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Peripheral field stimulation for thoracic post herpetic neuropathic pain

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ABSTRACT

Objective: Post herpetic neuralgia is a chronic, debilitating pain with very few management options and is often refractory to treatment. We present our experience with a series of 4 patients who underwent subcutaneous peripheral field stimulation for treatment of thoracic post herpetic neuropathic pain.
Methods: Four patients with intractable thoracic post herpetic neuropathic pain were operated after maximum medical treatment and a neuropsychological evaluation. Multiple percutaneous electrodes were placed in the subcutaneous plane in the region of pain for a 7-day trial. Following a successful trial (more than 50% reduction of pain), the electrodes were then internalized and attached to a pulse generator. Visual analog scores (VAS) were studied during the preoperative, immediate postoperative and last follow-up visits. Long-term treatment results were determined by retrospective review of medical records. Average follow-up period was 28.2 months.
Results: All 4 patients showed persistent improvement in their VAS pain scores with an average improvement of more than 75%. There were no treatment failures and no complication requiring re-operation was reported.
Conclusion: Peripheral field stimulation for the treatment of post herpetic neuropathic pain is a safe and effective method for pain relief for an extremely complex problem with very few solutions. Patient selection and proper lead placement is most important for the success of treatment.

1. Introduction

Post herpetic neuralgic (PHN) pain is a prevalent chronic neuropathic pain. It follows the eruption of varicella herpes zoster virus (VZV, chickenpox). It is estimated that 1 million new cases of VZV are reported annually in the United States alone [1]. Of those approximately 20–30% will develop PHN. The disorder is defined by three distinctive groups. Acute herpetic neuralgia that develops within 30 days of rash onset, sub-acute herpetic neuralgia which develops within 30–120 days after rash onset and post herpetic neuralgia which is defined as pain lasting at least 120 days following rash onset [2,3]. PHN leads to significant morbidity, diminished quality of life and decreased productivity. Typically PHN presents as variable pain (moderate to severe) and described by patients as burning, stabbing, shooting or gnawing. The involved area usually presents a dermatome belt of one or more nerves and there might be skin color changes or scarring [4,5]. Mostly, physical examination reveals tactile allodynia [6]. Management of PHN consists of Tricyclic antidepressants, anticonvulsants, morphine and lidocaine patches. These treatment offer moderate success and some patients will continue to have chronic PHN pain [7]. Combination therapy of topical capsaicin and aspirin creams was also reported as well as intrathecal methylprednisolone [7,8]. Various non-invasive [transcutaneous electrical nerve stimulation (TENS), repetitive Transcranial Magnetic Stimulation (rTMS), and transcranial direct current stimulation (tDCS)] and invasive [peripheral nerve stimulation (PNS), peripheral field stimulation (PFS), nerve root stimulation (NRS), spinal cord stimulation (SCS), deep brain stimulation (DBS), and motor cortex stimulation (MCS)] neurostimulation techniques have been explored in patients with medical refractory pain syndromes with varied success[9–11]. Due to the success of peripheral field stimulation (PFS) in the treatment of variety of neuropathic pain, there have been few reports of treating PHN via PFS [12–16].

Abbreviations: PFS, peripheral field stimulation; PHN, post-herpetic neuralgia; VZV, Varicella zoster virus; VAS, visual analog scale; IPG, implantable pulse generator.

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Here we report our experience with a series of 4 cases of refractory thoracic PHN that were successfully treated with PFS.

2. Methods

2.1. Patient selection

Following approval from our institutional review board, a retrospective review of 4 patients with thoracic PHN who were treated with PFS between 2010 and 2013 was done. All patients were referred by pain management specialists in our institution and one by another facility. All the patients were diagnosed to have classical symptoms of PHN and were non responsive to multiple pharmacological medical therapy and other interventions such as nerve blocks. Prior to surgical intervention neuropsychologist confirmed patients to be free of narcotic overuse and psychiatric comorbidities. The pain was assessed using a visual analog scale (VAS) which is a reliable non-verbal measurement scale (10 cm scale, with "0" being considered as "no pain" and "10" being "worst imaginable pain") commonly used to assess pain and disability [17,18] The neuropsychological evaluation was performed using battery for health improvement inventory (BHI-2), the pain Catastrophizing Scale (PCS) and various pain management instruments as part of comprehensive evaluation. In addition, scores on measures of depression, anxiety and hostility as well as alcohol or illicit drug dependence were evaluated in all patients prior to implantation. The average age of the patient at PFS implantation surgery was 47.5 ± 8.75 years. Half of the patients were males. All patients underwent a PFS trial done by our team. The 7-day trial period was used in order to confirm at least 50% reduction in the pain VAS score. Following successful PFS trial the patients underwent implantation of permanent lead stimulator and a pulse generator.

2.2. Surgical technique

As described in patient selection, surgery is done as a two stage procedure. For the trial procedure, the patient is awake. Area of pain and allodynia is marked before induction of local anesthesia and sedation. The surgical site is prepped and draped. A small skin puncture is made with a Tuohy needle. ON-Q® tunneler (I-Flow, Lake Forest, CA) that is molded to match the curvature of the thoracic region is introduced into the subcutaneous place by virtue of its flexibility and atraumatic tip. Four or eight contact cylindrical leads [Quad, Octad, Quad Plus, or Quad Compact (Medtronic, Inc, Minneapolis, MN)] are placed in the region of pain that is demarcated preoperatively in the same plane. We preferentially use an ON-Q tunneler (I-Flow, Lake Forest, CA) for the placement of cylindrical leads. The direction of tunneling and placing the lead is chosen to be either along the border of pain if there is significant allodynia or underlying the area of pain if allodynia is minimal. Leads are then anchored with a skin stitch. Trial stimulation with externalized battery is then carried out for 7 days.

In case of successful trial (more than 50% improvement in pain), permanent implant is done along with an implantable pulse generator (IPG) placement (Activa SC or Activa RC; Medtronic, Inc, Minneapolis, MN). The permanent implant is similar to trial lead placement, except the leads are placed using small skin incisions and are anchored subcutaneously and then tunneled to the IPG site (Figs. 1–4). A rechargeable IPG is placed in an IPG pocket either in infraclavicular region or over abdominal wall or over the hip.

2.3. Pain assessment, functional status and data collection

Following implantation of the PFS, patients were scheduled for an immediate post-operative visit at 10 days and then outpatient

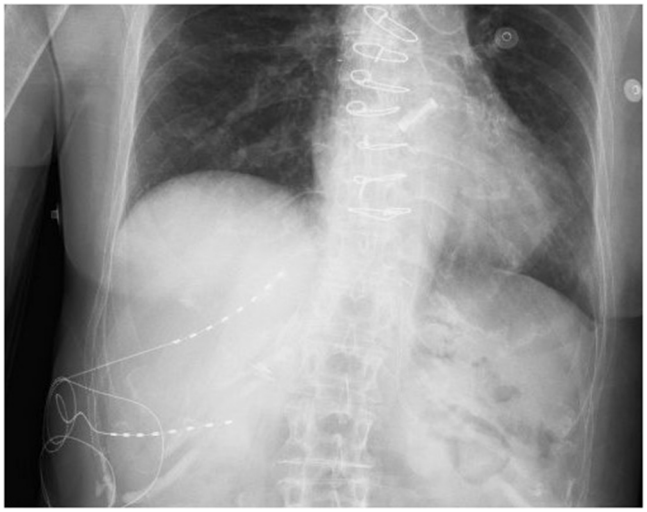

Fig. 1. Two octode PFS leads bracketing the area of PHN pain on the right anterior thoracic wall.

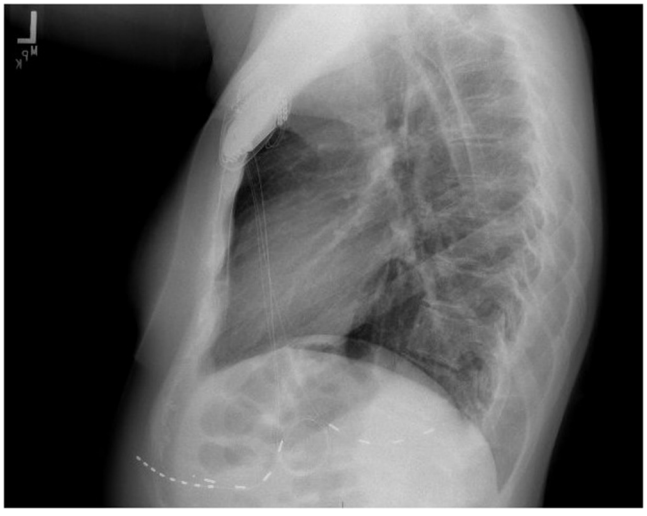

Fig. 2. Three PFS leads (2 quads and 1 octode) below the area of PHN pain on the left anterior and posterior thoracic wall and implantable pulse generator in the left subclavicular region.

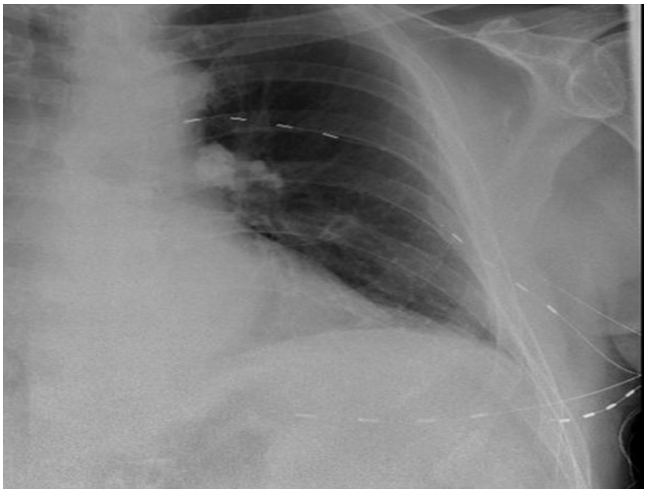

Fig. 3. Four quad PFS leads bracketing the area of PHN pain on the left anterior and posterior thoracic wall.