While the therapeutic use of neurostimulators for managing fecal and urinary incontinence has a long history in adult patients, the value of this approach in pediatrics has only begun to be explored over the past few years.

Initially used as a treatment for refractory urinary incontinence, neuromodulation of the sacral nerve (S3 nerve root) is now FDA approved as an acceptable option after other modalities have proven ineffective for the treatment of urinary and/or fecal incontinence in adults. In 2012, the Motility Center at Nationwide Children’s Hospital began offering sacral nerve stimulation to children with intractable urinary or fecal incontinence. In addition to the surgical implantation, Nationwide Children’s provides medical management from an integrated team of specialists, including pediatric urologists, pediatric gastroenterologists and pediatric surgeons with unique expertise managing complex neurogastrointestinal and urological disorders.

The following case study outlines the use of this therapy to treat a nine-year-old girl with a history of enuresis and constipation resistant to traditional treatments.
Case Study

**Presentation:** A nine-year-old girl was referred to Nationwide Children's and evaluated by Urology and Gastroenterology. The patient had a long history of enuresis and constipation refractory to all medications, and continued to have daily and nighttime enuresis not related to her degree of constipation. She had intermittent passage of large stools with soft stools every two to three days and occasional fecal soiling. Her medical problems included:

- Enuresis
- Constipation
- Gastritis and duodenitis
- GERD
- Asthma
- Chronic abdominal pain
- Ehlers-Danlos syndrome type III

GI workup for constipation, including assessment of anal sphincter and colonic function were performed by the Gastroenterology service. The anorectal manometry was normal. Urology service performed the urology workup for enuresis. Urodynamic studies of bladder function were normal. In addition, behavioral evaluation was performed but all behavioral interventions were unsuccessful.

The patient was always behind in school due to frequent hospitalizations and office visits. She had trouble in social situations with peers due to daytime enuresis and fecal soiling. Her lack of improvement despite aggressive medical therapy and behavioral interventions was frustrating to both the family and medical providers. Her mother identified enuresis as the most bothersome symptom. Therefore, it was determined that the patient was a candidate for sacral nerve stimulation. The patient and family were excited when the option of sacral nerve stimulation was introduced to them.

The patient was referred to Steven Teich, MD, senior pediatric surgeon, who explained how sacral nerve stimulation works to improve both bladder and colonic function. The results of published pediatric studies utilizing sacral stimulation for urinary and fecal problems were discussed. The patient and family were very enthusiastic and agreed to undergo this new therapy.

**Treatment:** Sacral nerve stimulation therapy addresses the communication problem between the brain and the nerves that control bowel function; if the nerves are not communicating properly, the muscles may not function properly which leads to control problems. The therapy is used as a last resort after the patient has failed all other treatments such as medications and behavioral therapy.

The stimulator is surgically implanted under the skin of the buttock and delivers electrical stimulation to the pelvic nerves (S3 nerve root) that control both bladder and anorectal function via an attached electrode implanted in the S3 sacral foramen. The stimulator helps to restore normal nerve activity so that children with fecal and/or urinary incontinence can defecate and urinate normally.

The two-stage procedure involves a test phase followed by permanent implantation of the stimulator if the patient shows significant improvement in fecal and/or urinary incontinence during test simulation.

In May 2012, the patient underwent placement of a temporary sacral nerve stimulator. One week later this was converted to a permanent sacral nerve stimulator after significant improvement in symptoms.

**Outcome:** The patient now experiences nighttime enuresis only once every three to four weeks with no daytime urinary accidents. The repeat urodynamic study was relatively stable with no significant bladder over-activity and with the same functional bladder capacity. The patient’s constipation has also improved, although to a lesser degree.

The family can check the functioning of the sacral nerve stimulator at any time and have been trained to make minor adjustments if necessary. Most importantly, the patient can now go to school without worrying about urinary incontinence. This has been a great relief to her and her family.
Sacral Nerve Stimulation at Nationwide Children’s

Sacral nerve stimulation is a promising new therapeutic modality for urinary or fecal incontinence in children when other treatments, such as medications and behavioral therapy, have been unsuccessful. While a few other children’s hospitals in the United States offer sacral neuromodulation based on subjective criteria and clinical symptoms, Nationwide Children’s is one of the first institutions to structure this therapy by evaluating objective bladder and bowel function studies before and after the procedure to assess treatment response.

About the Authors

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Carlo Di Lorenzo, MD, is chief of the Division of Pediatric Gastroenterology at Nationwide Children’s and professor of clinical pediatrics at Ohio State University College of Medicine. The co-author of the only book on pediatric gastrointestinal motility, Dr. Di Lorenzo has published more than 140 peer-review articles and 80 chapters, invited reviews and editorials. He has functioned as a grant reviewer for the NIH, abstract reviewer for the AGA and served on the NASPGHAN Council. Named multiple times among the “Best Doctors in America,” Dr. Di Lorenzo currently serves on the ANMS council and is the chair of the Growth, Development and Child Health Section of the AGA. He is the president-elect of NASPGHAN.

Steven Teich, MD, pediatric surgeon at Nationwide Children’s Hospital, is a leading expert in the field of surgical neurostimulator therapies. Dr. Teich is surgical director of the Nationwide Children’s Neonatal Intensive Care Unit, and clinical associate professor of surgery at Ohio State University College of Medicine. He is currently president of the Nationwide Children’s medical staff and coordinates the development of clinical pathways for pediatric surgery. Named among the “Best Doctors in America,” Dr. Teich has pioneered several innovative surgical therapies for pediatric patients, including implantation of gastric stimulators to treat severe gastroparesis and dyspeptic symptoms, and most recently, sacral nerve stimulation to treat intractable urinary and fecal incontinence.
When your child needs a hospital, everything matters.

At Nationwide Children’s, we are creating the future of pediatric health care. We consider every detail. Every decision. Every aspect of the care we provide. From the child who comes to us with complex motility disorders, inflammatory bowel disease, or polyposis. To those with a sprain, broken bone, or a fever. Here, the potential of all children is being shaped. Here, our doctors are revolutionizing your child’s health and the health of future generations. Learn more at NationwideChildrens.org.

Referrals and Consultations
Like all of the specialized programs at Nationwide Children’s, the Division of Gastroenterology, Hepatology and Nutrition accepts referrals from across the United States and internationally.

Online: NationwideChildrens.org
Fax: (614) 722-4000
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