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Saline Filled Intra-gastric Balloon Implantation Techniques

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Abstract

These are two conventional intra-gastric balloon implantation techniques, finger technique, and front attachment method. The insertion from the oral cavity to the stomach is performed nearly blindly in two techniques. A new technique, side attachment method, is recently presented for easy and safe insertion due to a clear front view like a diagnostic endoscopy. Experts can use any technique for intra-gastric balloon implantation, but side attachment method must be easier and safer method for beginners of intra-gastric balloon implantation.

Keywords: Intra-gastric balloon; Endoscopy; Obesity

Abbreviation

IGB: Intra-gastric Balloon; FAM: Front Attachment Method; SAM: Side Attachment Method

Introduction

The intra-gastric balloon (IGB) is the most widely used endoscopic bariatric procedure technique. This procedure has shown its efficacy and safety for achieving significant weight reduction in obese people. The mechanism of IGB is very simple. IGB behaves like space occupying object inside the stomach consequently decreasing the effective gastric volume and changing neurohormonal effects [1-5]. Intra-gastric balloon procedure is grossly divided into three steps: Implantation, managing the implanted intra-gastric balloon, and removal. Among these steps, the first hurdle for intra-gastric balloon procedure is implantation. Currently used implantation techniques commonly adopted a blind insertion from the oral cavity to the stomach. Most IGBs including Orbera® (Apollo Endosurgery, Austin, TX, United States) are blindly inserted into the stomach without an endoscopic guide, so-called finger technique [6]. End-Ball® (Endalis, Brignais, France) is inserted into the stomach by the fitting introduction kit at the end of an endoscope, front attachment method (FAM). This method uses an endoscope as the guide for IGB implantation. However, the endoscopic view is nearly blind because an introduction kit covers the camera of an endoscope [7]. Blind insertion can cause oral cavity and gastrointestinal tract bleeding. If it is possible to insert an IGB with the diagnostic endoscopic visual field, the implantation would be much easier. In this chapter, the skeleton of three IGB impalation techniques is presented: two currently used implantation techniques, finger technique and FAM, and side attachment method (SAM), which enables non-blind insertion.

Preparation before Procedure

Preparing filling material

Filling material needs to be prepared before beginning implantation procedure. 5 to 10ml methylene blue is mixed with 500cc normal saline. A large amount of leakage from an IGB causes urine color changes to blue.

Preparing a patient

A patient undergoes IGB implantation under conscious sedation. The patient was connected to monitoring devices and placed in left lateral position. A patient underwent IGB implantation under procedural sedation and analgesia, with midazolam and pethidine; if needed, propofol can be used. Oxygen was provided continuously through a nasal cannula. Intravenous medications were administered through an indwelling cannula. After adequate conscious sedation was achieved, the patient was intubated, and the endoscope was advanced under direct visualization to the duodenum. The endoscope was withdrawn after complete examination for the presence of grossly anatomical contraindications.

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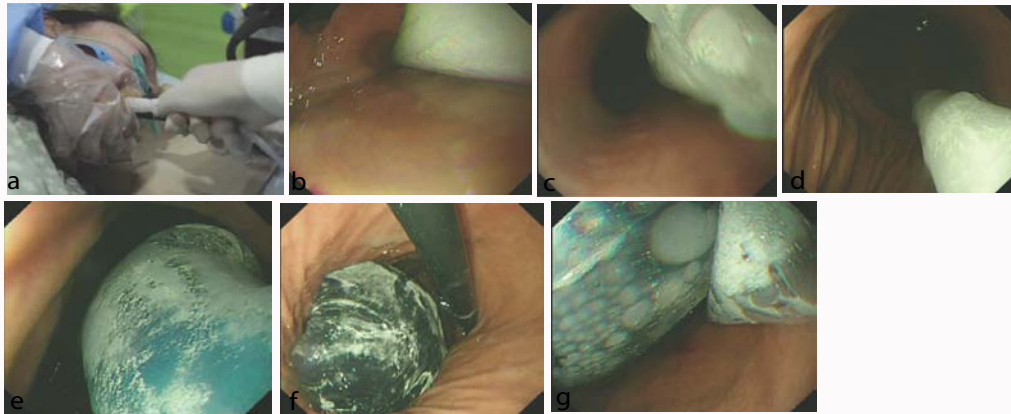


Figure 1: Finger technique.
 Figure 1(a): A practitioner inserts the pouch of the introduction kit into the oral cavity.
 Figure 1(b): The introduction kit passes the left pyriform sinus.
 Figure 1(c): The introduction kit is passing through the esophagus.
 Figure 1(d): The introduction kit arrives at the stomach.
 Figure 1(e): Saline is injected into the IGB.
 Figure 1(f): The IGB is released from the pouch.
 Figure 1(g): The introduction kit is pulled up to disconnect the IGB from a catheter (H) The IGB is located in the stomach.

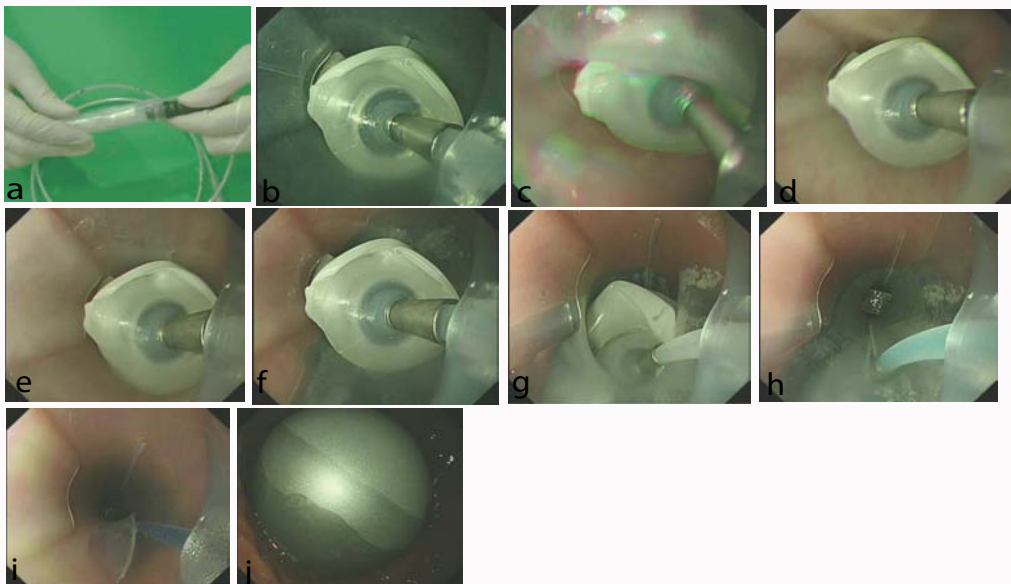


Figure 2: Front attachment method.
 Figure 2(a): The introduction kit is fixed to the end of the endoscope.
 Figure 2(b): The central part is opaque, and the peripheral part is relatively transparent.
 Figure 2(c): The oral cavity is visualized, and the bent pouch is noticed.
 Figure 2(d): The whitish blenched mucosa is observed through the transparent peripheral part when the introduction kit passes the pyriform sinus.
 Figure 2(e): The longitudinal wrinkles of esophageal mucosa compressed by the pouch is observed.
 Figure 2(f): The dark space is observed through the transparent peripheral part when the introduction kit arrives at the stomach.
 Figure 2(g): 150cc air is injected into the balloon.
 Figure 2(h): 500cc saline is injected into the balloon.
 Figure 2(i): The catheter is disconnected from the IGB.
 Figure 2(j): The balloon is observed in the stomach at follow-up endoscopy.

Implantation Methods

Finger technique

Figure technique is a direct blind insertion method by pushing IGB introduction kit from the oral cavity to the stomach. Most IGBs including Orbera[®] uses this implantation method. In the standard procedure, an endoscopy is enrolled after an introduction kit is inserted into the stomach. However, endoscopic views of each step of insertion are presented for explaining this technique in this part. The

procedure is as follows.

1. A practitioner inserts the pouch of the introduction kit into the mouth by finger manipulation (Figure 1a).
2. The introduction kit passes through pyriform sinus, the most important moment of this technique (Figure 1b).
3. The introduction kit is passing through the esophagus (Figure 1c).

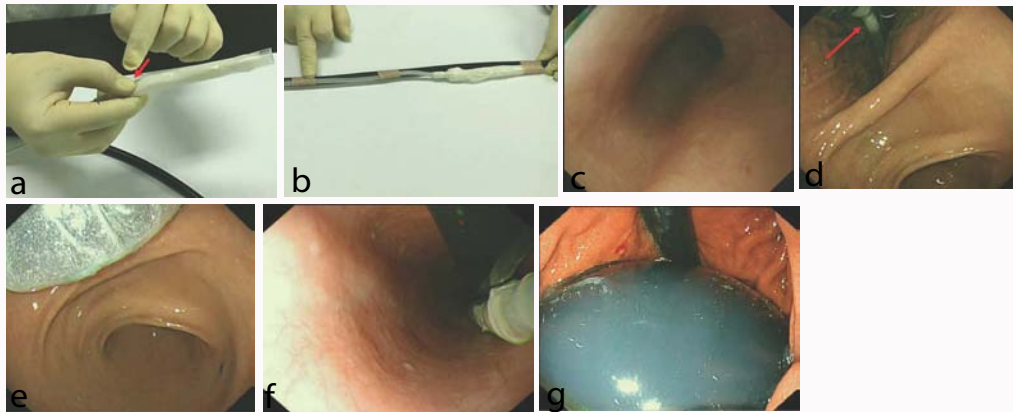


Figure 3: Side attachment method (SAM).

Figure 3(a): A window, 3.5cm X 1cm, for releasing an IGB is created at the pouch (red arrow).

Figure 3(b): The opposite side of the window is attached to the endoscope by paper plasters. The tip of the pouch is bound to the point 2cm from the end of the endoscope, and the catheter is bound to the shaft of the endoscope at 20 cm and 30 cm from the end of the endoscope.

Figure 3(c): The visual field of SAM is like the visual field of a diagnostic endoscopy.

Figure 3(d): Retroflexion view with SAM shows the placement of the introduction kit in the stomach (red arrow).

Figure 3(e): Retroflexion view also enables the practitioner to monitor an inflating IGB.

Figure 3(f): The IGB is disconnected from the feeding catheter, a photograph from the second endoscopy.

Figure 3(g): The IGB is observed in the stomach.

4. The introduction kit arrives at the stomach (Figure 1d).
5. An endoscope is inserted into the stomach to observe the filling process.
5. Saline is injected into an IGB (Figure 1e).
6. The IGB is released from the pouch (Figure 1f)
6. When the anticipated volume is filled, the introduction kit is pulled up to disconnect the IGB from a catheter (Figure 1g).
7. The IGB is located in the stomach (Figure 1h).

Front attachment method

The saline/air-filled End-Ball® uses FAM. It does not have an independent introduction kit that is introduced separately before the endoscope. The balloon is packed in the pouch, which is fixed to the end of the endoscope. Thus, the endoscope and balloon are introduced together; the endoscope is used as a guide for passage of the balloon into the stomach and enables direct visualization of inflation and release of the balloon. The key point of FAM is observing the situation through the transparent area between the balloon and the endoscope. Each step of FAM is as follows.

1. The introduction kit is fixed to the end of the endoscope (Figure 2a).
2. The central part is opaque; the peripheral part is relatively transparent so that a practitioner can observe the situation through this part (Figure 2b).
3. The introduction kit is inserted into the oral cavity (Figure 2c).
4. The introduction kit passes the pyriform sinus (Figure 2d). The whitish blenched mucosa is observed through the transparent peripheral part.
5. The introduction kit passes the esophagus (Figure 2e).
6. The introduction kit arrives at the stomach (Figure 2f). When the dark space is observed through the transparent peripheral part, the introduction kit is in the stomach.

7. 150cc air is injected into the balloon (Figure 2g).
8. 500cc saline is injected into the balloon (Figure 2h)
9. The introduction kit and the endoscope are pulled up together to disconnect the IGB from the catheter (Figure 2i).
10. Follow up endoscopy reveals the balloon is placed in the stomach (Figure 2j).

Side attachment method

SAM provides a diagnostic endoscopic visual field during implantation [8,9]. In SAM, the endoscope behaves like a guide to deliver an introduction kit into the stomach by attaching the introduction kit to the shaft of the endoscope side by side. The introduction kit does not cover the camera of an endoscope so that a practitioner can accomplish a diagnostic endoscopic visual field [8,9]. Additionally, retroflexion view allows a practitioner to identify the placement of the introduction kit in the stomach and to observe the inflation of an IGB time to time [8,9]. Each step of SAM is as follows.

1. A window, 3.5cm X 1cm, for releasing an IGB is created at the pouch (Figure 3a).
2. The introduction kit is attached to the shaft of the endoscope side by side (Figure 3b).
 - 1) The opposite side of the window is attached to the endoscope by paper plasters.
 - 2) The tip of the pouch is bound to the point 2cm from the end of the endoscope. The catheter is bound to the shaft of the endoscope at 20 cm and 30 cm from the end of the endoscope.
3. Introduction kit is inserted following the endoscope. While passing through the oral cavity, the pyriform sinus, and the esophagus, the diagnostic endoscopic view is accomplished (Figure 3c).
4. After inserting the endoscope to the antrum, retroflexion is used to identify the placement of the introduction kit in the stomach (Figure 3d).
5. Retroflexion view enables the practitioner to observe the

inflating IGB (Figure 3e).

6. After filling anticipated volume, the practitioner pulls up the introduction kit with the endoscope at the cardia to disconnect the IGB from the feeding catheter (Figure 3f).

7. Follow up endoscopy identifies that the IGB is in the stomach (Figure 3g).

Discussion

IGBs have been used to treat obesity since their introduction in 1982 [10]. Numerous studies showed that IGBs are an effective and low-cost method to achieve temporary weight loss in morbidly obese individuals, leading to significant decrease in morbidity and mortality rates [11,12]. The most widely used IGB to date is the Orbera[®], which fulfilled the specified requirements of the Tarpon Springs Conference in 1987 [13]. Orbera and its replicas adopted finger technique: inserting an IGB into the oral cavity and pushing into the stomach with a trocar without an endoscopic guide. The advantage of finger technique is that it is a simple method: a practitioner just needs to push an IGB without controlling an endoscope. However, finger technique is a blind insertion method, so the procedure cannot but be delicate. End-ball[®] uses FAM, an endoscope as a guide for inserting introduction kit into the stomach. The balloon is packed in the pouch, which is fixed to the end of the endoscope. However, it is near blind insertion because the pouch at the end of the scope inevitably hides the camera of the scope [7]. In FAM, near blind insertion with the support of an endoscope can easily cause oral cavity trauma and bleeding, which results in more difficult condition for inserting an IGB. However, a skilled practitioner can perform two techniques without serious difficulty. If a practitioner can insert an introduction kit with a diagnostic endoscopic view, introduction procedure must be easier and safer. SAM was devised to provide clear front view during implantation [8,9]. Additionally, SAM with retroflexion also enables a practitioner to watch inflation process. Experts can use any technique for an IGB implantation. For beginners, however, SAM would be the easier and safer implantation method compared to two conventional techniques.

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