Incisional Hernia After Percutaneous Endoscopic Gastrostomy Tube Placement: Importance of Avoiding the Linea Alba

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ABSTRACT

A gastrostomy tube passes from a patient’s stomach through the abdominal wall and allows for direct enteral access. An alternative to an open gastrostomy, a percutaneous endoscopic gastrostomy (PEG) is typically favored because it is a less invasive option. However, a thorough understanding of the anatomy involved is paramount to prevent complications, regardless of what technique is chosen for placement. We present a case of an incisional hernia, which developed after the removal of a PEG tube placed through the midline of an abdominal wall, which is both a rare and avoidable complication. Placement of a PEG tube lateral to midline and avoiding the linea alba, an inherent weak point, will decrease the incidence of incisional hernias.

INTRODUCTION

Percutaneous endoscopic gastrostomy (PEG) tubes are viewed as less morbid in comparison to an open gastrostomy. In the standard technique, an esophagogastroduodenoscopy is performed and the stomach is insufflated. Then, the abdominal wall is transilluminated and external pressure is then applied to the point of maximal transillumination, which is confirmed by visualization of a focal indentation of the anterior gastric wall on endoscopy, termed 1:1 blotment. This is commonly the method of identifying the location on the abdominal wall, as long as it is a sufficient distance away from the costal margin and the xiphoid process, generally considered a minimum of 2 finger breadths.1,2 The main purpose of this method is an attempt to avoid hollow viscus injury.3 However, because patients have anatomical variance, this location on the abdominal wall will also vary. It is thus integral to have a comprehensive understanding of abdominal wall anatomy to avoid complications with appropriate placement.

As a factor of optimal placement, it is important to keep in mind the healing capability of the site chosen once the tube has been removed. Although the standard thought is to look for the site of maximal transillumination, this may identify the weakest point of the abdominal wall, and thus we seek to assert that this may not always be the best method in choosing the optimal location for PEG tube placement. We present a case of incisional hernia that occurred in a midline PEG site, which is an extremely rare complication and has only been reported in a handful of cases in the literature.

CASE REPORT

A 51-year-old man with a history of alcohol abuse presented with failure to thrive secondary to minimal oral intake. A gastroenterology consult was sought concerning the utility of a PEG tube. An externally removable 20 French EndoVive Safety gastrostomy tube (Boston Scientific, Marlborough, MA) was placed, using transillumination through the body of the stomach for site determination. Placement was in the distal stomach near the pylorus, corresponding to the midline of the abdominal wall. A 1-cm incision was made over the point of maximal transillumination to allow for insertion, and the bumper was secured at 3 cm. No procedural complications were noted. Postoperatively, the tube was functional and used for feedings and medication delivery. Once the patient recovered from his underlying
disease and was able to tolerate adequate oral intake, approximately 6 weeks after placement, the tube was removed in standard fashion, with perpendicular force applied until the bumper was pulled through the abdominal wall. There were no immediate complications noted on removal, and no unusual amounts of force were required to remove the tube.

Less than 1 year later, the patient presented to the General Surgery Clinic because of a noticeable and persistently painful bulge at the previous PEG site. On examination, the patient was found to have a reducible incisional hernia. A computed tomography scan confirmed a 5-cm incisional fat-containing hernia, and the patient underwent an elective surgical repair (Figure 1).

DISCUSSION

In the current literature, there is limited information regarding a hernia at a PEG site aside from being identified in a handful of case reports. The few articles on the subject have cited a multitude of possible reasons for the hernia, including strenuous physical activity, chronic cough, multiple PEG tubes placed successively through the same point on the abdominal wall, and the method of removal of the PEG tube.\(^3\)\(^-\)\(^7\)

In reviewing the literature and this case, it appears that aside from the transillumination to ensure safety, consideration should be given to where the PEG tube is positioned on the abdominal wall itself. Notably, when transilluminating the stomach, if a portion of the stomach lies below the midline, the highest intensity of light will likely be at the linea alba because this section of the abdominal wall is thinnest, lacking any muscular coverage. Because of this, we believe the risk of herniation is higher when this site is chosen. In this case, a 20 French tube, with a diameter of 7 mm, resulted in an incisional hernia after being removed 6 weeks after placement, which we suspect would not have occurred if the tube were placed in a paramedian position. It is well known that weak points on the abdominal wall, such as the linea alba or the semilunar lines, are prone to higher pressures and higher risk for herniation, given the lack of muscular layers to reinforce the site (Figure 2).\(^8\) The relatively early removal of the tube in a patient with an interval of malnourishment also increased this risk, as the initial wound was unlikely to have fully healed when the tube was removed.

As such, we recommend considering avoidance of the linea alba, selecting sites either through the lateral rectus abdominis muscle or lateral to the semilunar lines, through the muscular bellies of the external or internal abdominal obliques, and transversus abdominis. The muscle layers are vital in maintaining the integrity of the abdominal wall, without which the risk of herniation is needlessly high. In addition, consideration for the interval of malnourishment in the overall time after placement before removal should be done, as the conventional 6–8 weeks of waiting for the tract to mature may be insufficient in these populations.

The literature is sparse regarding incisional hernias secondary to PEG tubes, yet we believe that this is an underreported complication of the procedure, and precautions should be taken to reduce the risk of hernia formation. Although this case resulted in a fat-containing hernia, the potential for more

Figure 1. Abdominal computed tomography scan demonstrating midline incisional hernia.

Figure 2. Cross-sectional diagram depicting the anatomy of the abdominal wall.\(^9\) The 2 areas of weakness are the linea alba, the area that is formed in the midline as the anterior and posterior rectus fascia join, and the semilunar lines, the curved tendinous insertion site found on either side of the rectus muscle. Thus, the ideal location for percutaneous endoscopic gastrostomy tube placement is between these 2 areas, through the rectus muscle, with an alternative location being lateral to the semilunar lines, through the bellies of all 3 muscles, the external oblique, internal oblique, and transversus.
serious herniation of bowel and strangulation should not be overlooked. Although the standard procedure for deciding on placement of the PEG site on the abdominal wall does depend on the specific anatomy of the patient in question, avoiding known weak points of the abdominal wall, such as the linea alba and the paramedian linea semilunaris, could help prevent such complications from occurring. In addition, in patients with underlying malnourishment, one should consider increasing the time interval between placement and removal from the standard because wound healing is retarded in this setting. Also, in patients with a previous history of hernias, the specific site of PEG tube placement should be thoroughly considered, and care should be taken to avoid placement of the tube in an area that has high risk for future herniation.

**DISCLOSURES**

Author contributions: All authors searched the literature, analyzed the data, and wrote and edited the manuscript. MD Kachare is the article guarantor.

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