Case Report

Sacral Nerve Neuromodulation for the Treatment of Patient with Idiopathic Fecal Incontinence: A First Successful Case Report in Thailand

Boonnithi W, MD[1], Parakonthun T, MD[1], Riansuwan W, MD[1], Lohsiriwat V, MD, PhD[1], Lindsey I, MD[2], Prapasrivorakul S, MD[1]

[1] Colorectal Surgery Unit, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

[2] Department of Colorectal Surgery, Oxford Pelvic Floor Centre, Oxford University Hospitals, Oxford, UK

Fecal incontinence is a debilitating condition that significantly impacts on psychosocial aspect and quality of life. Several treatment modalities have been used with various outcomes. Sacral nerve neuromodulation or stimulation (SNS) has been reported as an effective treatment for fecal incontinence in many countries. However, it is a novel procedure in Thailand. The authors herein reported a successful outcome of SNS in a Thai patient suffering from idiopathic fecal incontinence. The case report was a 57-year-old female presenting with passive and urge fecal incontinence for three years. Endoanal ultrasonography and magnetic resonance imaging (MRI) defecography demonstrated no anatomical abnormalities. Anorectal manometry revealed low baseline anorectal sphincter pressure with anismus. Preoperative St. Mark's incontinence score and gastrointestinal quality of life (GIQoL) was 20 and 98, respectively. Two-stage sacral nerve stimulation was performed. A pulse generator was implanted two weeks after a successful testing (50% symptom improvement). Postoperative period was uneventful. At a 6-month follow-up, her incontinence significantly improved with St. Mark's incontinence score of 6 and GIQoL score of 126.

Keywords: Fecal incontinence, Outcome, Sacral nerve neuromodulation, Sacral nerve stimulation

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Fecal incontinence (FI) is a debilitating condition that significantly impacts on patient's psychosocial and quality of life. The management of FI is difficult due to its multi-factorial etiologies including obstetric injury, congenital anomalies, neuropathy, and more importantly iatrogenic condition. Sacral nerve neuromodulation or stimulation (SNS) was first reported as an effective treatment for FI by Matzel et al in 1995[1]. Although its exact mechanisms of action are not fully understood, SNS is thought to improve somatovisceral reflex, modulate the perception of afferent information, and increase in external anal sphincter activity[2,3]. Despite unclear mechanism of SNS, it has proven to be an effective and safe treatment for FI in several studies. It significantly improved patients' symptoms and quality of life with long-term success rates of 50% to 80%[4-6]. As a result, many institutes[7,8] have widely used SNS as a treatment of FI. The authors herein report the first successful case of SNS for idiopathic FI performed at the largest university hospital in Thailand.

Correspondence to:
Prapasrivorakul S.
Colorectal Surgery Unit, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.
Phone: +66-2-4198005
Email: siriluck.pra@mahidol.ac.th

Case Report

A 57-year-old female presented with passive and urge FI for three years. Her underlying diseases were hypertension, diabetes mellitus, gout, and chronic renal failure. She had two vaginal deliveries without forceps assistance or any significant history of obstetric injury to anal sphincter. She underwent appendectomy five years ago but never had an anorectal operation. Her body mass index was 23. Conservative treatment, including administration of anti-diarrheal agents, and Kegel exercise was initially applied for six months but no improvement was seen.

The authors discussed with the patient about other treatment options such as retrograde colonic irrigation, diverting colostomy, and SNS. Eventually,

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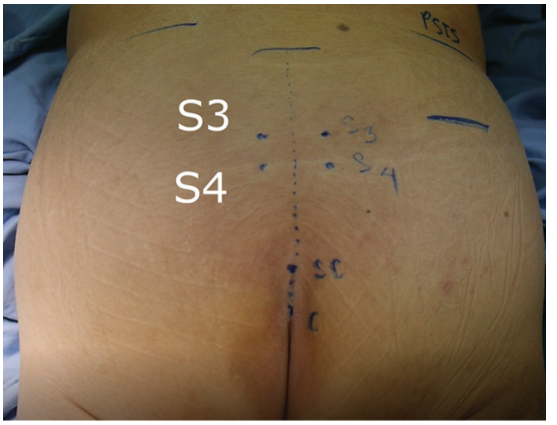


Figure 1. Skin marking.
S3: half-way between SC and PSIS, a finger breadth from midline; S4: 9 cm cranial to C, a finger breadth from midline

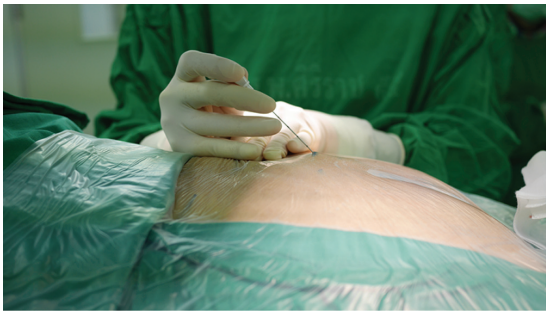
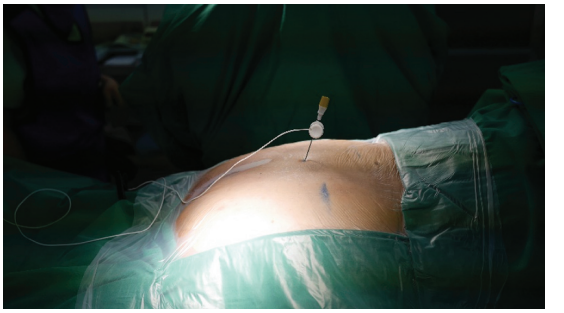
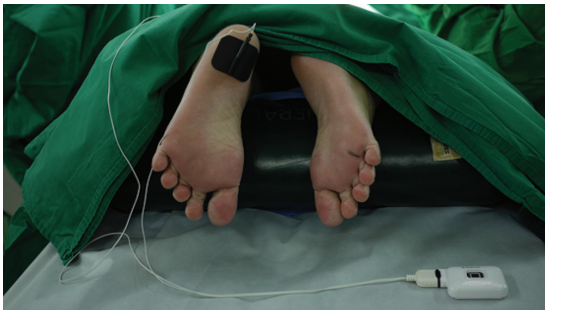


Figure 2. Needle insertion.

she opted for SNS as her first option. Preoperative evaluation included colonoscopy that showed no abnormality. An endoanal ultrasonography showed no defect in both external and internal anal sphincters. A magnetic resonance imaging (MRI) defecography demonstrated no anatomical abnormalities such as rectal intussusception or rectocele. An anorectal manometry revealed low baseline anorectal sphincter pressure with anismus. A bowel diary was completed before, during, and after test stimulation. She underwent a test stimulation for two weeks. If the patient encountered at least 50% reduction of incontinence episodes, the test period was considered successful and she would be proceeded to permanent SNS implantation. Preoperative St. Mark's incontinence score was 20 (minimal score 0= perfect continence, and maximum score 24=totally incontinence)[9]. Preoperative gastrointestinal quality of life index (GIQLI) was 98 (range 0 to 144; higher score means better gastrointestinal health-related quality of life)[10].



A. Connecting the stimulator cable to the needle



B. Looking for motor response

Figure 3. Testing stimulation.

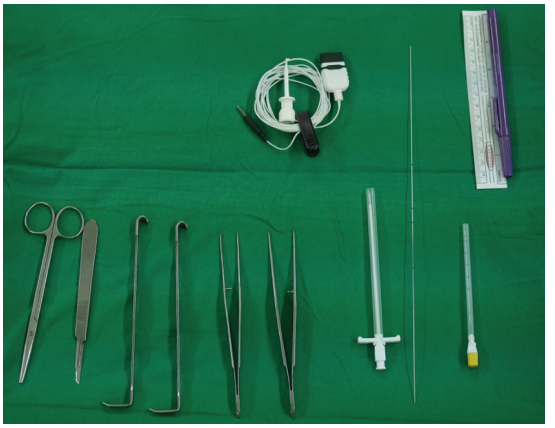
Surgical technique for percutaneous nerve evaluation (PNE, the first-stage of SNS procedure)

After obtaining a written inform consent, the patient was placed in prone position under general anesthesia without muscle relaxant.

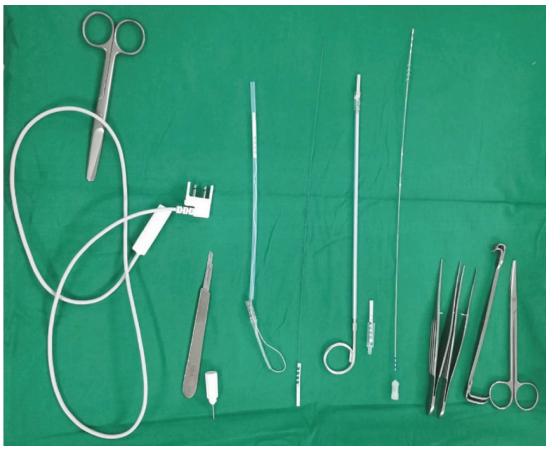
Skin marking: The coccyx, sacrococcygeal joint, and posterior superior iliac spine was palpated and skins marking of S3 and S4 foramen were performed[11] (Figure 1). The position of S3 foramen was confirmed by fluoroscopy.

Needle puncture and testing stimulation: A needle was inserted into S3 foramen, in an angle of 60 degree to the skin surface (Figure 2). The correct position of needle was confirmed by connecting a stimulator cable to the needle and testing motor response (Figure 3A). The stimulation of the S3 nerve root led to the flexion of big toe (Figure 3B).

Tinned lead insertion: The puncture site was then extended. The needle stylet was removed, and guide wire was inserted. The needle was then removed, and dilator was inserted under a fluoroscopic guidance. A tinned lead (InterSlim® II Neurostimulator, Medtronic, model 5098, USA) (Figure 4) was inserted, then the lead position was confirmed by both fluoroscopy and motor response testing for all four electrodes. The dilator was removed under fluoroscopy and the position of tinned lead was confirmed again by fluoroscopy (Figure 5).

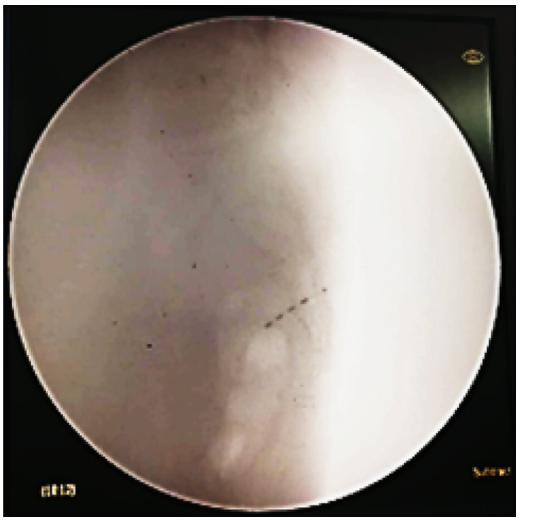


A. Needle, guidewire, dilator

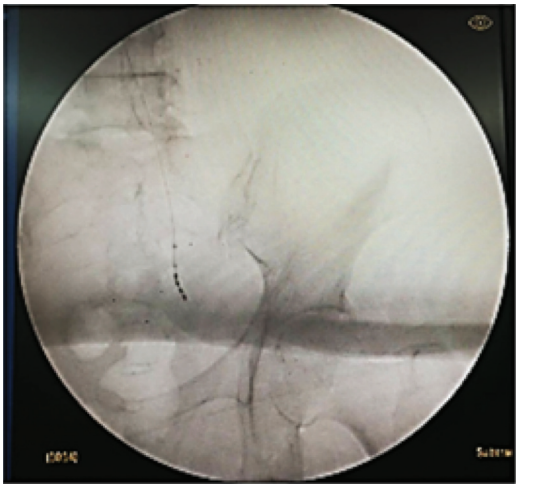


B. Tinned lead, tunneler, external connector

Figure 4. Instrument.



A. Lateral view



B. Anteroposterior view

Figure 5. Lead position.

Creating subcutaneous pocket and tunneling: Subcutaneous pocket was created at ipsilateral side and a tunneler was inserted from a puncture site to subcutaneous pocket. Then the tinned lead was tunneled to the created subcutaneous pocket.

Connecting tinned lead to external connector: An exit site for external connector was created at contralateral side. An external connector was tunneled to the exit site. The external connector was connected to the tinned lead and wound was closed subcutaneously.

After that, the patient asked to complete her bowel diary for two weeks. In the report case, she had more than 50% improvement in her symptoms. Therefore, she was scheduled for stimulator placement.

Surgical technique for stimulator (battery/impulse generator) implantation (the second-stage of SNS procedure)

The patient was placed in prone position under general anesthesia.

Removal of external connector: Skin over the subcutaneous pocket was incised. The external connector was removed.

Connecting tinned lead to stimulator: A stimulation lead was inserted into a stimulator (InterSlim® II Neurostimulator, Medtronic, model 3058, USA) (Figure 6) until blue dot appeared and the stimulation lead was then fixed to stimulator with screw. The stimulator was placed into the subcutaneous pocket. The Scapa's fascia was closed, and skin was closed with subcuticular sutures.

Postoperative period was uneventful. At a 3-month follow-up, her FI score was reduced from 20 to 8 and her gastrointestinal quality of life (GIQoL) score was increased from 98 to 122. At a 6-month

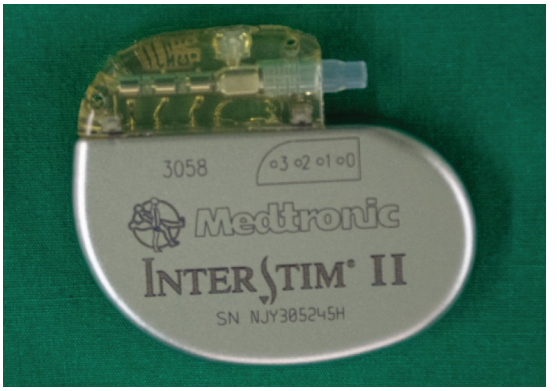


Figure 6. Stimulator (battery/impulse generator).

follow-up, her FI score and her GIQoL score were 6 and 126, respectively. Up to 9-month follow-up, her clinical symptoms involved only occasional bowel leakage. She was able to discontinue anti-diarrhea drug. She resumed her social activities.

Discussion

FI is defined as an uncontrolled passage of fecal material for at least one month, in an individual with a developmental age of at least four years[12]. Prevalence of FI was reported between 1.4% to 18% and higher in woman and elderly. There were several mechanisms causing FI, such as altered stool consistency, abnormal rectal capacity or compliance, decreased anorectal sensation, and pelvic floor or anal sphincter dysfunction[13]. There may be one or more causes for the symptoms. Therefore, the management of this condition must be tailored to an individual.

Initial treatment includes modification of precipitating factors e.g., medication, some kinds of food, and some medical condition, altering stool consistency. Stool bulking agent and antidiarrheal drugs may be helpful as well as diet modification including an increase uptake of fiber diet. Biofeedback and pelvic floor exercise play some roles in treating FI but their evidence for efficacy is still lacking[14].

There are several modalities used for the treatment of FI. Anal sphincteroplasty for FI patients due to sphincter defect have shown good short-term results in up to 85% of patients[15]. However, the results deteriorated with a long-term follow-up. In most studies, only 10% to 14% of patients have sustained the improvement after five years follow-up[15-17]. The artificial bowel sphincter was reported since 1996[18] but many reports showed high rates of complication such as infection, device erosions, and migration[19,20]. Hence, it was not widespread used. Other modalities such as injection of bulging agents, radiofrequency anal sphincter remodeling (known as SECCA), and a new device magnetic anal sphincter, have been used and reported with acceptable outcomes.

Meanwhile, sacral nerve stimulation has been widely used as a treatment for FI. The treatment consists of three phases, percutaneous nerve evaluation (PNE), testing, and permanent SNS implantation. During the PNE, the needle is inserted into S2 to S4 foramen. The appropriate position of needle and lead must be confirmed by fluoroscopy, sensory response, or motor response. Optimal sensory response is throbbing or buzzing within 2 cm of anus with extension to perineum or scrotum/vagina. Stimulation of the S2 to S4 nerve roots leads to contraction of the pelvic floor, seen as a lifting and tightening (bellows) action of the anus, and contraction of the external anal sphincter. Additionally, S2 stimulation results in plantar flexion, S3 stimulation gives flexion of great toe[11], and S4 stimulation results in internal rotation of whole foot. Test period after PNE is usually two to three weeks. The test period is considered successful if the patients have a reduction in incontinence episodes of at least 50%. Then, patients will proceed to permanent SNS implantation.

A systematic review involving 266 patients revealed that 75% to 100% of patients have more than 50% improvement and 41% to 75% achieved complete fecal continence[21]. A recent report on long-term outcomes from the European SNS study group[5], 407 patients underwent temporary stimulation, 272 patients (67%) had an impulse generator implanted and 228 patients (56%) were available for long-term follow-up at a median of 84 months. There were significant reductions in the number of FI episodes per week and summative symptom scores after implantation. In long-term follow-up, long-term success was maintained in 71% of patients and full continence was achieved in 50%.

In the report study, the patient was suffered from FI without any anatomical abnormalities and had failed conservative treatment. Therefore, SNS was taken as the treatment option. She had a successful testing phase and proceeded to permanent stimulator implantation. On her follow-up, there were significant improvement in both incontinence and quality of life. To the best of the authors' knowledge, this is the first successful SNS case in Thailand.

Conclusion

Sacral nerve stimulation is safe and effective for the treatment of idiopathic FI. However, long-term

outcome needs to be followed.

What is already known on this topic?

Despite unclear mechanism of SNS, it has proven to be an effective and safe treatment for FI in several studies. It significantly improved patients' symptoms and quality of life with long-term success rates of 50% to 80%.

What this study adds?

This study reports the first successful case of SNS for idiopathic FI performed in Thailand.

Conflicts of interest

The authors declare no conflict of interest.

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