CLINICAL EXPERIENCES

Spinal Cord Stimulation of the Dorsal Root Ganglion for Neuropathic Groin Pain: A Case Series

Liong Liem, MD[1]; Harold Nijhuis, MD [1]; Ashish Gulve, MD[2]; Katharina Wolf, MD[3], Stefan Schu, MD[4], Walter Demmel, MD[5], Anders Wåhlstedt, MD[6]

[1]St. Antonius Ziekenhuis, Nieuwegein, The Netherlands, [2]James Cook University Hospital, Middlesbrough, UK
[3]Berufsgenossenschaftliche Unfallklinik Murnau, Murnau, Germany,
[4]Universitätsklinikum Düsseldorf, Düsseldorf, Germany,
[5]Klinikum Fürstenfeldbruck, Fürstenfeldbruck, Germany, [6]Akademiska sjukhuset, Uppsala, Sweden

INTRODUCTION

Neuropathic groin pain after groin surgeries, the most common being hernia repair, is a recognized procedural complication. Published reports indicate an incidence ranging from 5 - 35%.[1,2] 12% of all groin hernia repair patients experience severe chronic pain requiring intervention.[3] Chronic groin pain has a major effect on the daily life of a patient. While diagnosis and treatment concepts have been widely discussed, there is a lack of consensus on an optimal approach. This case series represents experience with the Spinal Modulation Spinal Cord Stimulator system in patients treated in Europe and Australia.

Neuropathic groin pain typically results after damage to the inguinal nerves and usually develops in the sensory distribution of the injured nerve. The nerves involved are the Ilioinguinal nerve (IIN), the Iliohypogastric nerve (IHN), the genital branch of the Genito-Femoral nerve (GFN) and sometimes the Lateral Femoral Cutaneous nerve (LFC) (Fig. 1).[4] These nerves can be damaged either by partial or complete transection, stretching, contusion, crushing, electrical damage or by being caught in the suture used in open repair or the tacks used in laparoscopic repair. Secondary nerve damage can also occur as a result of adjacent inflammatory processes, such as granuloma, or because of excess fibrotic reaction or mesh encasement.[5,6]

As of this publication, 39 groin pain patients have been treated with the Spinal Modulation system. Two patients were lost to follow up. 33/37 (89.2%) had a successful trial, and 29 have gone on to receive the fully implantable INS thus far. The average follow-up period of this total cohort was 13 weeks and average pain reduction was 69.4%.

This case series provides in-depth information about two of these patients who have experienced excellent improvements in their Visual Analog Scale (VAS) and significant improvements in their daily living activities. Experience to date in these types of patients suggest lead placement at the T12 to L3 levels produce the best results.

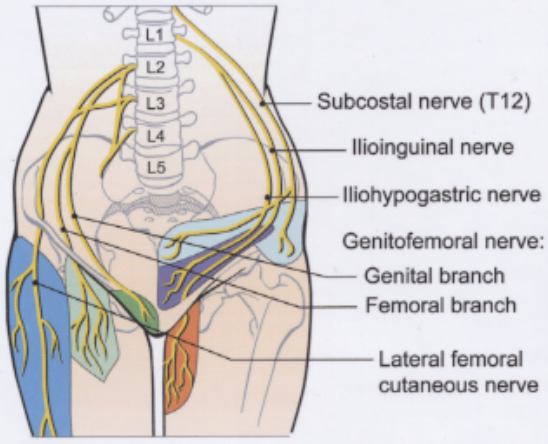

Figure 1. Neuroanatomy of nerves involved in neuropathic groin pain. Figure courtesy of Loos et al.[4]

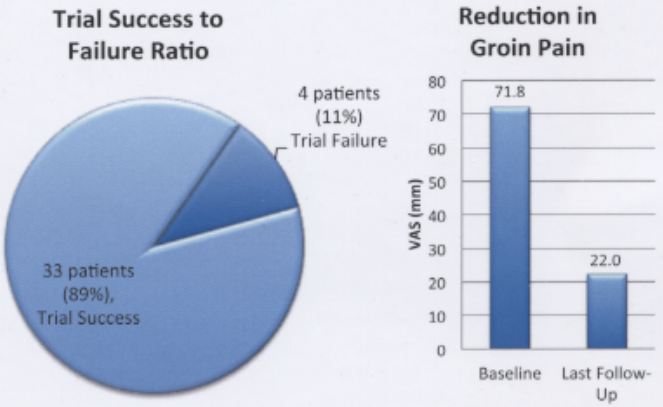

Figure 2. 89% trial success (>50% pain relief) and 69.4% average pain reduction at last follow-up for groin pain patients treated with SCS of the DRG.

MK0006D-EN Apr 2013

PATIENT 1

Patient 1 is a 43 year-old father of four young children who suffers from neuropathic pain in his left groin after a surgical release of a torsed testicle. Prior to the implant of the device, he was unable to work in his manual labor job. Radiating pain to his abdomen produced persistent vagal symptoms of nausea. His pain condition led to depression and an inability to enjoy life.

The patient experienced more than two years of chronic pain and received multiple treatments. He received a previous SCS device, but did not receive adequate long-term pain relief due to the inability to reach the target area.

IMPLANT HIGHLIGHTS

- Single L2 lead placement.
- 100% coverage of painful area.
- Straightforward, fast procedure.
- 100% reduction in VAS.
- Subthreshold pain relief (no paresthesia felt).

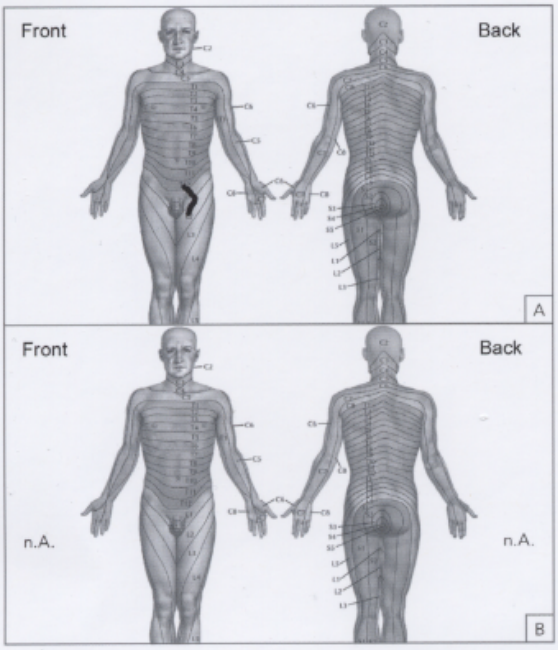

Figure 3. Patient 1 (a) pain area pre-implant and (b) paresthesia field distribution. (Note: Subthreshold pain relief. No paresthesia felt.)

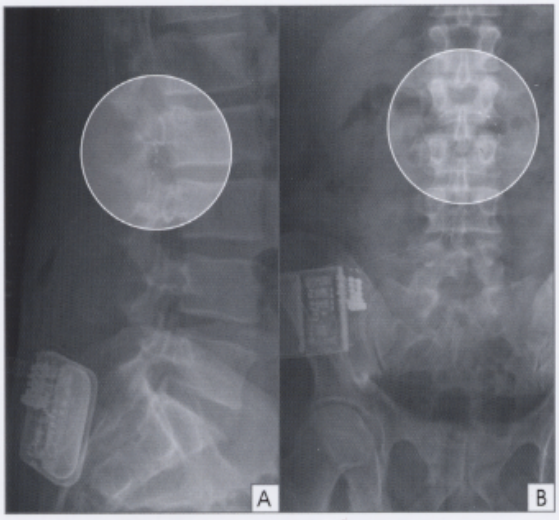

Figure 4. Patient 1 X-rays of implanted neurostimulation system for SCS of the DRG. (a) Lateral and (b) anterior views.

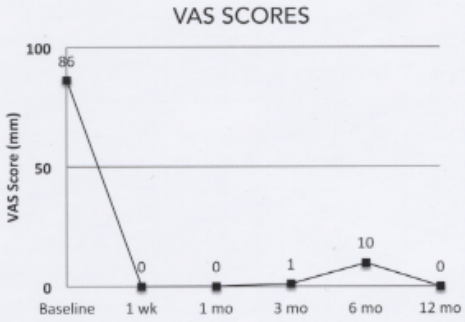

Figure 5. Patient 1 VAS scores at baseline and during SCS of the DRG to treat groin pain.

FOLLOW-UP HIGHLIGHTS

Patient 1 reports excellent pain relief and does not feel the paresthesia since the stimulation is subthreshold. This is a significant change as compared to his previous SCS system and took some adjustment. During the first month, Patient 1 returned to the clinic twice. He was programming himself to high levels as he had needed to do with his previous stimulator. After clinic staff explained that DRG stimulation only requires very low level of stimulation, he received excellent pain relief. His children state that they "have a new Dad". He also has appreciated being able to perform at a higher level in his manual labor job.

PATIENT 2

Patient 2 is a 59 year-old female with multiple sclerosis suffering from neuropathic pain in her right groin after a hernia procedure. Prior to the Spinal Modulation implant, she was confined to a wheelchair and predominantly homebound due to excessive pain, which increased when mobile.

Additionally, the patient did not receive adequate long-term pain relief from previously implanted SCS devices due to the inability to reach the target pain area.

IMPLANT HIGHLIGHTS

- Single T12 lead placement.
- 100% coverage of painful area.
- This patient has major degeneration in her spine causing compression in the T12-L1 area.
- 100% reduction in VAS.

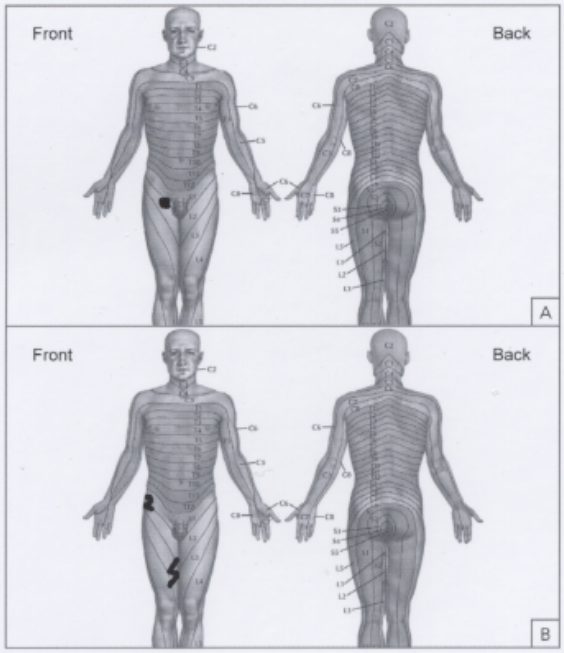

Figure 6. Patient 2 (a) pain area pre-implant and (b) paresthesia field distribution. (Note: Patient has 100 % pain coverage, but only feels mild paresthesia in outlying areas).

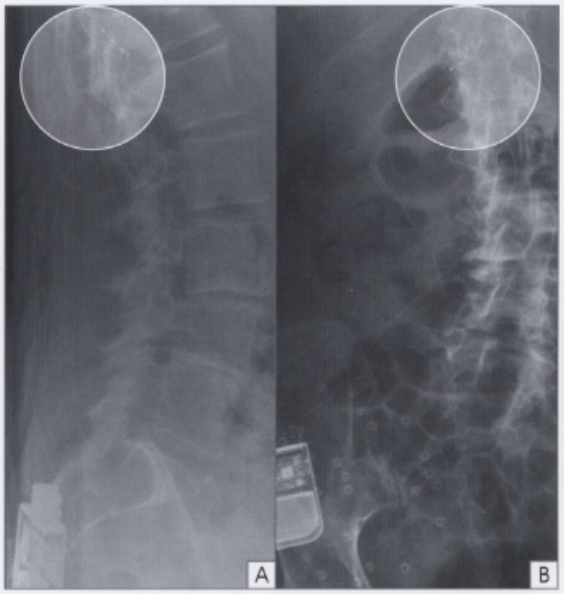

Figure 7. Patient 2 X-rays of implanted neurostimulation system for SCS of the DRG. (a) Lateral and (b) anterior views.

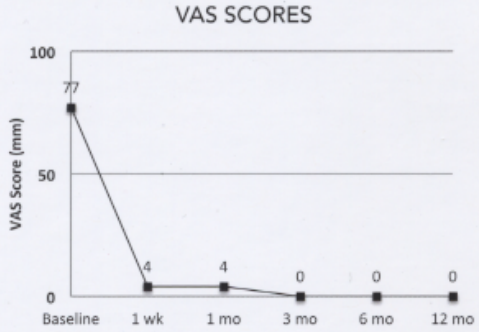

Figure 8. Patient 2 VAS scores at baseline and during SCS of the DRG to treat groin pain.

FOLLOW-UP HIGHLIGHTS

The patient considers this therapy life-changing. She has been able to re-engage with relationships and interests outside the home due to her increased mobility on her motor scooter. The patient reports no postural effects with the stimulation on. She describes the stimulation as much "smoother, milder and more pleasant" than her previous SCS system.

CONCLUSION

Early experience with the Spinal Modulation Spinal Cord Stimulator shows promising results for the treatment of groin pain. This has typically been a difficult condition to treat with dorsal column SCS devices as demonstrated by two patients having had unsuccessful experiences with other SCS devices. As with many severe, chronic pain conditions, the inability to find solutions is difficult for both the patient and physician.

The early results in these cases show remarkable success with 84.6% of treated patients having successful trials. Both highlighted cases show a 100% improvement in overall VAS scores.

It is interesting to note how the patients perceive the Spinal Modulation system. Compared to previous SCS system therapies, the patients perceive the stimulation to be "smoother, milder and more pleasant", which may be related to the lower energy requirements of the Spinal Modulation system (90% less energy required than traditional stimulation systems). Patient 1 has been programmed in a way to give him 100% excellent pain coverage in a subthreshold setting where no paresthesia is felt. In comparison to previous treatments, the patient frequently programmed the device at high stimulation settings expecting that strong, sometimes uncomfortable, paresthesia is needed to achieve pain relief. In addition, the patients did not experience postural effects as they had with previous devices. All of these factors and the stability of the pain relief have led to infrequent use of the patient programmer and minimal visits back to the pain clinic.

The aforementioned results have been achieved via a straightforward procedure. Both highlighted patients received 100% consistent and effective coverage with one 4-contact lead placed in the L2 or T12 location.

REFERENCES

1. Macrae WA, Chronic post-surgical pain: 10 years on. Br J Anaesth. 2008 Jul; 101(1): 77-86
2. Kehlet H. Chronic pain after groin hernia repair. Br J Surg 2008; 95(2):135-6
3. Poobalan AS, et al. A review of chronic pain after inguinal herniorrhaphy. Clin J Pain 2003; 19(1): 48-54.
4. Loos MJ, Scheltinga MR, Roumen RM. Surgical management of inguinal neuralgia after a low transverse Pfannenstiel incision. Ann Surg. 2008 Nov; 248(5):880-5.
5. Abdul Hakeem, Venkatesh Shanmugam. Current trends in the diagnosis and management of postherniorraphy chronic groin pain. World J Gastrointest Surg. 2011 June 27; 3(6): 73-81
6. Cunningham J, Temple WJ, Mitchell P, Nixon JA, Preshaw RM, Hagen NA. Cooperative hernia study. Pain in the postrepair patient. Ann Surg. 1996; 224: 598-602

Data courtesy of P Almqvist, G Baranidharan, W Demmel, L Elzinga, A Gulve, G Jähnichen, D Klase, L Liem, H Nijhuis, D Rasche, M Russo, S Schu, M Sharma, C Sommer, A Wahlstedt, K Wolf, & P Zomers.