

Dorsal Root Ganglion Stimulation Post Surgical Knee Pain

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Background

Knee pain is a common problem. Many people still have persistent pain after surgery. Spinal cord stimulation can be helpful but precise paraesthesia coverage is not always possible. Dorsal root ganglion (DRG) stimulation can improve coverage and can be effective when other types of stimulation have been ineffective.

Aims

We describe 4 scenarios to illustrate the clinical management of Dorsal root ganglion (DRG) stimulation.

Methods

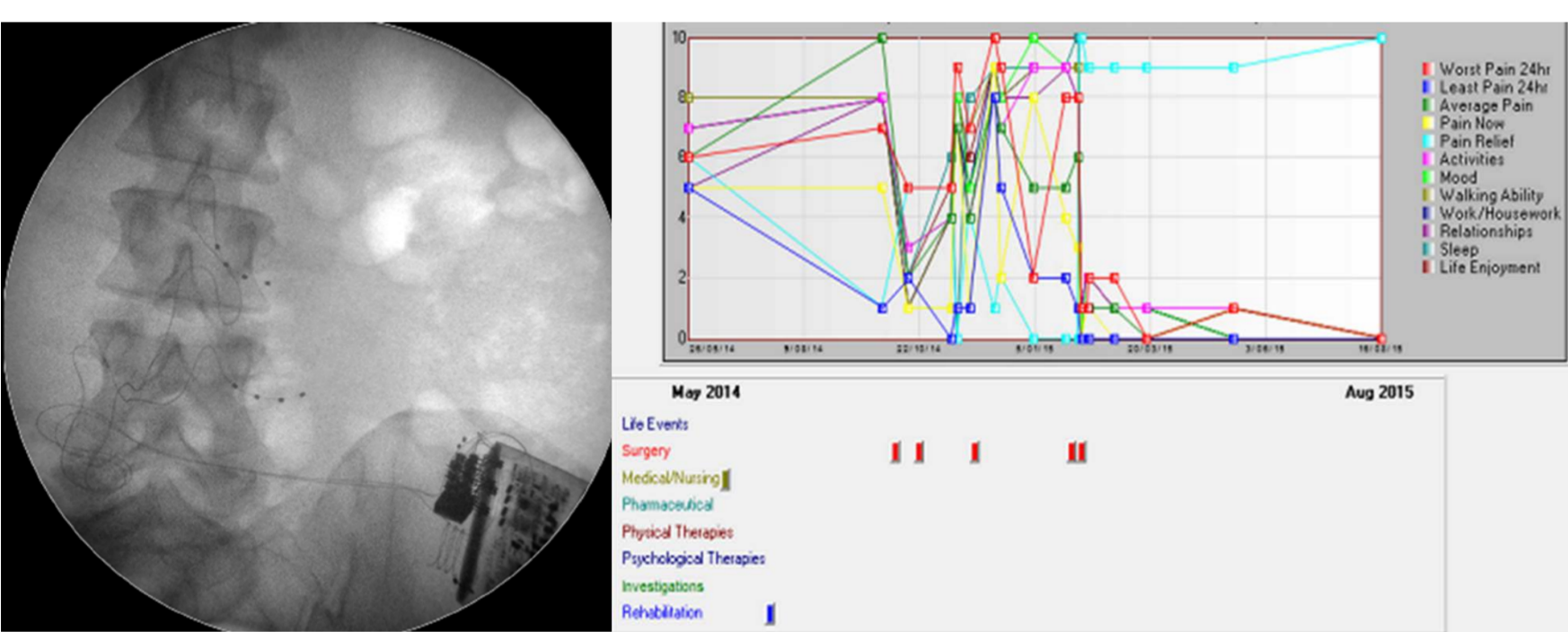
We reviewed the electronic medical records of 4 patients with intractable post-surgical knee pain who had DRG stimulators implanted after diagnostic blocks, failed pulsed radiofrequency treatment (PRF), failed trials of conventional spinal cord stimulation (SCS) in two patients and successful trials of DRG stimulation. Pain intensity, pain interference, mood and QOL scores, satisfaction and medication use were collected.

Case 1

45 F, past history hydrocephalus, otherwise well. Sudden onset pain in right knee bending to collect mail. Unable to straighten leg, medial joint tenderness, no effusion. Xrays showed lateral compartment narrowing and arthritis. No pain relief from arthroscopy, intra-articular injections or NSAIDs. Referred by Orthopaedics for pain management.

Reported Pain 8-9/10 at pain clinic assessment. No relief from multidisciplinary rehabilitation. Saphenous, infrapatellar and lateral genicular nerve blocks relieved pain twice for 2 days. Subcutaneous fascial PRF treatment relieved pain for just 2 days!

Semi permanent trial with right L3 and L4 DRG leads gave near complete pain relief. Implantable pulse generator (IPG) implanted 10/2/2015. Pain free at 6 months



Literature Review

- Billet, B et al 2014 described DRG stim after knee replacement and after arthroscopy
 - Case 1 50% pain relief from 8 to 4/10 @ 3m
 - Case 2 80% reduction from 7 to 1/10 @ 5m
- VanBussel et al 2014 for CRPS post arthroscopy
 - L2,L3 and L4 leads gave 90% coverage of pain
 - Pain dropped from 6-9/10 to 1-2/10
- US Pivotal RCT study (Levy & Deer, INS Montreal 2015) compared DRG to conventional tonic spinal cord stimulation in a 152 patients with complex regional pain syndrome.
 - Primary Composite Endpoint
 - ≥ 50% pain relief during trial and,
 - ≥ 50% pain relief 3m post implant and
 - No stimulation induced neuro deficit during 3m
 - 81.2% DRG v 55.7% in SCS group
 - DRG stim met non-inferiority and superiority

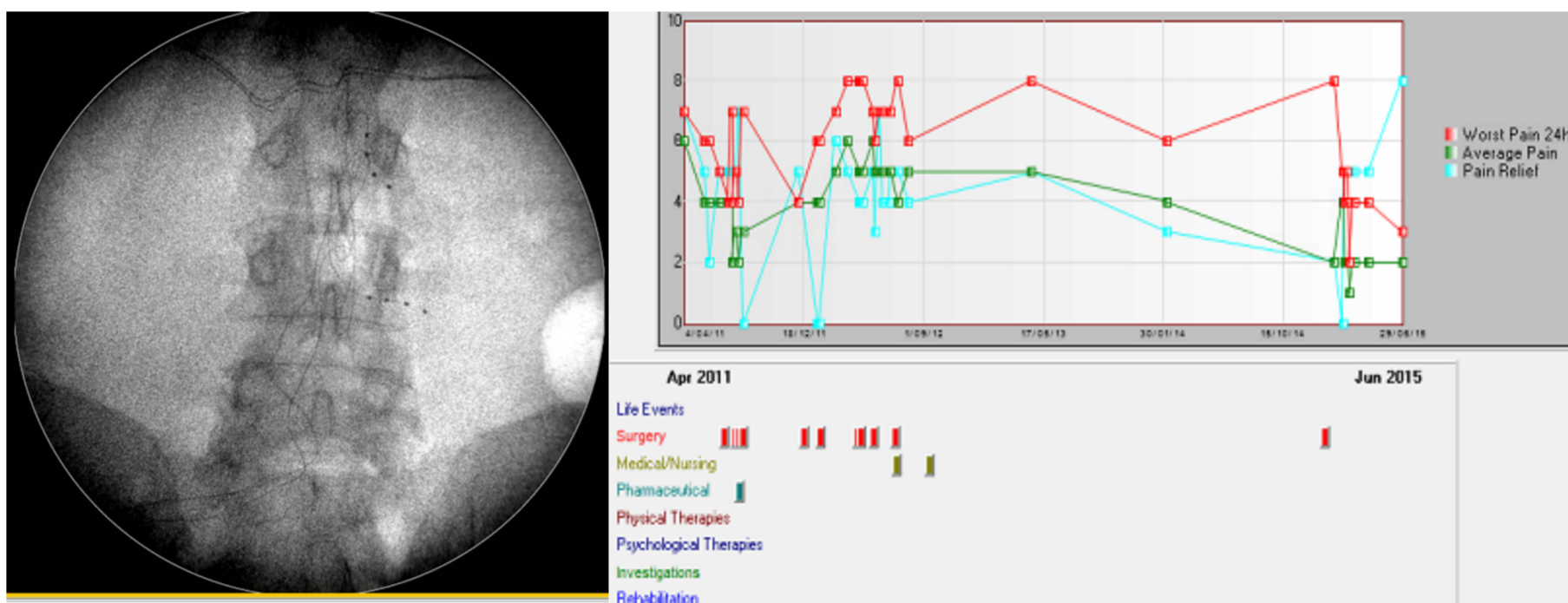
Case 2

60M, 10y painful knees, presented 18m after bilateral knee arthroplasties. Ongoing pain R knee rated 5-6/10, reduced activity, unable to work, had to sell business. Pain had mechanical and neuropathic qualities. Infrapatella nerve neuroma suspected. Partial relief from nerve block, no relief from pulsed RF treatment. St Jude Medical (SJM) 'tonic' SCS relieved lateral calf pain.

Ongoing Medial knee pain. Repeat PRF no help. Plastic surgery didn't help. L3&L4 nerve root blocks helped but PRF ganglionotomies didn't help. Revision arthroplasty didn't help. Hinged knee brace reduced pain to 6/10.

SJM trial burst SCS stimulation didn't help. Right L3 & L4 DRG stimulator leads reduced pain to 5-6/10.

DRG stimulation AND knee brace gave best relief with pain rated 1/10 and greater activity.



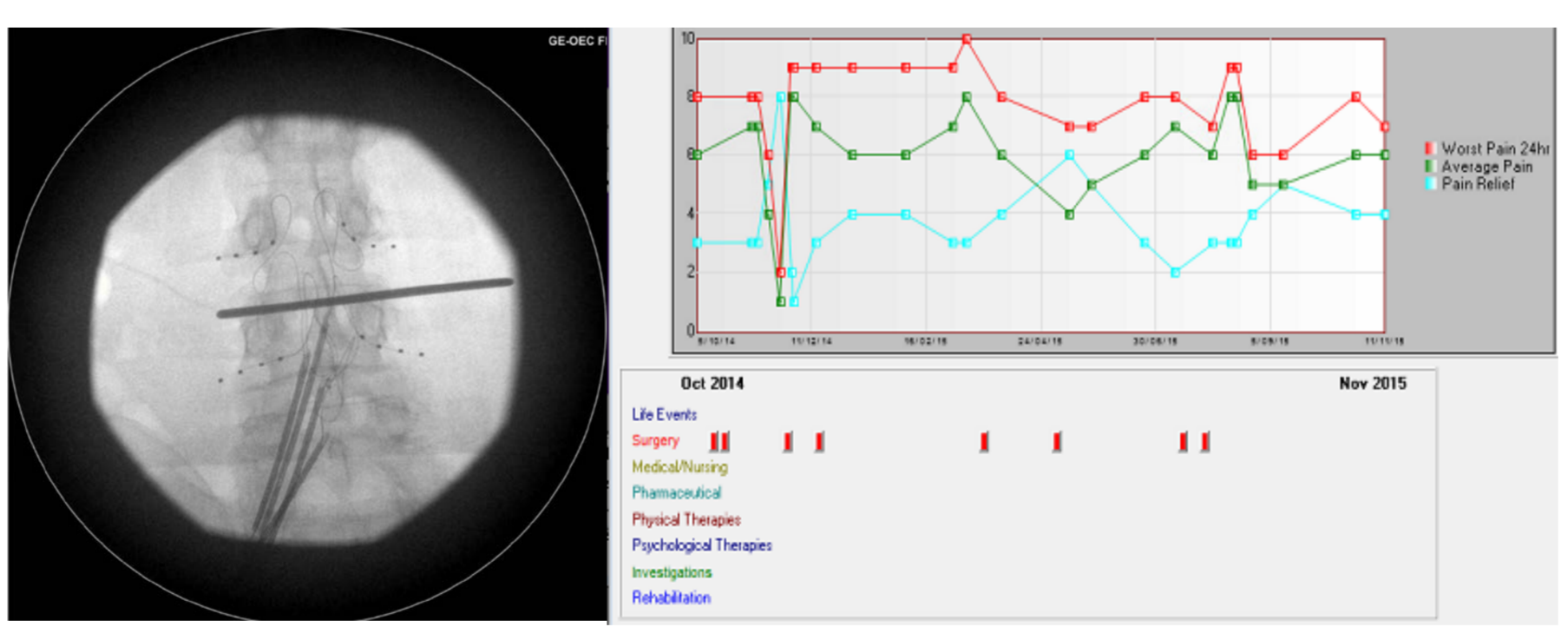
Case 3

46F bilateral knee pain last 16 years after fall. 5 ops right knee and then 5 ops left knee. Mixed mechanical and neuropathic pain. Sympathetic blocks didn't work. A trial of SJM 'tonic' SCS in 2001 was 'perceived' at 3.2mA and painful at 3.3mA.

She obtained good pain relief during an intrathecal trial of morphine and clonidine but pain relief from an implanted pump was less successful. She had gross fluid retention, venous eczema, cellulitis, limited relief. The pump was stopped pre SCS trial and she lost 13kg weight in 1w!

She had unsuccessful trials Nevro 'HF10' high frequency SCS and Nevro 'tonic' low frequency stimulation. Bilateral L3 and L4 DRG stimulation reduced pain to 2-3/10. The leads became infected waiting for WorkSafe approval. The leads and pump were removed. The DRG stimulator was implanted 4 months later.

At 6m, she has ongoing good right sided pain relief but limited left sided relief due to lead movement. She has lost over 40kg in weight and needs IPG revision due to pocket site pain.

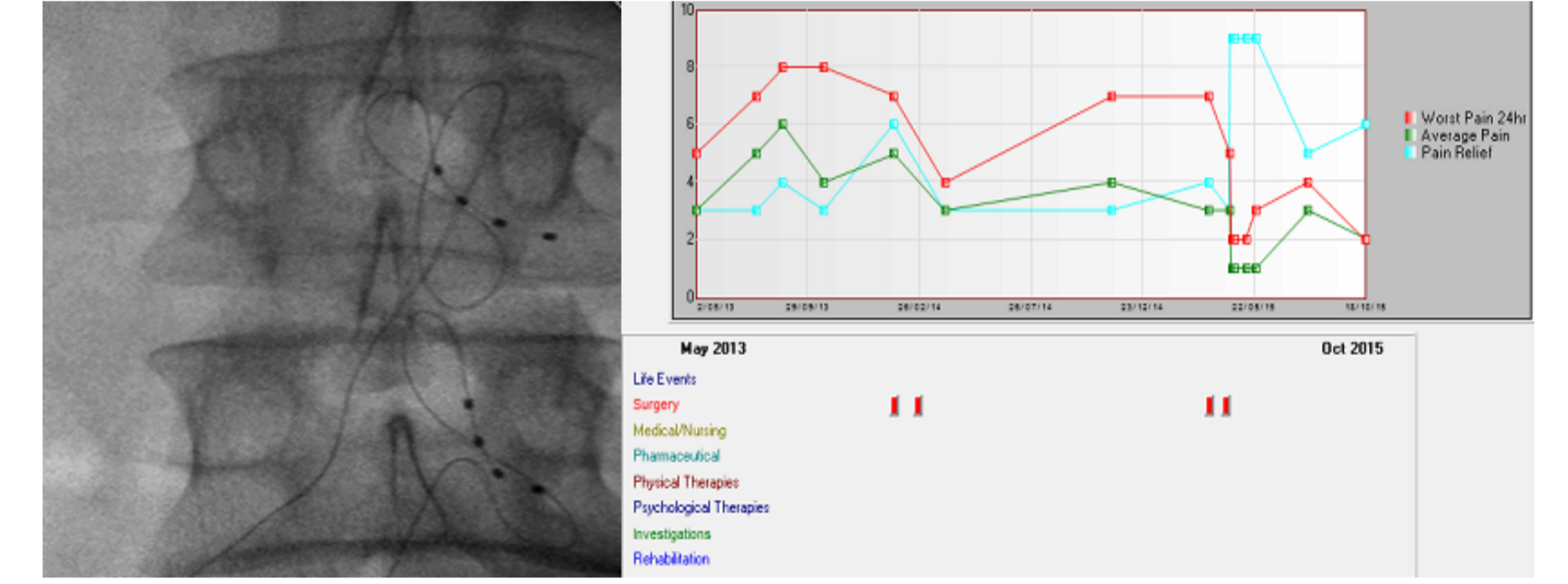


Case 4

56M, PHx low back pain, twisted right knee at work, became painful and swollen overnight. He has persistent pain despite an arthroscopy, hemiarthroplasty, lateral release, knee replacement and redo lateral release & synovectomy. Analgesics caused sedation before pain relief and he could not work as maintenance fitter due to safety risks. Referred for pain management.

Right knee pain was 3-7/10 and causing 6-7/10 pain interference at first assessment. He obtained no relief from rehabilitation, TENS or medication adjustment. Genicular nerve blocks relieved pain for 2 days and bipolar PRF relieved pain for only 7-10days!

Right L3 and L4 DRG leads were inserted April 2015 and provided near complete pain relief. The IPG was implanted May 2015 and at 6m pain in his knee is 0-3/10 and he is again working full time and using no analgesics.



Discussion

All patients reported good pain relief. DRG stimulation provides another treatment option in the rapidly growing neurostimulation market. It can provide high quality pain relief and can work when other stimulator modes have failed.

Indications

- Post back surgery syndrome (PBSS)
- Complex regional pain syndrome (CRPS)
- Post surgical neuropathic pain
- Post herpetic neuralgia
- Abdominal pain
- Other focal pain

Lessons

- DRG stimulation while better than 'tonic' SCS stimulation, both are effective.
- Time from injury is no barrier
- Past treatment failures is not a barrier
- We can Try, Try and Try... again with new technology
- Inserting DRG leads is more difficult than conventional leads.

References and Reprints

Available on request from: mtaverner@phcn.vic.gov.au