



# Complex Child E-Magazine

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## **Fundoplication in Children with Neurological Impairments** by Susan Agrawal

Almost all parents of children with neurological impairments and reflux will be faced with making a very crucial decision at some point: whether or not their child should have a fundoplication or anti-reflux surgery. It is an exceptionally difficult decision to make, one that could have profound consequences for the remainder of the child's life.

How do you as a parent make such a difficult decision?

In the past, almost every child who received a G-tube for supplemental feeding, along with many other children with significant uncontrolled reflux, received a fundoplication surgery or anti-reflux procedure. This procedure involves wrapping the stomach around the lower esophageal sphincter to prevent reflux of stomach contents. These surgeries were especially common in children with neurological impairments such as cerebral palsy or certain genetic syndromes, due to the increased risk of reflux (75% have reflux) as well as feeding problems, nutritional deficits, recurrent spitting-up, vomiting, retching, and abdominal pain. Recently, evidence has come to light that this may not be the best standard of care due to a high rate of potential serious complications.

### **Potential Complications of Fundoplication Surgery**

It is beyond the scope of this article to address all possible complications of a fundoplication. Major complications can include vein laceration, bowel obstruction, or perforation, though these occur quite rarely. Those that occur most commonly include retching, gas-bloat, continued reflux and/or vomiting, dysphagia (difficulty swallowing) and other feeding problems, dumping syndrome (particularly when fundoplication is coupled with pyloroplasty), abdominal pain and/or nerve damage and sensitivity, and delayed gastric emptying or other esophageal and gastric motility problems. Continued retching, vomiting, and reflux can lead to wrap failure, defined as a fundoplication that loosens or comes completely undone, allowing reflux and vomit to once again enter the throat. By far, the most common post-fundoplication problem is the return of preoperative symptoms, such as reflux, vomiting, and aspiration.

Children with neurological impairments are particularly prone to these complications due to a variety of reasons, many of which are not well understood, but may include underlying motility problems, hypersensitive reflexes, spasticity or high tone, seizures,

and orthopedic problems such as scoliosis. In general, the more neurologically impaired a child is, the greater the likelihood of complications.

### **Rate of Complications in Children with Neurological Impairments**

As early as the 1980s, doctors and researchers began to notice an alarming trend among children with neurological issues. Complications, failure rates, and mortality rates were dramatically increased in children with neurological impairments who received funduplications as compared to children who were neurologically normal.<sup>1</sup> It is widely accepted now that children with neurological impairment require a second fundoplication reoperation due to wrap failure or continuing symptoms of reflux at four times the rate of children without neurological issues.<sup>2</sup> In addition, they have four times the failure rate, which includes complications, reoperations, and death from aspiration. In an early study, children with neurological impairment had a failure rate of 28%, greater than one in four, as compared to six percent for children who were neurologically normal. Another study from the same era demonstrated that 24 out of 28 children whose funduplications failed were neurologically impaired.<sup>3</sup>

Complication rates vary from study to study, depending on a variety of factors including the definition of a complication and the skill of the surgeons who performed the funduplications. Many studies only include documented wrap failure as a complication, and do not include more minor problems such as retching or gas bloat that can be extremely debilitating for children.

The broadest study documents a 71% recurrence of reflux symptoms after surgery, but only a 25% surgery failure rate in children with neurological issues.<sup>4</sup> This implies that one in four children has a fundoplication wrap failure, but nearly three out of four experience significant symptoms including retching, pain, vomiting, and aspiration despite fundoplication. In many cases these symptoms can be more debilitating than the original reflux. Another study documents a 59% complication rate in children with severe intellectual disabilities, 10% of which were major complications and 49% of which were minor complications such as retching.<sup>5</sup>

Despite surgical improvements in the past few years, including laparoscopic surgery and more advanced wrap techniques, the most recent studies continue to show high complication rates. One study in severely impaired children published in 2006 had a 10% mortality rate and a 30% rate of reflux after fundoplication and also showed no reduction in aspiration pneumonia after surgery.<sup>6</sup> A study published in 2007 that actually touts its results as “impressive” still lists a 40-46% rate of recurrent reflux and a 15% rate of requiring a second fundoplication.<sup>7</sup>

In some children, fundoplication simply does not appear to work or actually worsens the child’s condition. This may be due to undiagnosed coexisting problems such as gastroparesis, eosinophilic esophagitis, or cyclic vomiting, or may be due to the surgery compounding underlying problems, such as increased pain sensation of the gut (visceral hyperalgesia) or neuropathy.

Relief of specific symptoms after fundoplication is also quite poor in children with neurological impairments. In one study, pneumonia occurred 63% of the time before surgery, and continued to occur 40% of the time after surgery.<sup>8</sup> Vomiting decreased from 80% to 20% after surgery, but choking, gagging, and retching increased from 11% before surgery to 23% after surgery. While half the children with failure to thrive before surgery gained weight, the other half either remained on the same growth curve or lost weight. Children who had apnea before surgery continued to have apnea after surgery.

It is clear that the risk of complications after fundoplication, whether minor or major, is extremely high in children with neurological impairments. Almost all studies show some complications in at least one out of two children, with one out of four to six children suffering serious complications such as wrap failure. With such a high risk of complications, failure, reoperation, and even death, fundoplication surgeries should only be performed as an absolute last resort.

### **Current Recommendations for Fundoplication Surgery in Children with Neurological Impairments**

Almost all hospitals no longer recommend “prophylactic” fundoplication surgeries with every G-tube placement. While some surgeons still suggest fundoplication for children with severe reflux who are having surgery to place a G-tube, many hospitals, gastroenterologists, and even surgeons have determined that there are better, less risky options for most children. For example, British Columbia Children’s Hospital has reduced its fundoplication rate from 40-50 surgeries per year to three to five fundoplications, Toronto’s Hospital for Sick Children has virtually replaced fundoplication surgeries with GJ placements since 1992, and Children’s Hospital of Wisconsin performs only a small number of surgeries per year.<sup>9</sup>

The treatment of choice for most children with severe reflux is a GJ tube or even a separate J tube in some cases.<sup>10</sup> Use of a GJ tube accomplishes many of the same goals as a fundoplication and is substantially safer with fewer side effects. Even children who aspirate may have better results with a GJ as compared to fundoplication surgery.

Fundoplication surgery should only be performed on children with life-threatening symptoms such as severe aspiration, severe failure-to-thrive, Barrett’s esophagus, and certain anatomical conditions of the GI tract. In cases where fundoplication will save a specific child’s life, even if it causes long term discomfort from retching, the benefits of performing the surgery clearly outweighs the risks for that child.

### **Weighing the Risks and Benefits**

The decision to have or not have a fundoplication must be a choice that is made individually for each child, weighing the risks against the benefits. For a child with life-threatening aspiration of reflux and no history of motility problems, fundoplication may be the best choice. It is never a cure-all, and most children should expect a return of some symptoms, as well as the possibility of new complications. Other children with a

history of vomiting, motility problems, and abdominal pain are more likely than not to have serious complications from a fundoplication and may want to consider a GJ tube instead.

If your child must have a fundoplication, make sure to seek a second opinion from both a gastroenterologist and a surgeon at another practice or institution. In addition, try to find a surgeon with many years of experience performing fundoplications who has a lower rate of complications. Most importantly, do not expect a cure-all and be prepared for complications and side effects.

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<sup>1</sup> For a good overview of all outcomes of fundoplications, see Hassall E, Outcomes of Fundoplication: Causes for Concern, Newer Options. *Archives of Disease in Children* 2005;90:1047-52; or Di Lorenzo C and Orenstein S, Fundoplication: Friend or Foe? *Journal of Pediatric Gastroenterology and Nutrition* 2002;34, no. 2:117-24.

<sup>2</sup> Pearl RH, et al. Complications of Gastroesophageal Antireflux Surgery in Neurologically Impaired versus Neurologically Normal Children. *Journal of Pediatric Surgery* 1990;25, no. 11:1169-73.

<sup>3</sup> Dedinsky GK, et al. Complications and Reoperation after Nissen Fundoplication in Childhood. *American Journal of Surgery* 1987;153, no. 2:177-83. See also Smith CD, et al, Nissen Fundoplication in Children with Profound Neurologic Disability. *Annals of Surgery* 1992;215:654-9, which documents a 20% reflux recurrence and a 17% reoperation rate.

<sup>4</sup> Martinez DA, et al. Sequelae of Antireflux Surgery in Profoundly Disabled Children. *Journal of Pediatric Surgery* 1992;27, no. 2:267-73.

<sup>5</sup> Spitz L., et al. Operation for Gastro-oesophageal Reflux Associated with Severe Mental Retardation. *Archives of Disease in Childhood* 1993;68, no. 3:347-51.

<sup>6</sup> Cheung KM, et al. Nissen Fundoplication and Gastrostomy in Severely Neurologically Impaired Children with Gastroesophageal Reflux. *Hong Kong Medical Journal* 2006;12, no. 4:282-8.

<sup>7</sup> Goessler A, et al. Recurrent Gastroesophageal Reflux in Neurologically Impaired Patients after Fundoplication. *Acta Paediatrica* 2007;96, no. 1:87-93.

<sup>8</sup> Smith, 656.

<sup>9</sup> Hassall, 1051; Wales PW, et al. Fundoplication and Gastrostomy Versus Image-Guided Gastrojejunal Tube for Enteral Feeding in Neurologically Impaired Children with Gastroesophageal Reflux. *Journal of Pediatric Surgery* 2002;37, no. 3:412.

<sup>10</sup> Wales, 407-12.