

Main topic

Anti-reflux gastrointestinal surgery in the neurologically handicapped child

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Abstract. The frequent requirement for gastrointestinal feeding tubes in the mental-motor retarded (MMR) child has become a relative indication for concomitant anti-reflux surgery in many pediatric surgical centers. The need for the addition of this relatively morbid procedure to simple feeding tube placement remains controversial. To analyze the role of anti-reflux surgery in the MMR child, we reviewed our experience with enteral feeding access procedures and anti-reflux procedures. A total of 76 feeding access procedures (71 gastrostomies) and 98 anti-reflux procedures were performed. All patients were thoroughly evaluated for the presence of reflux preoperatively. The presence of asymptomatic reflux prior to feeding tube placement was not predictive of subsequent need for fundoplication. Only 3 of 71 patients with gastrostomies (4.2%) ultimately required fundoplication. Of 106 MMR children in this series, 48 had an anti-reflux operation with their feeding gastrostomy while 58 had a primary feeding tube alone, 2 of which were jejunostomies. Although 2 children in the gastrostomy group later required fundoplication for uncontrolled GER, the other 54 were managed without an anti-reflux procedure. Our experience does not support the routine performance of concomitant anti-reflux surgery with feeding tube placement in the MMR child and argues for a conservative approach to feeding access. Fundoplication should be reserved for those children with a clinical indication for an anti-reflux operation.

Key words: Gastroesophageal reflux – Gastrostomy – Nissen fundoplication – Anti-reflux surgery

Introduction

Anti-reflux gastroesophageal surgery has become commonplace in many pediatric surgical centers when gastrointestinal (GI) feeding tubes are contemplated for the mental-motor handicapped child; the outstanding question is

whether such a therapeutic endeavor is prudent. It is true that mental-motor retarded (MMR) children are particularly prone to gastroesophageal reflux (GER) [23]. It is also true that placement of a Stamm gastrostomy tube both experimentally and clinically renders the child more prone to GER [3, 5, 12, 13, 17]. Countering these observations is the recognition that a transabdominal Nissen fundoplication is a major procedure with a significant morbidity for such children to tolerate; unfortunately, the need for a redo operation is highest in the MMR population [21, 22, 24]. Furthermore, in the large series of patients reported here and in a larger series reported by Gauderer et al. [7], placement of a percutaneous gastrostomy tube was infrequently followed by the need to add an anti-reflux operation. This paper will address these conflicting data and, utilizing a series of patients from the Children's Hospital of Philadelphia, will assess the role played by the anti-reflux operation in the MMR child.

Methods and results

From 1 January 1985 through 1 July 1989, the senior author (MMZ) placed enteral feeding access tubes in 76 patients. Table 1 summarizes the series in terms of demographic information and types of feeding tubes. Each patient was studied preoperatively by contrast upper GI roentgenogram to define esophagogastric and gastric outlet anatomy. Children whose history suggested GER were also studied with quantitative milk-technetium gastric emptying scans as well as 12–24-h esophageal pH recording. Seven patients were shown to have significant GER preoperatively; 3 of these had placement of an operative jejunostomy, 3 had a percutaneous endoscopic gastrostomy (PEG), and 1 had a Stamm gastrostomy coupled with a transgastric jejunostomy. From this series of 76 patients and 71 gastrostomies, 3 children (3/71 = 4.2%) subsequently required an anti-reflux procedure to control GER unmasked after gastrostomy. These 3 children had their fundoplication done at 4, 30, and 31 months, respectively, after the original feeding access procedure and had not been identified as having significant reflux preoperatively; 2 of the 3 had significant MMR. Of the 4 children identified preoperatively as having signifi-

Table 1. Enteral feeding operative access tubes

Patients:	
36	females, 40 males
67.6	months mean age (range 1 day to 292 months)
Feeding devices:	
53	Percutaneous endoscopic gastrostomy
14	Stamm gastrostomy
4	Stamm gastrostomy, transgastric jejunostomy
5	Operative jejunostomy
76	Total
Patient diagnosis:	
58	Mental motor retardation
2	Congenital microgastria
2	Short bowel syndrome
2	Epidermolysis bullosa
2	Gas bloat, delayed gastric emptying
1	each Gastric perforation, traumatic pancreatitis, miliary tuberculosis, pure gastroesophageal reflux, Pierre-Robin syndrome, cystic fibrosis, swallowing dysfunction, pyloric atresia, gastrocutaneous fistula, systemic lupus erythematosus

Table 2. Operative anti-reflux procedures

Patients:	
41	females, 50 males
46	months mean age (range 3 months to 22 years)
Operation:	
98	Funduplications in 91 children
97	360° Nissen fundoplication
1	180° Thal fundoplication
7	Redo funduplications
	Mean time 22 months post-primary operation (range 1–60 months)
2	Permanent jejunostomies post-failed fundoplication
3	Funduplications post-primary gastrostomy (Stamm 1, PEG 2)

cant GER, none subsequently required an anti-reflux operation.

From July 1977 through July 1989, the senior author (MMZ) did 98 anti-reflux operations in 91 children, 97 360° Nissen funduplications and one 180° Thal fundoplication. Table 2 summarizes the demographic characteristics of this population. From this series, 7 children (7.1%) required redo fundoplication 1, 4, 12, 21, 35, and 60 months, respectively, after the original anti-reflux procedure. Two additional children whose anti-reflux procedure failed came to subsequent operative jejunostomy for a remedial feeding access device. Of these 9 children with failed anti-reflux procedures, 6 (67%) had associated MMR; of the entire series of 91 children, 48 (53%) had MMR.

Discussion

The subject of enteral feeding access in patients prone to have GER is occupying increasing need, effort, and expense for patients, doctors, and society, respectively. It is not uncommon for pediatric surgeons to discuss anti-reflux GI operations as being among the most frequently done procedures today. The question is not whether surgeons are acting irresponsibly in doing the anti-reflux procedure, but rather, are they misinterpreting the indications for a fundoplication?

In our own series of cases, one-half (48/91, 53%) of the anti-reflux procedures were done in patients who had MMR or developmental delay. The association of reflux in this group is well documented [23], and often the feeding problems of these children are exacerbated by swallowing dysfunction. In an effort to prevent and/or correct malnutrition, aggressive feeding is employed, often requiring enteric tube feeding [19]. A gastrostomy tube is most commonly used when feeding access is needed for prolonged periods [7]. Despite the frequency of the practice of gastrostomy and gastrostomy coupled with an anti-reflux operation, little is known about the impact of aggressive feeding on the child with cerebral palsy, either in terms of improving or correcting growth retardation or of limiting morbidity [19]. Child care is facilitated and weight improves, but there is little effect of such aggressive nutritional support on linear growth and complications of the access procedures themselves are frequent [15, 19].

Various anti-reflux operations are available, but at least in children the Nissen fundoplication remains the standard against which others are measured. Hill et al. have described a transabdominal median arcuate ligament posterior gastropexy coupled with tightening of the esophageal hiatus [10], Borema has described a right-sided subhepatic anterior gastropexy [4]. Transthoracic repair is done in both the Alison [1] and Belsey [20] approaches. Menguy developed a posterior 180° fundic “half wrap” in an effort to stop reflux yet preserve the ability to eructate [16]. Most recently, Ashcraft et al. have popularized the Thal anterior 180° “half wrap”, successfully doing this procedure in an enormous series of children with minimal subsequent morbidity and excellent results [2]. Despite these variations, the principles of a successful anti-reflux operation remain the same: to (1) eliminate a hiatal hernia and narrow the esophageal hiatus; (2) increase the length of intra-abdominal esophagus in order to take advantage of thoracoabdominal pressure differentials, minimizing reflux; (3) increase or deepen the esophagogastric angle of His; and (4) produce an anti-reflux nipple valve within the stomach that permits effective transmission of the intragastric pressure against the lower esophagus, which in effect increases lower esophageal sphincter (LES) pressure.

The Nissen fundoplication [18, 25] accomplishes all of these goals, but its detractors hold that despite its being a successful anti-reflux procedure, the recurrence of reflux after a successful operation remains frequent [6, 21, 22, 24]. In addition, the operation is complicated by two unpleasant problems, namely, the inability to vomit or eructate, the so-called gas bloat syndrome, and difficulty in swallowing secondary to a too-tight 360° wrap. The gas bloat syndrome is almost always temporary and is less of a problem in children with a gastrostomy tube air-escape valve. However, catastrophic problems secondary to gas bloat syndrome have been reported, especially when there is a coincidental distal bowel obstruction [14]. Since the child who is neurologically impaired often has swallowing dysfunction, the added interference with swallowing from a “too-tight” 360° wrap may be catastrophic and may obstruct even the swallowing of saliva. Whether this can best be prevented by constructing the wrap over a bougie or by direct fundic measurement is the choice of the operating

surgeon, but this remains perhaps the most subjective part of a successful 360° fundoplication [25]. The spastic child who frequently demonstrates opisthoclonic posturing may be the child most likely to have failure of a Nissen fundoplication, a probable mechanism being the abdominal hyperextension that pulls the wrap apart, an observation confirmed at redo Nissen fundoplication.

The physiologic controversy involved in the argument for an anti-reflux operation complementing gastrostomy is the recognition that the LES pressure is central in the etiology of GER. Both experimental animal [5] and clinical observations [3, 12, 13, 17] have demonstrated the adverse influence of gastrostomy, whether by the Stamm or PEG technique [8, 11], on LES pressure. However, the reports of Langer et al. [15], Gauderer et al. [7, 9], and now ourselves contradict the previous concerns of Wesley [23], Jolley [12, 13], Mollitt [17], and Berezin [3], who have suggested that a gastrostomy should be accompanied by an anti-reflux procedure when being performed on the neurologically handicapped. In the data presented here from the Children's Hospital of Philadelphia, 48 children in the fundoplication series and 58 in the feeding tube series had MMR. Of these 106, 48 had an anti-reflux Nissen fundoplication with their feeding gastrostomy while the other 58 had a primary feeding tube alone, in 2 cases a permanent jejunostomy. Two patients in this gastrostomy group required fundoplication at a later time for uncontrolled GER; the other 54 were managed without an anti-reflux procedure. These data lend strong support to the notion that not every neurologically handicapped child requires a concomitant anti-reflux procedure; we concur with Gauderer, who has suggested that a PEG serve as a screening tool when selecting patients who may need a subsequent anti-reflux procedure [9]. Certainly, neither a PEG nor a Stamm gastrostomy will significantly compromise a subsequent anti-reflux procedure technically.

This series showed excellent clinical results: 7 of 91 children required redo fundoplication and an additional 2 required a permanent jejunostomy. These 9 failures (9/91, 9.9%) represent a favorable overall outcome, especially considering that 6 of these 9 patients had significant neurological impairment (6/48 = 12.5% recurrence in MMR children versus 3/43 = 7.0% recurrence in children who were neurologically normal). This report has not addressed mortality (1/91 = 1.1%) or temporary morbidity, which is significant in these high-risk children [21].

On summary a series of children from The Children's Hospital of Philadelphia who underwent enteral feeding access tube placement or an anti-reflux gastroesophageal operation is reported. There was a high incidence of MMR in both operative populations. Gastrostomy alone was not associated clinically with uncontrolled GER even in the children with MMR. The Nissen fundoplication remains an effective anti-reflux operation in children undergoing this procedure, even in the face of significant MMR.

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