, or did not reference both GOO and IGB placement were also excluded. After applying these criteria, the selected articles were carefully examined to

extract relevant data, including the number of cases reported and detailed information pertaining to each case. Additionally, the reference lists of the included articles were thoroughly reviewed, and any additional cases that met the inclusion criteria were added to the analysis.

An initial literature search on PubMed identified 414 articles. After reviewing article titles and abstracts, 368 articles were excluded. Of the 46 remaining articles, 28 were further excluded due to being non-English publications or lacking relevant information on GOO in the full-text review. A more targeted search using the Web of Science yielded 27 additional articles. After removing duplicates, seven additional articles were added to the analysis. Further analysis of article reference lists revealed an additional two articles which were included for analysis. Figure 1 depicts the search algorithm implemented for the study. A total of 27 articles[20-46] (Table 1) were included in the final analysis, identifying 29 cases of GOO secondary to IGB insertion. The vast majority of these cases were female (92.3%), with most having a history of obesity necessitating IGB insertion. Other common comorbidities included dyslipidaemia, pre-diabetes, iron deficiency anaemia, and hiatus hernia. All patients presented with gastrointestinal symptoms, primarily nausea, vomiting, and abdominal pain. The onset of symptoms following IGB insertion varied widely, ranging from as early as three days to as late as 18 months. The median BMI on insertion was 35 $kg/m^2$, while the median age was 44 years old. The most implicated IGB was the Orbera IGB (38.1%) followed by the Allurion IGB (28.6%). The most frequently used diagnostic tool was an abdominal computed tomography (78.3%), which typically revealed a dilated stomach proximal to the balloon. In most cases, endoscopic removal of the balloon was the standard treatment (93.1%), however there were two notable exceptions. Badiuddin *et al*. reported a case in which GOO caused by an Allurion-Elipse IGB that was successfully resolved through percutaneous aspiration of the balloon's contents, allowing it to pass naturally without the need for endoscopic or surgical intervention[36]. An article described a case where endoscopic removal failed, necessitating laparoscopic intervention to remove the IGB[37]. After removal, symptoms and electrolyte

abnormalities resolved in most patients, with minimal complications. The most common complication was gastric ulceration at the site of IGB insertion. More serious complications included two cases of esophageal perforation associated with the use of an overtube during IGB removal[27,28]. In these cases, the patients developed odynophagia and fever within a day of the procedure. Both were managed conservatively with intravenous antibiotics.

## CASE PRESENTATION

### *Chief complaints*

A 39-year-old Spanish woman presented to our institution with a two-week history of abdominal pain, nausea and vomiting post-prandially to both liquids and solids.

### *History of present illness*

This was following the insertion of a Silimed IGB two weeks earlier for weight loss. She had an office job and led a sedentary lifestyle. She was obese with a BMI of 32 $kg/m^2$.

### *History of past illness*

She had no medical issues and was not on any regular medications.

### *Personal and family history*

She had no medical history nor significant family history.

### *Physical examination*

Her initial examination demonstrated epigastric tenderness with an obvious palpable mass consistent with the recently inserted IGB.

### *Laboratory examinations*

Initial biochemical assessment was unremarkable.

*Imaging examinations*

A computed tomography of the abdomen demonstrated the IGB device in the body and prepyloric region, with proximal dilatation of the body and fundus of the stomach which contained gastric contents. Thickening of the pylorus was also noted (Figure 2).

## FINAL DIAGNOSIS

The clinical and radiological findings were consistent with a GOO secondary to IGB insertion.

## TREATMENT

Attempted external manipulation of the IGB *via* abdominal palpation was unsuccessful, and due to clinical features consistent with a GOO, the patient proceeded to have an urgent endoscopy. Endoscopic evaluation revealed a food bezoar in the proximal body of the stomach and fundus, accompanied by a dilated proximal stomach (Figure 3A). Distally, the IGB was visualized in the prepyloric region and distal antrum of the stomach. Passage of the adult gastroscope beyond the IGB to access the pylorus was not successful, reaffirming the clinical suspicion of a GOO. Using and injector needle, fenestrations were made in the IGB, and suction was applied, leading to decompression. Approximately five hundred millilitres of methylene blue solution was removed, successfully deflating the balloon (Figure 3B). The deflated IGB was then retrieved endoscopically using raptor grasping forceps. Post-retrieval examination of the distal antrum and prepyloric region revealed no ulceration or perforation.

## OUTCOME AND FOLLOW-UP

The patient's symptoms resolved following the procedure with no further complications. She was monitored overnight and was discharged home in a stable condition.

## DISCUSSION

Obesity is a global epidemic affecting approximately 760 million adults, with numbers expected to rise further[3]. The disease is a chronic, relapsing disease driven by a complex interplay between genetic predisposition, physiological, psychological, sociocultural and economic factors. It is associated with a range of morbidities, including cardiovascular diseases, diabetes mellitus, liver disease, certain cancers, osteoarthritis, and depression[47,48]. Obesity is particularly stark in developing countries, with these communities often faced with the burden of undernutrition, a heavy reliance on inexpensive, calorie-dense processed foods, and a lack of awareness about obesity's health implications[3]. Coupled with limited healthcare resources, this only serves the rising prevalence of the disease and further increases the strain on the already fragile healthcare systems. On the other hand, the key contributor of obesity in high-income countries stems from an abundance of food supplies, sedentary lifestyles, and, in some cases, cultural attitudes that associate higher weight with wealth and affluence, despite significantly better access to healthcare education[3,49]. This highlights the need for context-specific, comprehensive interventions that address socioeconomic inequities, cultural perceptions, and the broader determinants of health.

As obesity becomes more common, and its associated health risks are better understood, there is a growing emphasis on exploring weight loss strategies beyond LM and pharmacological treatments. This has led to the rising popularity of bariatric surgery, including sleeve gastrectomy and Roux-en-Y gastric bypass surgery. While these surgical options are effective, they are not without limitations. Many patients face barriers to access bariatric surgery due to financial constraints, limited availability, and the potential for significant complications[50]. Furthermore, the fear of undergoing invasive surgery often deters individuals, especially when non-surgical alternatives are available. As such, EBMT procedures such as IGB and endoscopic sleeve gastroplasty have emerged as an attractive option for weight loss given their minimally invasive nature and perceived lower complication rates compared to traditional bariatric surgery. They can also serve as an adjuvant therapy prior to bariatric surgery. Unfortunately, for the majority of individuals with obesity, socioeconomic constraints

limit their access to pharmacotherapy, bariatric surgery and endoscopic bariatric procedures. The most recent guidelines published by the American Society for Gastrointestinal Endoscopy and the European Society of Gastrointestinal Endoscopy made a conditional recommendation (based on low quality evidence) that in those with a BMI ≥ 30 kg/m², with or without an obesity-related comorbidity, or a BMI of 27 to 29.9 kg/m², with at least one obesity-related comorbidity, should pursue EBMT alongside LMs rather than relying on LMs alone[16]. With these recommendations, it is likely that adoption of these approaches will increase among clinicians, which may subsequently lead to a rise in procedural-related complications.

IGBs were initially introduced in the 1980s as a novel, minimally invasive option for weight loss. It was inspired by the observation that bezoars, or foreign objects in the stomach could induce a sensation of satiety and reduce food intake. The utility of early iterations of the IGBs were unfortunately limited due to the high rates of complications such as gastric ulcers, balloon deflation and migration. Subsequent advancements in materials and designs lead to a resurgence in their popularity in the 2000s. Newer devices such as the Orbera, Spatz3 and Allurion Elipse balloons were designed to be more durable, with enhanced biocompatibility and better patient tolerance[51,52]. IGBs rely upon a soft balloon that is filled with either saline, methylene blue or air and placed in the stomach[51,52]. The mechanism through which IGBs promote weight loss is by restriction of stomach volume and likely by a change in gut motility[53]. It is typically inserted endoscopically. Alternatively, the device can be swallowed, negating the need for endoscopic placement. In terms of efficacy, newer IGB models can achieve a BMI reduction of 5-9 points during the six-month period they remain in place; however, there is a risk of rebound in weight gain after removal[54].

Whilst the perception is that IGBs are well tolerated, more than 90% of patients develop nausea, vomiting, dyspepsia and abdominal pain, and approximately 6% of patients require early removal due to intolerance. Less frequent but more severe complications include balloon leakage, gas production, migration, GOO, pancreatitis and visceral perforation[55]. These severe complications are low, ranging from

approximately 1%-6%[18,19]. GOO is the mechanical blockage of gastric emptying and presents with nausea, vomiting, abdominal pain, distension, early satiety and weight loss[56]. It is a relatively uncommon complication associated with IGB insertion with the literature only limited to isolated case reports. The timing of this complication is unpredictable, with cases published demonstrating diagnosis within three days of insertion or up to 18 months. However, it is important to note that in cases where GOO occurred after six months, inadequate patient follow up could be cited as an explanation for the complication rather than the device or procedure itself. Review of the literature demonstrates that GOO occurs more frequently in women, with the most frequently implicated IGB being the Orbera IGB. Complications associated with GOO secondary to IGB are mainly gastric ulceration and erosions secondary to pressure necrosis, while electrolyte abnormalities secondary to vomiting have been previously reported in the literature. All four Food and Drug Administration - approved IGBs required endoscopic removal after 6 months due to the risk of spontaneous deflation and migration.

Endoscopic removal is the most effective and commonly pursued modality with regards to management of GOO secondary to IGB. Percutaneous aspiration and spontaneous passage of the IGB have also been published in the past along with laparoscopic removal post endoscopic failure[36,37]. The advantage of endoscopic removal of IGB causing GOO allows for inspection of the surrounding gastric mucosa to assess for localised complications, namely erosions and ulceration. These complications may be missed in the case of surgical or percutaneous removal, subsequently resulting in significant morbidity to the patient. Effective removal of an impacted IGB results in rapid symptom amelioration. However, complications after removal, namely esophageal perforation have been documented, particularly in cases where an endoscopic overtube was used during IGB extraction[27,28]. Although IGBs are effective at inducing weight loss, patients must remain highly motivated to sustain their weight loss through regular exercise and a healthy diet upon removal of the balloon. However, many individuals struggle to maintain these LMs, often regaining

weight and reverting to their original BMI[57-59]. To support long-term success, education and a strong awareness about the health risks associated with obesity are critical. In many developing countries, socioeconomic challenges exacerbate the issue. Addressing these underlying factors is essential to achieving sustainable weight management in these population[3].

Our case resembles previous literature, particularly regarding patient demographics and the timing of removal. Notably, this is the first published case documenting GOO secondary to the use of the Silimed IGB. A potential explanation for this could be the less frequent use of the Silimed IGB compared to other IGBs namely the Orbera, Spatz3 and Allurion Elipse, which are more commonly employed in clinical practice[60]. Although the incidence of GOO secondary to IGB is reported as low, several factors may contribute to this finding. There is likely an element of reporting bias in the published literature regarding outcomes following IGB insertion. In the presented case, proximal dilatation on cross sectional imaging along with endoscopic visualisation of a food bezoar proximal to the IGB with upstream gastric dilatation affirmed the presence of an iatrogenic GOO. Future studies should judiciously document imaging and endoscopic findings in patients presenting with this perceived "intolerance" following IGB insertion to ensure accurate reporting of complications, including but not limited to GOO. This allows clinicians to be informed in their clinical practice, and more importantly, allows patients to make informed decisions regarding endobariatric procedures.

A major limitation of this study lies in the selection of studies included for analysis. Due to the rarity of this complication, most of the studies were case reports, highlighting a distinct lack of robust evidence for analysis. Among the included studies, two were prospective observational studies[22,26], and two were retrospective cohort studies[20,32]. Despite their inclusion in this article, it should be noted that details pertaining to the cases of GOO secondary to IGB were limited in the published articles, thus limiting their value with reference to inclusion for qualitative and quantitative analysis. Additionally, the heterogeneity of study designs, patient populations, and

reporting criteria further complicates the ability to draw definitive conclusions. Moreover, reporting bias is likely a significant factor affecting the literature. Many studies classify "patient intolerance" as a reason for early IGB removal without fully elucidating an underlying complication such as a GOO or partial GOO. This misclassification may lead to an underestimation of the true incidence of GOO. Standardised reporting criteria for IGB-related complications, including detailed imaging and endoscopic findings, are essential to enhance the accuracy and reliability of future studies. The limited availability of long-term follow-up data further constrains the understanding of IGB efficacy and safety. Most studies focus on short-term outcomes, neglecting the potential for delayed complications or the sustainability of weight loss. The current evidence in the published literature demonstrates that women more frequently experience GOO post IGB insertion and therefore should be closely monitored following insertion to ensure timely recognition of this complication if it were to occur. This observation however may be influenced by a higher prevalence of obesity in women and therefore a higher proportion of women opting for EBMT including IGB insertion compared to men[3]. This potentially reflects a selection bias or sociocultural factors influencing the pursuit of weight-loss interventions.

Prospective studies should be conducted in centres specializing in EBMT to identify patient demographic and clinical characteristics that increase the risk of developing GOO following IGB insertion. Additionally, future studies should also focus on assessing long-term outcomes in those with IGB insertion to inform about delayed complications and the sustainability of the weight reduction. Such data would be instrumental in redefining clinical guidelines and optimising the safe and effective use of IGBs to enhance their overall success. In addition to this, future studies should aim to determine what method of surveillance can be implemented in patients post IGB insertion to ensure complications do not arise, or in the event where they do, can be addressed in a timely manner. Abdominal ultrasound has previously been implemented in the case of IGB insertion to assess the status of the IGB along with monitor for complications[61]. Given the recommendation that IGBs remain in situ for

up to 6 months and the wide variation in time to GOO secondary to IGB insertion, time points for surveillance imaging have not been established. Future studies should aim to determine whether intensive surveillance with abdominal ultrasound in patients post IGB insertion has any clinical utility or is indeed cost effective.

## CONCLUSION

Obesity is a complex and chronic disease with a wide range of serious complications, and requires a comprehensive management. While LM remains the first line of treatment for obesity, many patients often require additional interventions, such as pharmacotherapy, endobariatric procedures or bariatric surgery to achieve a reasonable and sustainable weight reduction. IGB insertion is an endobariatric procedure that is effective in weight reduction and is increasing in popularity. However, IGB insertion resulting in GOO is a concerning complication associated with significant patient morbidity. This complication is relatively uncommon and this is the first reported case of GOO caused by Silimed IGB. Despite its scarcity, patients should be educated on monitoring for symptoms suggestive of GOO. Endoscopic retrieval is the gold standard of management of IGB impaction resulting in GOO, and results in rapid symptomatic amelioration. Further research should aim to determine what patient demographics, aside from female gender, are associated with this complication to better inform clinical decision-making and improve patient outcomes.

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