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Successful Treatment of Chronic Coccydynia with Peripheral Nerve Stimulation: A Case Report

Mohammad H. Bawany, MD[1], and Nalini Sehgal, MD[2]

Background: Coccydynia, or "tailbone pain," can be difficult for both patient and clinician to manage. Recently, reports have begun to describe the use of neuromodulation techniques to treat chronic coccydynia with high levels of success.

Case Report: We present a case of coccydynia finally managed with peripheral nerve stimulation after a host of prior failed therapies. At follow-up after one, 4, and 12 months post procedure, our patient continued to endorse 50% improvement in pain, improved overall function, and discontinuation of her pain medications.

Conclusion: Peripheral nerve stimulation is a minimally invasive option that can be considered for patients with intractable tailbone pain, both prior to and after coccygectomy, as highlighted in this case report.

Key words: Case report, coccydynia, coccygodynia, peripheral nerve stimulation, tailbone pain

BACKGROUND

Coccydynia, also known as coccygodynia, or "tailbone" pain, is a type of low-back pain that is underrecognized and often not adequately treated (1). Patients usually complain of pain that is worsened with prolonged sitting, leaning back while sitting, or defecation. On examination, pain is inferior to the lumbosacral spine as compared to usual back pain, and more midline than in buttock pain syndromes such as sacroiliac pain and piriformis pain, with external palpation revealing focalized tenderness over the coccyx (2). The exact incidence has not been reported, though factors associated with developing it include female gender and obesity (3). The most common causes of developing coccydynia include external and internal trauma, such as backward falls and childbirth, respectively, though underlying masses and infections can also be causative etiologies (4). While the majority of cases resolve with conservative treatment, chronic coccydynia continues to pose challenges for both clinicians and patients. Recently, reports have begun to describe the use of neuromodulation techniques to treat chronic coccydynia with high levels of success (5-8). This report adds to the limited evidence in favor of neuromodulatory techniques for refractory coccydynia, with the goal of highlighting for clinicians the increasing variety of modern treatment options they can pursue both prior to and after surgical referral.

Written Health Insurance Portability and Accountability Act (HIPAA) authorization was obtained for this case report.

CASE

A 70-year-old woman status-post surgical resection of her coccyx in 2007 due to a presacral tumor presented with a complaint of 13 years of "tailbone" pain causing functional impairment, sleep loss, and depression. Her

From: [1]Department of Emergency Medicine, University of Wisconsin, Madison, Wisconsin; [2]Department of Orthopedics and Rehabilitation Medicine, University of Wisconsin, Madison, Wisconsin

Corresponding Author: Nalini Sehgal, MD, E-mail: sehgal@rehab.wisc.edu
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symptoms initially began spontaneously in 2006 and gradually worsened, prompting her to first undergo banding of hemorrhoids without relief. On further worsening of her symptoms, she received pelvic magnetic resonance imaging (MRI) that showed a retrorectal hamartoma. After tumor excision and complete coccygectomy in 2007 (Fig. 1), her symptoms persisted, prompting her to undergo acupuncture trials and a ganglion impar block in 2008, caudal epidural injections and a spinal cord stimulator (SCS) trial in 2009, intravenous (IV) lidocaine infusions in 2011, and trigger point injections in 2013, all without success. She had consistently attended years of physical and psychological therapy with no benefit and found that among all the medications she had tried, including various opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), topical anesthetics, and tricyclic antidepressants, only gabapentin 300 mg 4 times daily and mexiletine 150 mg 3 times daily offered her 40% relief of her pain, though she was displeased with the side effects of weight gain and drowsiness associated with these medications.

Her tailbone pain was centralized in the sacrococcygeal region, felt like a burning sensation in that area, and was a constant 6 of 10 that worsened to 9 of 10 with prolonged periods of sitting. A computed tomography (CT) scan of her pelvis showed a normal lower lumbar spine (Fig. 2). She did not have bowel or bladder symptoms or numbness, and no pain radiating to the hips or lower limbs. Her pain had a significant negative impact on her quality of life, forcing her to quit her full-time desk job and impairing her ability to sleep.

On her physical exam, she alternated between appearing comfortable and uncomfortable while seated on a cushion. Examination of her sacral area revealed a midline well-healed surgical scar, with hyperesthesia to light touch and pinprick hyperalgesia over the area. Her gait was normal, her active lumbar spine and hip ranges of motion were normal and without pain, and she had no pain on palpation of the lumbar spine, paraspinous muscles, and buttocks. She had a negative supine straight leg raise, and 5 of 5 muscle strength in her lower extremities bilaterally.

We thought the cause of her symptoms was neuropathic given the burning nature of her pain and associated sensory abnormalities around her scar site, including light touch hyperesthesia and pinprick hyperalgesia. We suspected these symptoms were a result of both nerve damage to the area directly from the surgery and from postsurgical scar tissue compressing peripheral nerves. She did not have signs of musculoskeletal impairment, given her otherwise normal physical exam.

To manage her condition, we proposed a trial of peripheral nerve stimulation (PNS) that would encompass the area between the bilateral S3 dorsal sacral foramina to the left and right lateral margins of the distal sacrum and the area overlaying the resected coccyx. The patient decided to proceed with the trial and underwent psychological clearance prior to the procedure. The procedure was performed under fluoroscopic guidance; skin entry sites overlaying the S3 dorsal sacral foramina on the left and right were marked and infiltrated with 1% lidocaine, stab incisions were made, and 2 13-gauge, 4.5-inch Tuohy spinal needles were inserted and tunneled subcutaneously toward the lateral margins of the distal sacrum and along the path of the coccyx. Two leads were inserted through the spinal needles. Following lead placement, each lead was connected to an external transmitter. During the 10-day trial, the patient kept the stimulator on for 24 hours per day and had no adverse events. Her pain improved by 50%; she was able to sit and stand for over an hour at a time without a cushion or ice pack, she had improved sleep duration and quality, and improved mood.

She next underwent placement of a permanent peripheral nerve stimulator using the StimWave Freedom 4A StimQ stimulator (Stimwave Technologies Inc., South Pompano Beach, FL) (9). Under fluoroscopic guidance, skin entry sites overlaying the S3 dorsal sacral foramina on the left and right were marked and infiltrated with 1% lidocaine, stab incisions were made, and 2 13-gauge, 4.5-inch Tuohy spinal needles were inserted and tunneled subcutaneously toward the lateral margins of the distal sacrum and the area overlaying the resected coccyx (Fig. 3). Two leads were inserted through the spinal needles. Following lead placement, each lead was connected to the stimulator (Fig. 4). Repeat intraoperative testing of each lead demonstrated stimulation to the lower sacrum and midline coccyx regions. The leads were then tunneled subcutaneously into the right gluteal region and buried under the skin in the subcutaneous tissues. Each lead consists of 4 electrodes and wireless receivers that communicate with a wearable antenna assembly and a handheld patient programmer that controls stimulation settings.

The patient was seen at one, 4, and 12 months post implant and endorsed using the stimulator 24 hours a day with continued 50% relief of symptoms and no side effects. She had stopped taking her pain medications

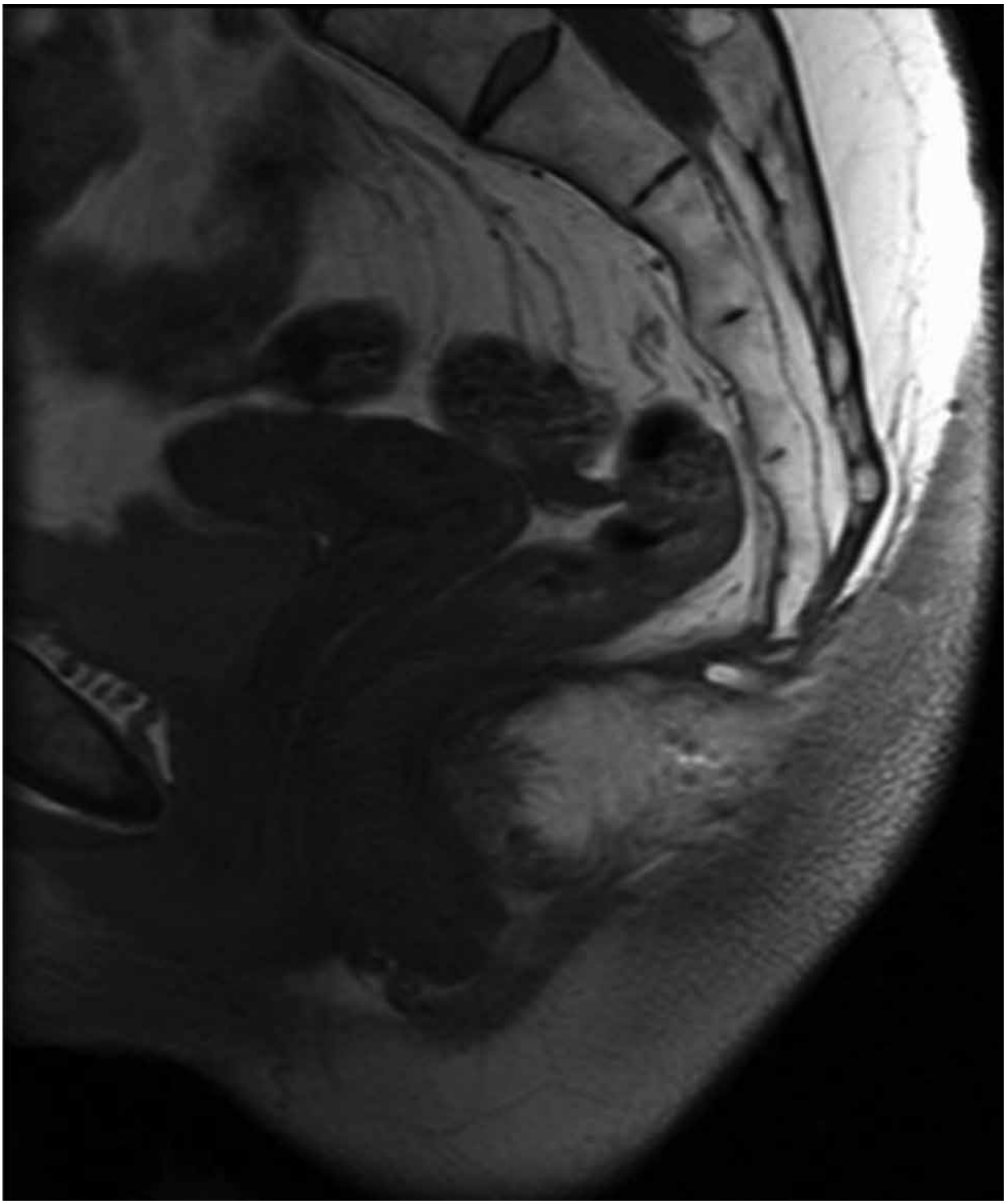

Fig. 1. MRI pelvis post-coccygectomy, 2007. Sagittal view. No residual mass is identified in the pelvic space. There is some mild edema and enhancement in the region which may be related to postsurgical change. There is absence of the coccygeal segments.

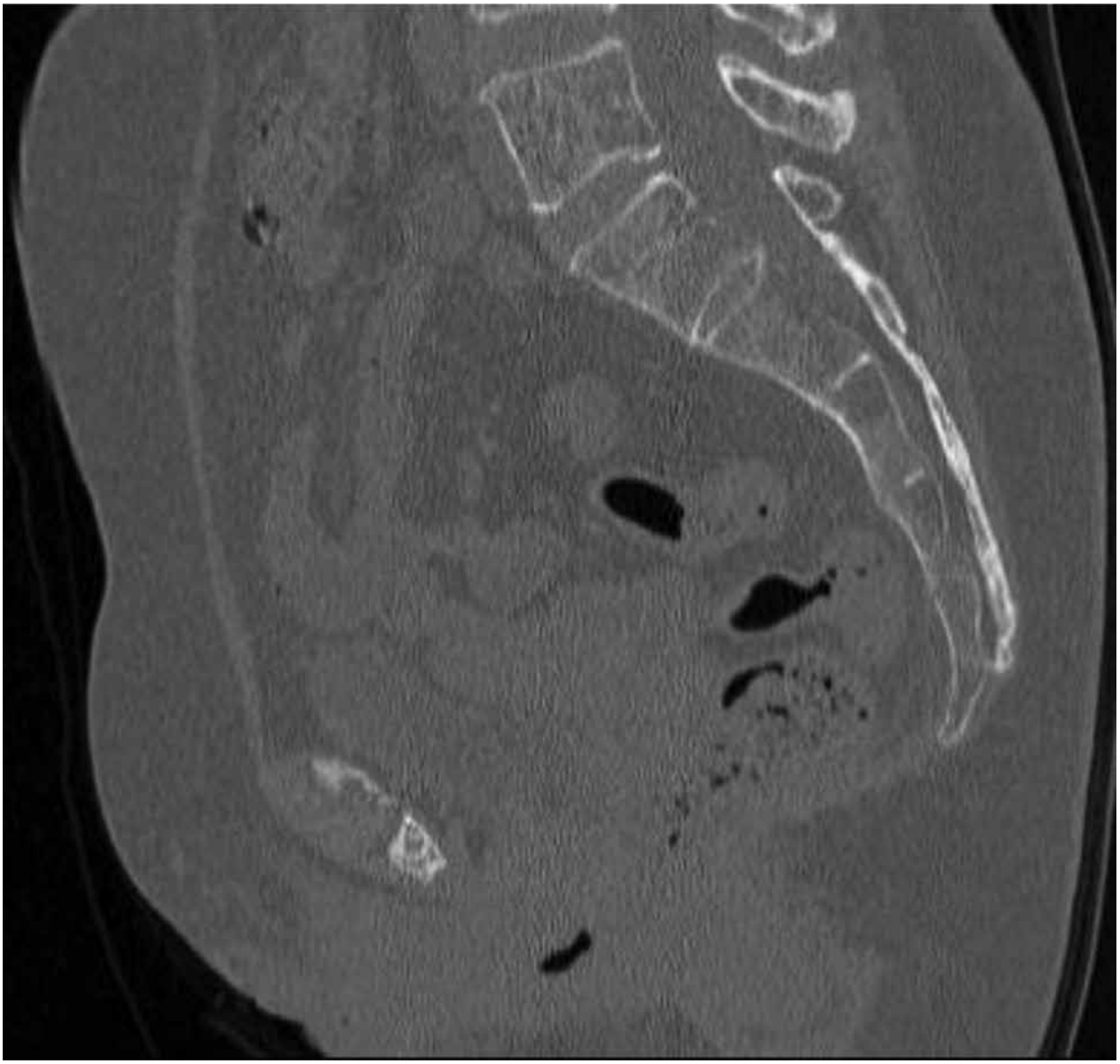

Fig. 2. CT Pelvis. Sagittal view. Surgical absence of the coccygeal segments. The sacrum appears unremarkable with normal alignment of the sacral segments. The lower lumbar spine appears normal with no features of spondylolysis or spondylolisthesis, and the neural foramina appear well-maintained. Within the lower pelvis at the site of the coccygeal resection, there is no abnormal residual soft tissue mass or fluid collection. The presacral space appears well maintained. There are no abnormal calcifications identified.

and noted improved sleep quality and mood since the implant.

DISCUSSION

Chronic low back pain is pain located below the costal margin and above the inferior gluteal fold that persists for 12 weeks or more (10). It is the most common cause of years lived with disability worldwide, and is also associated with quality of life reducing comorbidities such as depression and anxiety (11). Coccydynia is a distinct type of low back pain that can lead to persistent disability.

Conservative treatment, such as using modified cushions that relieve pressure on the coccyx, physical therapy,

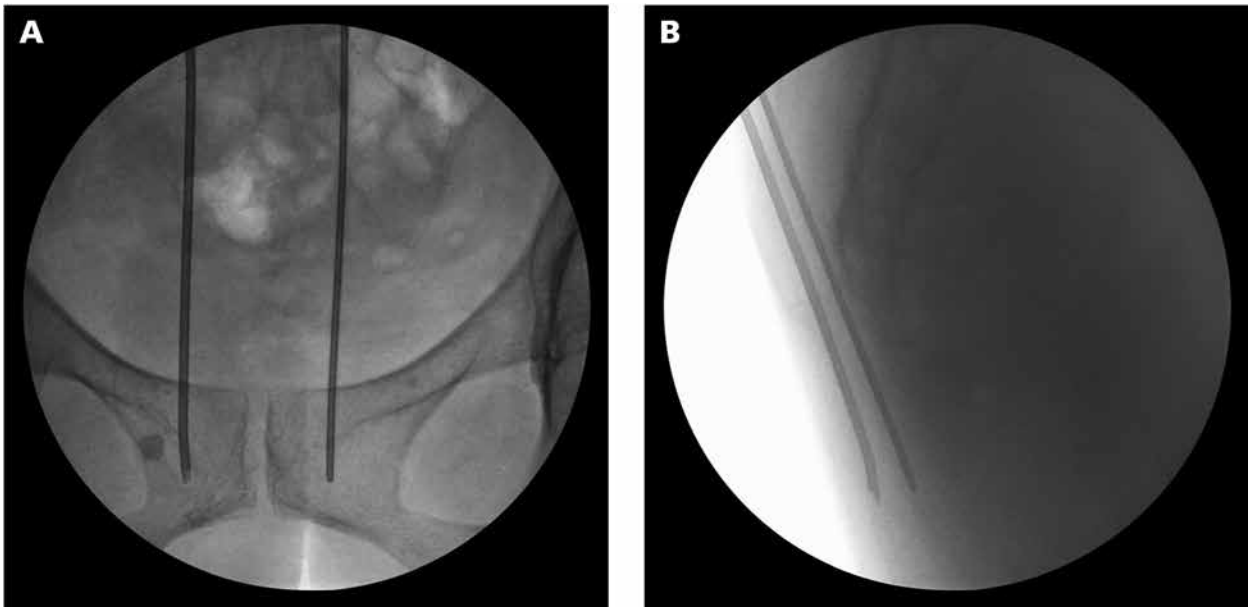

Fig. 3. Fluoroscopic image of peripheral nerve stimulator needle placement. Anteroposterior view (A) and lateral view (B). The needles, through which leads were passed into their final positions, overlay the distal sacrum and region of the excised coccyx.

NSAIDs, and opioids, is often successful, with resolution of symptoms in 90% of cases (12). In the past, for those in whom pain was unresolved after exhaustion of the limited nonsurgical treatment options available, the next step involved coccygectomy. Partial or total coccygectomy has shown benefit in cases of both traumatic and idiopathic coccydynia, though carries with it a risk of postoperative complications including local infection, pelvic floor prolapse, and ongoing pain despite surgery, as highlighted in our report (13).

Neuromodulation involves minimally invasive procedures and is becoming a viable treatment option for those who have failed conservative treatment (5-8). Further, as we have shown in our report, neuromodulation is a treatment option in patients with persistent pain even after surgery, in this case post coccygectomy. PNS, in particular, is an underutilized treatment modality for chronic coccydynia (7) though it has been used successfully in regional pain syndromes including postherpetic neuralgia, hip and knee pain, postjoint replacement pain, and postlaminectomy pain (14,15). Our patient initially had an unsuccessful outcome with SCS but responded well to PNS. SCS is often unsuccessful at targeting sacral and coccygeal segments of the spinal cord, whereas PNS may be better suited for this region due to its broader and less specific area of superficial nerve coverage (15).

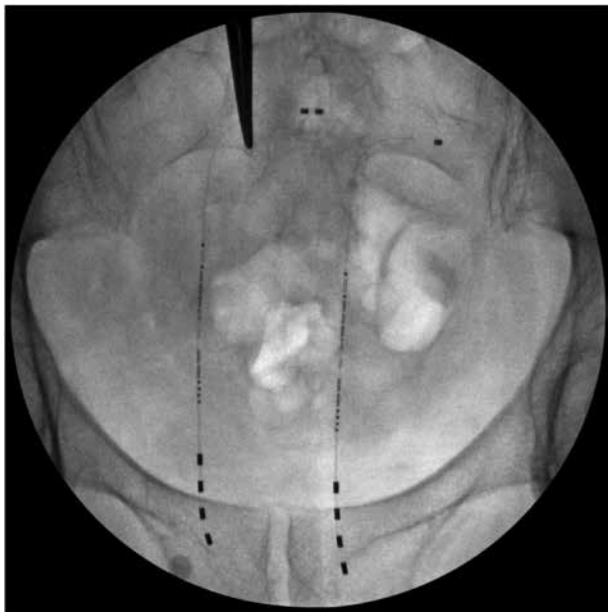

Fig. 4. Fluoroscopic image of peripheral nerve stimulator lead placement. Anteroposterior view. The PNS leads overlay the distal sacrum and region of the excised coccyx.

CONCLUSION

PNS can be used successfully as a minimally invasive therapy for chronic coccydynia if both conservative and invasive therapies, including coccygectomy, fail.

Moreover, it can be considered in those who have failed prior neuromodulatory treatments, such as SCS in our patient's case, due to the broad area it can affect in cases of suspected superficial nerve damage. Our patient achieved 50% improvement of her neuropathic coccygeal pain and a significant improvement in her quality of life with PNS, with no notable side effects attributed to the treatment.

Author Contributions

MB contributed to the design and writing of this case report.

NS performed the procedures highlighted in this case report and contributed to the design and writing of the report.

NS is fellowship-trained in pain medicine and interventional spine procedures from Spine Technology and Rehabilitation in Fort Wayne, Indiana, and is board certified in Pain Medicine.

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