Gastrostomy Placement in Children: The Method of Operation

Abstract

Purpose: The aim of this report is to summarize recent reports comparing the outcomes and the complications between the two most adopted procedures for gastrostomy placement in children: percutaneous endoscopic gastrostomy (PEG) and laparoscopic gastrostomy (LG).

Methods: Electronic databases were queried for comparative studies of the two most common insertion techniques, including the PEG and LG. Major Complications were defined as reoperation within 30 days or death.

Results: Recent studies comparing PEG and LG revealed an increased risk in major complications with PEG.

Conclusion: PEG is associated with an increased risk of major complications when compared to the LG approach.

Keywords: Gastrostomy; Laparoscopy; Percutaneous endoscopy; Children; Outcome; Complications

Introduction

The various technical options that have been described for gastrostomy tube placement in children include the time honored Stamm procedure, percutaneous endoscopic gastrostomy (PEG), percutaneous fluoroscopy-guided gastrostomy, several types of laparoscope-assisted gastrostomy (LG), video-assisted gastrostomy, and a combined laparoscopic and endoscopic approach as well as different variations of the methods used in the hands of the reporting surgeons [1]. Minimally invasive procedures for enteral access in children have evolved over the years, resulting in various techniques of gastrostomy tube placement. The two most common techniques are PEG and LG. This study compares the reported outcomes of both procedures exclusively in children. Consensus is lacking as to which procedure, if any, is superior.

Increasing evidence has suggested a lower rate of serious complications following LG in comparison to PEG, open gastrostomy, or other techniques [1,2]. The advantages of video-assisted gastrostomy are placement of the gastrostomy under direct visualization and the performance of the gastropexy [1-6]. Complication rates associated with laparoscopic- or video-assisted or fully laparoscopic techniques have been reported to be inferior to those associated with other techniques [7-11]. However, previous studies examining postoperative complications in children undergoing LG have included only small numbers of patients and have had various durations of follow-up and without any comparison with other techniques for gastrostomy placement [12-20]. The same applies to the PEG technique [21-24]. PEG and LG are widely used in the pediatric population. The aim of this literature review was to determine which one of the two procedures is the most effective and safe method.

Methods

Electronic databases were queried for comparative studies of the two most common insertion techniques, including the PEG and LG. Complications are generally classified as major or minor [25]. Major complications, the object of this review, were defined as reoperation within 30 days or death. Major complications were to include pneumoperitoneum, hemorrhage, duodenal hematoma, colon injuries, liver injuries, small bowel injuries, gastric perforation, gastro-colic fistula, peritonitis, and buried bumper syndrome [26]. Minor complications, in line with previous studies were to include granuloma, infection requiring antibiotic treatment, leakage, vomiting, pain, and dislocation of the button [12-20].

Results

Eleven reports were found discussing the comparison of the PEG and LG [1,2,7,11,27-33]. All revealed a significantly increased risk in major complications with PEG. During the same period, there were no reports showing lower number of major complications after PEG compared with LG in children. The operating time for LG is 2–3 times longer than the quarter of an hour usually needed for the PEG insertion. There is a shorter time to enteral nutrition after LG insertion compared by PEG.

Discussion

This study aimed to compare two different techniques for placement of gastrostomy tubes in a pediatric population. The PEG procedure involves a blind puncture through the abdominal cavity while the LG procedure involves visualization of the stomach through an umbilical port and a selection of a second epigastric gastrostomy site to select and anchor the stomach with
sutures prior to the placement of a low profile gastrostomy feeding device. Several major complications have been associated with PEG. On the contrary, only a few major complications, including gastric perforation, gastrostomy dislodgment, and conversion to open procedure have been described in association with LG. Minor complications have been shown to diminish significantly over time whereas pain and dislodgement of the gastrostomy device does not [34]. The minor complications, on the other hand, are equally encountered in both PEG and video-assisted gastrostomy [35]. The operating time needed for LG is 2-3 times longer than the quarter of an hour needed for the PEG insertion. This advantage in operative time is outweighed by the increased safety profile of LG insertion. The data on the shorter time to enteral nutrition after LG insertion compared by PEG seem to be hampered by local traditions. Buried bumper syndrome, in which the internal fixation device migrates alongside the tract of the stoma outside the stomach, is known to be a severe complication to PEG placement only [36].

Conclusion

Summary of the findings of the reports of PEG compared with LG in the literature indicates that LG should be the preferred method of gastrostomy placement in children. The results suggest that by performing LG in children it is possible to avoid the serious intestinal fistula complications caused by a blind puncture through the abdominal cavity when performing the PEG.

Thus, PEG is associated with an increased risk of major complications when compared to the LG approach. Some advantages in operative time for PEG appear outweighed by the increased safety profile of LG insertion as well as shorter time to enteral nutrition after LG. Because of the lack of well-designed studies, we have to be cautious in making definitive conclusions comparing PEG to LG. To decide which type of gastrostomy placement is best practice in pediatric patients, randomized controlled trials comparing PEG to LG are highly warranted. Prospective analysis of the various techniques is needed to confirm which minimally invasive techniques for gastrostomy tube placement are associated with a less complicated post-operative course. The most important question of how we manage to make the performance of a gastrostomy placement in children still safer remains to be answered.

Conflict of Interest

The author declares that no financial interest or any conflict of interest exists.

References

1. Merli L, De Marco EA, Fedele C, Mason EJ, Taddei A et al. (2016) Gastrostomy Placement in Children: Percutaneous Endoscopic Gastrostomy or Laparoscopic Gastrostomy? Surg Laparosc Endosc Percutan Tech 26(5): 381-384.
2. Lantz M, Hultin Larsson H, Arnbjörnsson E (2010) Literature review comparing laparoscopic and percutaneous endoscopic gastrostomies in a pediatric population. Int J Pediatr 2010: 507616.
3. Shimizu Y, Okuyama H, Sasaki T, Nose S, Saka R (2014) Laparoscopic-assisted percutaneous endoscopic gastrostomy: a simple and efficient technique for disabled elderly patients. J Parenter Enteral Nutr 38(4): 475-480.
4. Yu SC, Petty JK, Bensard DD, Partrick DA, Bruny JL, et al. (2005) Laparoscopic-assisted percutaneous endoscopic gastrostomy in children and adolescents. JSLS 9(3): 302-304.
5. Idowu O, Driggs AX, Kim S (2010) Laparoscopically assisted antegrade percutaneous endoscopic gastrostomy. J Pediatr Surg 45: 277-279.
6. Given MF, Hanson JJ, Lee MJ (2005) Interventional radiology techniques for provision of enteral feeding. Cardiovasc Intervent Radiol 26(6): 692-703.
7. Akay B, Capizzani TR, Lee AM, Drongowski RA, Geiger JD et al. (2010) Gastrostomy tube placement in infants and children: is there a preferred technique? J Pediatr Surg 45(5): 1147-1152.
8. Jones VS, La Hei BR, Sun H (2007) Laparoscopic gastrostomy: the preferred method of gastrostomy insertion. PediatrSurg Int 23(11): 1085-1089.
9. Vervloesem D, Van Leersum E, Boer D, Hop WC, Escher JC et al. (2009) Percutaneous endoscopic gastrostomy (PEG) in children is not a minor procedure: risk factors for major complications. Semin Pediatr Surg 18(2): 93-97.
10. Zamakhshary M, Jamal M, Blair GK, Murphy JJ, Webber EM et al. (2005) Laparoscopic vs percutaneous endoscopic gastrostomy tube insertion: a new pediatric gold standard? J Pediatr Surg 40(5): 859-862.
11. Liu R, Jiwane A, Varjavandi A, Kennedy A, Henry G et al. (2013) Comparison of percutaneous endoscopic, laparoscopic and open Gastrostomy insertion in children. Pediatr Surg Int 29(6): 613-621.
12. Backman T, Sjövie H, Kullendorff CM, Arnbjörnsson E (2010) Continuous double U-stitch gastrostomy in children. Eur J Pediatr Surg 20: 14-17.
13. Mikaelsson C, Arnbjörnsson E (1998) Single-puncture laparoscopic gastrostomy in children. PediatrSurg Int 14(1): 43-44.
14. Arnbjörnsson E, Larsson LT, Lindhagen T (1999) Complications of laparoscopy-aided gastrostomies in pediatric practice. J Pediatr Surg 34(12): 1843-1846.
15. Andersson L, Mikaelsson C, Arnbjörnsson E, Larsson LT (1997) Laparoscopy aided gastrostomy in children. Ann Chir Gynaecol 86(1): 19-22.
16. Norén E, Gunnarsdóttir A, Hansfus K, Arnbjörnsson E (2007) Laparoscopic gastrostomy in children with congenital heart disease. J Laparoendosc Adv Surg Tech A 17(4): 483-489.
17. Backman T, Berglund Y, Sjövie H, Arnbjörnsson E (2007) Complications of video-assisted gastrostomy in children with or without a ventriculoperitoneal shunt. PediatrSurg Int 23(7): 655-668.
18. Plantin I, Arnbjörnsson E, Larsson LT (2006) No increase in gastroesophageal reflux after laparoscopic gastrostomy in children. PediatrSurg Int 22(7): 581-584.
19. Arnbjörnsson E, Backman T, Mörse H, Berglund Y, Kullendorff CM, et al. (2006) Complications of video-assisted gastrostomy in children with malignancies or neurological diseases. Acta Paediatr 95(5): 467-470.
20. Backman T, Arnbjörnsson E, Berglund Y, Larsson LT (2006) Video-
assisted gastrostomy in infants less than 1 year. Pediatr Surg Int 22(3): 243-246.

21. Hansen E, Qvist N, Rasmussen L, Ellebaek MB (2017) Postoperative complications following percutaneous endoscopic gastrostomy are common in children. Acta Paediatr 106(7): 1165-1169.

22. Koca T, Skvrice AÇ, Dereci S, Duman L, Akçam M (2015) Percutaneous endoscopic gastrostomy in children: a single center experience. Turk Pediatr Ars. 50(4):211-216.

23. Szlagatys-Sidorkiewicz A, Borkowska A, Popińska K, Toporowska-Kowalska E, Grzybowska-Chlebowczyk U et al. (2016) Complications of PEG are not related to age - The result of a 10-year multicenter survey. Adv Med Sci 61(1): 1-5.

24. McSweeney ME, Kerr J, Jiang H, Lightdale JR (2015) Risk factors for complications in infants and children with percutaneous endoscopic gastrostomy tubes. J Pediatr 166(6): 1514-1519.

25. Schrag SP, Sharma R, Jaik NP, Seamon MJ, Lukaszczyk JJ et al. (2007) Complications related to percutaneous endoscopic gastrostomy (PEG) tubes. A comprehensive clinical review. J Gastrointest Liver Dis 16(4): 407-418.

26. Khaliq Q, Khibria R, Akram S (2010) Acute buried bumper syndrome. South Med J 103: 1256-1258.

27. Landisch RM, Colwell RC, Densmore JC (2016) Infant gastrostomy outcomes: The cost of complications. J Pediatr Surg 51(12): 1976-1982.

28. Petrosyan M, Khalafallah AM, Franklin AL, Doan T, Kane TD (2016) Laparoscopic Gastrostomy Is Superior to Percutaneous Endoscopic Gastrostomy Tube Placement in Children Less Than 5 years of Age. J Laparoendosc Adv Surg Tech A 26(7): 570-573.

29. Suksamanapun N, Mauritz FA, Franken J, Van derZee DC, Van Herwaarden-Lindeboom MY (2017) Laparoscopic versus percutaneous endoscopic gastrostomy placement in children: Results of a systematic review and meta-analysis. J Minim Access Surg 13(2): 81-88.

30. Sulkowski JP, De Roo AC, Nielsen J, Ambeba E, Cooper JN et al. (2016) A comparison of pediatric gastrostomy tube placement techniques. Pediatr Surg Int 32(3): 269-275.

31. Baker L, Beres AL, Baird R (2015) A systematic review and meta-analysis of gastrostomy insertion techniques in children. J Pediatr Surg 50(5): 718-725.

32. Wragg RC, Salminen H, Pachl M, Singh M, Lander A et al. (2012) Gastrostomy insertion in the 21st century: PEG or laparoscopic? Report from a large single-centre series. Pediatr Surg Int 28(5): 443-448.

33. Jones VS, La Hei ER, Shun A (2007) Laparoscopic gastrostomy: the preferred method of gastrostomy in children. Pediatr Surg Int 23(11): 1085-1089.

34. Salö M, Santimano A, Helmroth S, Stenström P, Arnbjörnsson EÖ (2016) Long-term outcomes of children undergoing video-assisted gastrostomy. Pediatr Surg Int.

35. Wragg RC, Salminen H, Pachl M, Singh M, Lander A et al. (2012) Gastrostomy insertion in the 21st century: PEG or laparoscopic? Report from a large single-centre series. Pediatr Surg Int 28(5): 443-448.

36. Cyrany J, Rejchrt S, Kopacova M, Durek J (2016) Buried bumper syndrome: A complication of percutaneous endoscopic gastrostomy. World J Gastroenterol 22(2): 618-627.