Biliary Diversion: Another Option for Children with Severe Dysmotility
by Jessica Hilliard

“Does it always look like that?”

“Hmm?” I turned to our surgeon. “What?” The nurse and I were trying to negotiate a sterile dressing onto my three-year-old’s central line, a technically demanding procedure, especially on a squirmy preschooler. Of course, the specialist we’d been waiting all week to see had chosen that incredibly inconvenient moment to show up ready to discuss an extremely important step in my daughter Eithene’s care.

“Her stomach drainage. Does it always look like that?”

I glanced at the bag. As usual, it contained about half a liter of blackish-green bile that had drained from my daughter’s stomach over the last few hours.

“Yes, more or less.”

“That is bad. I need to think about this.” And he was gone.
Failing Feeds

My daughter’s surgeon is a man of few words, and the only one of her twenty-plus specialists whom I trust implicitly. So instead of furiously chasing him through the hallway demanding an explanation for such cryptic remarks, the nurse and I shrugged and went back to our dressing change. I knew he’d be back with a plan. The surgical team was supposed to be consulting about the next step in getting Eithene off of TPN. She’d been miserably failing tube feeds for the last two years, and eight months ago had landed on Total Parenteral Nutrition (TPN), which is intravenous nutrition. It was great for her nutrition-starved body, but the list of side effects and complications was long and deadly. If at all possible, she needed to come off of TPN in the near future.

We’d already been in the hospital for three months and seen yet another feeding trial go down in screaming, puking flames, when Eithene’s Gastroenterologist admitted defeat and turned her over to the surgeons. In the last week since we’d brought in surgery, they’d already decided she would need to have her colon removed, an ileostomy created, a bladder procedure, her gall bladder removed, a liver biopsy, and they now were “thinking about” her black bile. It was a bit overwhelming. In their defense, most of these procedures had been a long time coming, but still…what else could we do in one surgery?
**Biliary Diversion**

As it turns out, Eithene’s surgeon had an unusual idea. He had performed multiple previous surgeries on Eithene’s esophagus, stomach, and intestines, and was concerned that the constant reflux of bile from her intestines back into her upper GI tract was damaging his handiwork. It might also be contributing to formula washing backward from her intestine into her stomach, as we’d been seeing formula drain from her stomach, even though it had been given straight into her intestines. The bile was also definitely causing a lot of pain. Maybe this “biliary reflux” was playing a significant role in why my daughter couldn’t tolerate any type of food in her gut. The surgeon decided Eithene needed a procedure called a Roux-en-Y Biliary Diversion. This procedure is sometimes done on adults, but is rarely performed in the pediatric population.

During digestion, bile normally flows from its production site in the liver (or its storage site in the gall bladder), past the pancreas, and into the top of the small intestine. There, it mixes with food and is responsible for aiding in the digestion of fats and other nutrients. In Eithene’s case, bile was flowing into the small intestine and refluxing backward up into the stomach and even the esophagus. The surgeon planned to divert its entrance to a spot much farther down the intestinal tract to prevent the bile reflux.

On a technical level, the Biliary Diversion would involve detaching the end of her stomach from her duodenum, the top portion of the small intestine. The surgeon would then pull 45cm of small bowel up from the jejunum (lower in the intestinal tract) and attach that intestine to the end of her stomach (removing her duodenum). Next, he would use a second piece of small intestine to make an outlet for bile to re-enter, but at a much farther point down the digestive tract, 45cm away from the opening to her stomach, to be exact. When all was said and done, she’d have a large “Y” shape in her intestines, with one leg of the “Y” connected to her stomach, and the other connected to bile drainage. If it worked, the bile would be entering her gut too far down from the opening to her stomach to flow back into it and cause damage or pain.

While this procedure is similar to a Roux-en-Y Gastrojejunostomy, in which a separate J tube is placed, the primary purpose of this surgery was to divert bile. In the Gastrojejunostomy surgery, the left part of the “Y” (Roux limb) is brought to the surface of the abdomen and a feeding tube is placed in it. In a Biliary Diversion, the left part of the “Y” is instead attached to the biliary drainage.
Results of Surgery

A week later Eithene underwent ten hours of gastrointestinal and urological surgery. Her recovery was extremely difficult, but one thing we immediately noticed post-op was that the black bile was gone. Over the next month we were able to confirm that the Biliary Diversion had been successful in stopping the reflux of bile. Her stomach drainage changed from nearly a liter a day of bilious output to less than 200mL of white or clear stomach fluids. Accordingly, her nausea decreased and her daily pain levels diminished.

I wish I could say that the surgery enabled my daughter to stop TPN and use her GI tract again, but unfortunately that was not to be. A month after the surgery we received news that Eithene had a Mitochondrial Disease. This is a progressive disorder of energy metabolism that can damage organs and cause organ failure. Eithene’s GI tract is severely impacted by the disease, and it is unlikely that any surgeries or medications could have restored GI function. In May of 2010 she was declared to be in permanent intestinal failure.

Despite that, we don’t regret having the Roux-en-Y Biliary Diversion done. Over a year later, we never see any bile reflux into her stomach unless she has an infection or intestinal ileus. Her mitochondrial disease now affects her ability to regulate electrolyte levels, and keeping her stable would be much more difficult if we had to battle the electrolyte losses that come with biliary drainage.

Although the Roux-en-Y Biliary Diversion is an uncommon procedure in the pediatric population, it was a good option for Eithene. It successfully stopped the reflux of bile
from her intestines into her upper GI tract, stopped electrolyte and fluid losses from bilious drainage, decreased reflux-related damage to her stomach and esophagus, and lowered her reflux-related pain levels.

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