Early Buried Bumper Syndrome Treated by Bedside Replacement

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ABSTRACT **Background:** Buried bumper syndrome (BBS) mostly occurs as a late complication after percutaneous endoscopic gastrostomy (PEG) insertion; however, early BBS has been rarely reported, and the treatment of this condition is still unclear.

Objectives: To evaluate the Seldinger technique for treatment of early BBS after PEG insertion.

Methods: We report two cases of early BBS in two consecutive patients who underwent PEG insertion to maintain oral intake. The first patient was an 83-year-old woman showing Alzheimer type dementia, while the other was a 76-year-old man who presented with maxillary cancer and treated with radiotherapy followed by left maxillectomy. Post-surgery, he developed progressive difficulty of swallowing due to mouth deformation and treatment-related nerve toxicity. The first patient presented with fever and purulent discharge from the gastrostomy insertion site, without ability to rotate or slide the tube through the stoma 10 days after the PEG insertion. The man was admitted to the hospital 5 days following PEG insertion due to a fever of 38°C and peritubal swelling with purulent discharge. In addition, the tube could not rotate or slide through the stoma.

Results: Buried bumper syndrome was demonstrated by computed tomography scan. Gastroscopy and gastrostomy tube replacement was performed successfully according to the Seldinger technique (replacement over guidewire) in both cases. Correct intragastric tube positioning was demonstrated radiographically before resuming tube feeding. The two patients were discharged in good physical condition several days later.

Conclusions: External replacement over guide wire should be considered in such cases.

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KEY WORDS: buried bumper syndrome (BBS), percutaneous endoscopicgastrostomy (PEG)

Enteral tube feeding is necessary in patients who are unable to maintain an adequate oral intake to satisfy body energy requirements [1]. Of the enteral feeding modalities, percutaneous endoscopic gastrostomy (PEG) is a well-known procedure that is being increasingly utilized. PEG is relatively safe and mostly well tolerated. However, there are early and late complications associated with PEG tube insertion. Among the early complications, the most common are pneumoperitoneum, ileus, esophageal and gastric perforation, peritonitis, bleeding, and aspiration. The late complications, which occur more than 4 weeks after insertion, include buried bumper syndrome (BBS), and deterioration of the gastrostomy site [2,3].

BBS is a condition that affects the gastrostomy feeding tubes placed into the stomach through the abdominal wall. Gastrostomy tubes include an internal bumper, which secures the inner portion of the tube inside the stomach, and an external bumper, which secures the outer portion of the tube to the abdominal wall. BBS occurs when the internal bumper of a gastrostomy tube migrates into the wall of the stomach. The internal bumper may become entirely buried within the fistulous tract. The etiology of BBS could be because of tension of the internal bolster resulting in pressure necrosis and migration into the gastric wall. The diagnosis of BBS is based on clinical, imaging, and endoscopic investigation [4]. BBS is a potentially life-threatening rare complication of PEG tube insertion occurring as a late complication, mostly more than 1 year following insertion in 0.3–2.4% of patients [5]. In late BBS, the gastrocutaneous tract of the PEG tract is already mature. The treatment is usually straightforward and consists of removal of the gastrostomy tube via simple external traction or endoscopic removal, and surgery is rarely necessary [6].

Early BBS occurring up to 4 weeks after PEG insertion has been rarely reported. Early BBS is caused by vigorous traction of the cannula by agitated patients or by extreme tightness of the external bolster [7]. The treatment poses a challenge since the gastrocutaneous tract is not mature yet. A conservative radiologic and endoscopic approach is probably not suited for early BBS because of the immature stomal tract. Laparotomy and surgical removal should be considered in cases of peritonitis, sepsis, or complex fistulous tracts [8].

PATIENTS AND METHODS

We reviewed the medical charts of all patients who underwent primary PEG insertion at the Galilee Medical Center between January 2018 and January 2020 and at a follow-up appointment performed up to one month following PEG insertion. Patients

who were re-admitted due to BBS within one month were considered to have early BBS and were described in the study. We performed a comprehensive review using a MEDLINE/PubMed search for all studies that reported early BBS. Data regarding timing of early BBS occurrence, clinical condition, and treatment were reported. Patient consent was obtained for publication of the case details.

SELDINGER TECHNIQUE TUBE REPLACEMENT DESCRIPTION

A round-tipped guidewire was introduced through the lumen of the PEG tube into the stomach lumen, and the PEG tube was withdrawn. A new PEG tube was passed over the guidewire and inserted into the stomach. The guidewire was then withdrawn [9]. Intragastric placement was confirmed by contrast injection through the new tube.

RESULTS

We report two cases of early BBS treated successfully by bedside Seldinger technique tube replacement, thus avoiding endoscopic or surgical replacement.

PATIENT 1

The patient was an 83-year-old female with advanced dementia and convulsive disorder that necessitated PEG insertion due to inability to attain sufficient oral intake and several episodes of aspiration pneumonia after attempting careful oral spoon feeding. She underwent the procedure with an overall uneventful intra-procedural and immediate post-procedural course. Second look endoscopy confirmed the position of the internal bumper against the anterior wall of the stomach. The patient presented to the emergency department 10 days after PEG insertion with fever and purulent discharge at the tube insertion site. On admission, her blood pressure was 100/50 mmHg, heart rate was 90 beats per minute, room air saturation was 96%, and a temperature of 36.8°C. Physical examination revealed abdominal tenderness and induration surrounding the PEG tube with localized rebound tenderness. The rest of the physical examination was unremarkable. Blood tests revealed leukocytosis of 14,000/µl (normal range 4000-10,000), C-reactive protein levels of 133 mg/L (normal range 0-5) (. Computed tomography (CT) scan showed the PEG tube inner bolster embedded into the gastric wall [Figure 1A] and upper endoscopy demonstrated inner tube bolster migration into the gastric wall [Figure 1B].

PATIENT 2

The patient was a 76-year-old male with a medical history of atrial fibrillation, multiple sclerosis, and hyperthyroidism. He was diagnosed with carcinoma of the left maxilla and treated with radiotherapy followed by left maxillectomy. Post-surgery, he developed progressive difficulty of swallowing because of mouth deformation and treatment-related nerve toxicity. The patient underwent PEG tube insertion with unremarkable intra-and post-procedural course. Second look endoscopy confirmed the position of the internal bumper against the anterior wall of the stomach. The patient was admitted 5 days following the PEG insertion with a fever of 38°C, and peritubal swelling with purulent discharge. His physical examination revealed PEG site induration, abdominal tenderness, and local guarding around the PEG site. The tube could not rotate or slide through the stoma. Laboratory blood tests showed leukocytosis of 16000/µl (normal range 4000–10,000) with left shift and elevated C-reactive protein of 166 mg/L (normal range 0–5). Abdominal CT showed migration of the inner bumper into the gastric wall [Figure 2A]. Upper endoscopy showed the inner bumper embedded in the gastric wall with surrounding inflammatory reaction [Figure 2B].

TREATMENT COURSE

Since the patients were severely ill, we elected to perform feeding tube replacement through wire guidance according to the Seldinger technique rather than surgical or endoscopic repair despite the short time period elapsed from the primary PEG in-

Figure 1. Buried bumper syndrome in patient 1
[A] Computed tomography scan demonstrated the PEG inner bolster imbedded into the gastric wall. **[B]** Direct visualization of the PEG tube migration into the gastric wall with purulent discharge by upper endoscopy
PEG = percutaneous endoscopic gastrostomy

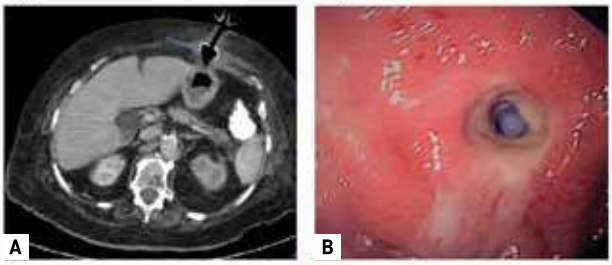
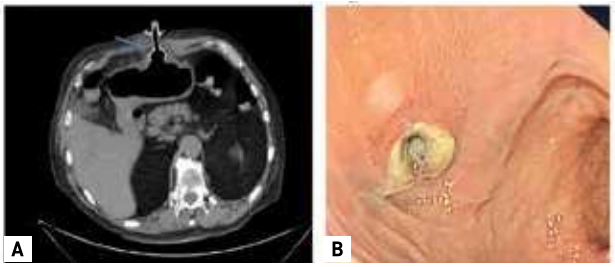


Figure 2. Buried bumper syndrome in patient 2
[A] Computed tomography scan demonstrated the PEG inner bolster imbedded into the gastric wall. **[B]** Direct visualization of the PEG tube migration into the gastric wall with purulent discharge by upper endoscopy
PEG = percutaneous endoscopic gastrostomy



sertion, taking into consideration the option of surgical repair in case of tube replacement failure. In parallel, the patients were treated with intravenous antibiotics including metronidazole 500 mg three times daily and cefuroxime 750 mg twice daily. Post replacement, intragastric tube localization was confirmed in the first patient by X-ray of the abdomen following water soluble contrast injection through the tube, and by CT scan in the second patient. The patients were discharged 3 or 5 days later in good stable condition.

DISCUSSION

We report two cases of early BBS that were successfully treated by bedside tube replacement under wire guidance according to the Seldinger technique rather than the endoscopic or surgical option. PEG insertion is generally considered a safe procedure. Several complications have been associated with PEG insertion, including early and late complications [10-12]. The tract of the PEG begins to mature 1–2 weeks after placement and it is well formed in one month [13]. In our patients BBS was observed shortly after PEG insertion (5 and 10 days). Since both patients were severely ill, we elected to perform tube replacement under wire guidance according to the Seldinger technique rather than endoscopic or surgical repair taking into consideration the option of surgical repair in case of tube replacement failure.

Successful intragastric tube localization was confirmed by imaging techniques. The time of presentation of BBS varies in the literature. It is commonly expected to occur 3 weeks to 3 months after PEG insertion [14] with the vast majority of cases occurring more than 1 year after PEG insertion [5]. Early BBS has rarely been reported. Early BBS (< 4 weeks after PEG insertion) mostly necessitated surgical intervention as the patients are not suitable candidates for conservative and endoscopic treatment [8]. Table 1 shows the cases of early BBS reported in the literature. Deivasigamani et al. [15] reported a case of BBS that occurred 4 weeks after PEG insertion treated by external replacement over guidewire. A case of early BBS complicated by septic shock occurred in two patients 7 days following PEG insertion, which was treated surgically by exploratory laparotomy [14,16]. Furthermore, a study reported a case of a hemodynamically and respiratory stable patient with early BBS that occurred 3 weeks following PEG, treated surgically [17]. A case reported by Anagnostopoulos and colleagues [18] showed early BBS demonstrated by upper gastrointestinal bleeding 21 days following PEG insertion that was treated endoscopically. However, Pinho et al. [19] reported a case of early BBS one week after PEG insertion successfully treated by repositioning through the original track using guidewire. A review from a British hospital reported the frequency and success of BBS treatment from 2009 to 2018. Overall, 27 incidences of BBS were identified in 18 patients, among them 4 patients (22%) had recurrent episodes of BBS. Of these patients, 18 episodes (67%) of BBS were successful resolved endoscopically, and endoscopic treatment of 9 episodes of BBS were unsuccessful as they needed surgical removal [20].

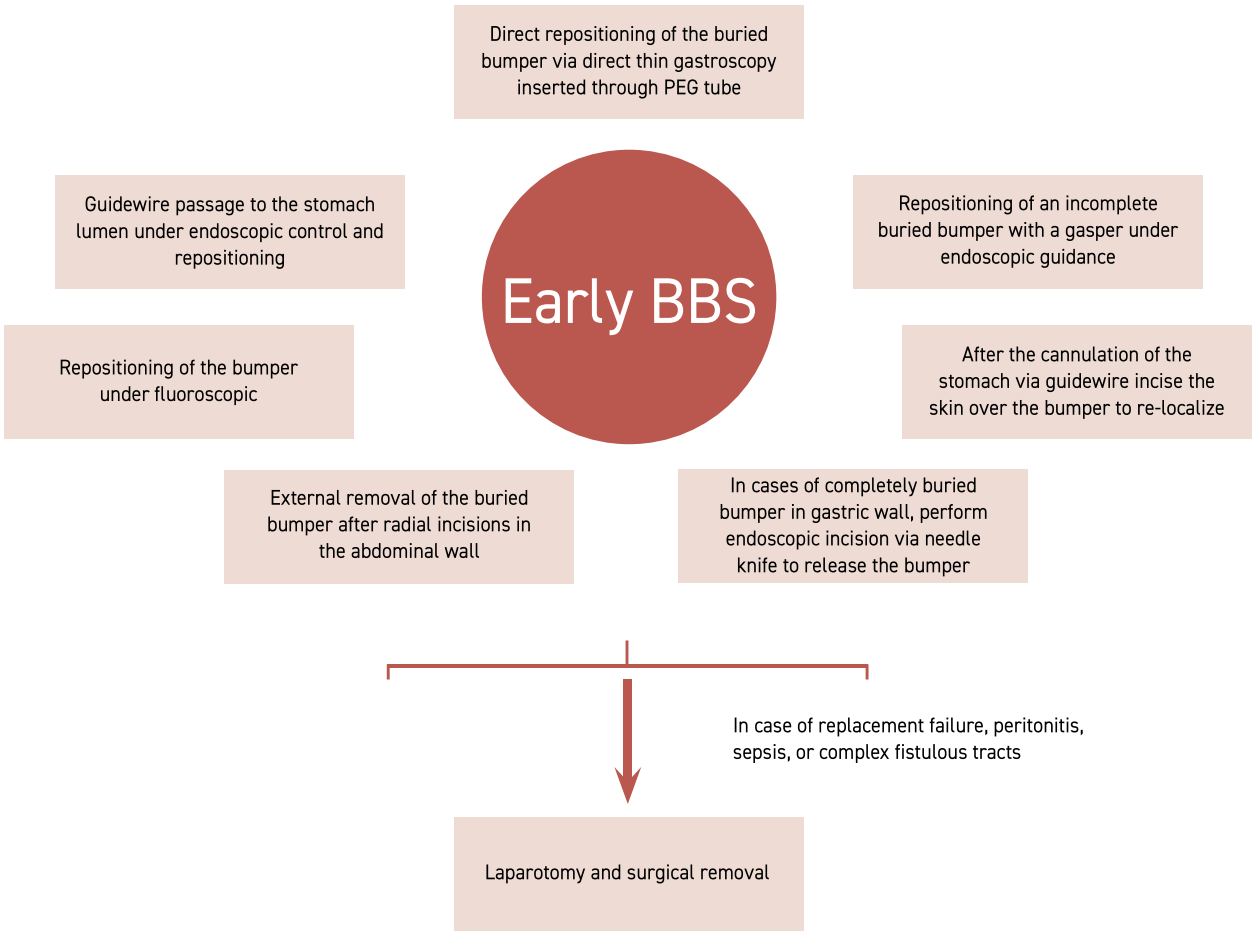
A recent editorial highlighted the controversies in treating early BBS [20]. Figure 3 demonstrated the available percutaneous and endoscopic treatment options for early BBS. Recently a novel therapeutic technique for BBS was described in five patients using the Flamingo device with excellent technical success and high safety profile [21]. According to the British Association of Parenteral and Enteral Nutrition guidelines for percutaneous endoscopic gastrostomy management of BBS, if PEG feeding is not required, it is recommended to leave the buried bumper in situ [22]. In cases where PEG feeding is still required, the patient is fit for gastroscopy, and there is evidence of an abdominal wall abscess, it may be necessary to treat with antibiotics and replace the PEG tube at another site once the original site has healed [23]. If no abdominal wall abscess was observed, it is recommended to perform endoscopic removal of the buried bumper [24] followed by surgical or radiological removal [25].

Table 1. Reported cases of early BBS in the literature

Reference	Time from PEG insertion	Age/gender	Clinical condition	Treatment
Deivasigamani et al. [15]	28 days	25 / Male	*Stable	Replacement over guidewire
Azevedo et al. [14]	7 days	71 / Female	**Unstable	Surgical laparotomy
Afifi et al. [16]	7 days	38 / Male	**Unstable	Surgical laparotomy
Geer et al. [17]	21 days	76 / Female	*Stable	Surgical laparotomy
Anagnostopoulos et al. [18]	21 days	32 / Female	*Stable	Endoscopically
Pinho et al. [19]	7 days	57 / Male	*Stable	Repositioning over guidewire
Rino et al. [7]	19 days	69 / Female	*Stable	Surgical removal
#Ala' Abdel Jalil et al.	14 days	48 / Female	*Stable	External replacement

*Hemodynamically and respiratory stable. **Septic shock. #Poster presemtation, P2065. World Congress of Gastroenterology at ACG2017 meeting abstracts. Orlando, FL: American College of Gastroenterology.

Figure 3. The endoscopic treatment options for buried bumper syndrome
BBS = buried bumper syndrome, PEG = percutaneous endoscopic gastrostomy



CONCLUSIONS

To the best of our knowledge, we arethe first group to report cases of early BBS treated successfully under wire guidance according to the Seldinger technique. This extremely rare complication should be considered into the differential diagnosis of abdominal symptoms, fever, or purulent discharge from the insertion site of the gastrostomy in the early period up to 4 weeks after primary PEG insertion. Stable patients with early BBS could be treated with tube replacement according to the Seldinger technique, confirming the localization of the tube by water soluble contrast X-ray of the abdomen or CT scan before resuming feeding especially in high surgical risk patients, with surgical backup in cases of replacement failure.

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Capsule

Inflamed by TLR4 internalization

The pattern recognition receptor Toll-like receptor 4 (TLR4) stimulates the production of proinflammatory cytokines when activated on the cell surface, but endocytosed TLR4 signals through different effectors to drive the production of an antiviral cytokine called interferon-β. **Metwally** et al. found that endocytosed TLR4 also contributed to the production of a pair of proinflammatory cytokines. Endocytosed TLR4 promoted the noncanonical phosphorylation of the transcription factor STAT1, which alters its target DNA motif and, in a series of steps, stimulates the production of the cytokines. These results add another dimension to signaling by TLR4 after endocytosis.

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Capsule

Policy decisions and use of information technology to fight 2019 novel coronavirus disease, Taiwan

Lin et al. explained that because of its proximity to and frequent travelers to and from China, Taiwan faced complex challenges in preventing 2019 novel coronavirus disease (COVID-19). As soon as China reported the unidentified outbreak to the World Health Organization on 31 December 2019, Taiwan assembled a taskforce and began health checks onboard flights from Wuhan. Taiwan's rapid implementation of disease prevention measures helped detect and isolate the country's first COVID-19 case on 20 January 2020. Laboratories in Taiwan developed 4-hour test kits and isolated two strains of the coronavirus before February. Taiwan effectively delayed and contained community transmission by leveraging experience from the 2003 severe acute respiratory syndrome outbreak, prevalent public awareness, a robust public health network, support from healthcare industries, cross-departmental collaborations, and advanced information technology capacity. The authors analyze use of the National Health Insurance database and critical policy decisions made by Taiwan's government during the first 50 days of the COVID-19 outbreak.

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