Research Paper Review

Failed Back Surgery Syndrome: Pitfalls Surrounding Evaluation and Treatment

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ABSTRACT

This article describes the costs and risk factors for failed back surgery syndrome and reviews the diagnosis and treatment strategies commonly used to address this syndrome. The purpose of this review is to describe some of the treatment pitfalls associated with these approaches from a physiatric perspective.

ANALYSIS

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Background Information

Determining when to operate on a back pain patient is a major point of contention in the scientific literature. It is clearly indicated in those suffering from progressive motor loss or cauda equine syndrome (CES), but in less severe cases the decision process can be difficult. The general consensus in surgical circles is to allow 6-12 months of conservative care prior to even considering surgery.

Failed Back Surgery Syndrome (FBSS) is defined as recurring or persistent pain with or without lumbar radiculopathy post-spinal surgery. Its incidence is between 10-50%, depending on the type of surgery performed (seems pretty high, doesn't it!?). Unfortunately, the incidence of FBSS has NOT decreased with the invention and evolution of less invasive techniques. Specifically, the failure rate of microdiscectomy is between 19-25%, while the rate for lumbar fusion lies between 30-46% (1). After reading this review, it should become apparent that FBSS is clearly a complex, multifaceted, biopsychosocial problem.

SUMMARY OF FBSS

Generally speaking, the two-year outcomes for patients treated with laminectomy or micro-laminectomy for back pain is similar for those treated conservatively. However, surgical patients tend to experience faster improvement in the short term so each case must be considered individually.

Pre-Operative Risk Factors (found to result in poor outcomes)

- Psychosocial factors such as depression, anxiety, poor coping, somatization and hypochondriasis.
- Use of worker's compensation (likely due to secondary gain).
- Prior surgery (spinal instability occurs in 12% of cases after the first surgery, and increases to > 50% after 4 or more revisions) (2).
- Evidence of abnormality on imaging, without clinical correlation.
- Non-surgical cases (i.e. toxic/metabolic neuropathies, inflammatory radiculitis, vascular disease, mass effect, trauma).

Intra-Operative Risk Factors for Developing FBSS

- Poor ability to localize disc injury
- Inadequate decompression
- Too aggressive decompression, leading to spinal instability
- Loss of disc height
- Unrecognized pathology (i.e. disc fragments in neural foramen, root compression by articular process, etc.)
- Battered root syndrome (13% of discectomy cases) – this is suspected with incomplete resolution of sciatic symptoms or progressive neurological deficit 3-6 months post-surgery and often occurs when there is excessive surgical bleeding.
- Fracture of pars interarticularis during surgery
- Destabilization of segment

Post-Operation Risk Factors for Developing FBSS

- Infection or hematoma
- Symptomatic pseudoarthritis (post-fusion)
- Epidural fibrosis, tethering nerve roots and interfering with their fluid nutrition and vascular supply
- Pseudomenigocele from inadequate closure or inadvertent meningeal tear. These present with wound swelling, headache, or focal neurological symptoms (i.e. radicular pain and cauda equina).
  WRITER'S NOTE: *In clinical practice, it is not unusual to see this manifested as an intense headache that occurs with standing after lying down. Suspect this type of meningeal tear if a patient describes this symptom pattern post-surgery.*
- Post-surgical arachnoiditis, resulting in axial or lower limb pain. To find this, you need gadolinium enhanced T2 weighted MRI images.
- Biomechanical/anatomic alterations such as spinal instability, transition syndrome (increased load across adjacent spinal segments after discectomy. This is found in approximately 36% of cases (3-5). Look for this especially in the SI joint), recurrent disc herniations, and myofascial pain.

Myofascial Pain After Surgery

- This can result from dissection or prolonged retraction of the paraspinals during surgery or from altered postural changes post-surgery.
- Fusion disease: myofascial pain attributed to compensatory lumbar spinal hyperextension, exacerbating poor posture. It has also been attributed to hamstring muscle spasm or atrophy.
- Myofascial pain can also feed into the perception of incapacity, hopelessness and deconditioning commonly seen in FBSS patients. Therefore, treating myofascial pain effectively and efficiently is incredibly important.
- Stabilization of the lumbopelvis and improving motor control is important in rehabilitation of any spinal surgery patient. There are many theories as to how to do this (including Stu McGill's work, Dynamic Neuromuscular Stabilization [DNS], Richardson, Jull et al. etc). Essentially, pick your poison!
- It is important to keep in mind reflex mechanisms that are affected by supraspinal influences such as mood and arousal. Remember, these people are biopsychosocial beings – treat the whole person, or refer for appropriate assistance.

WRITER'S NOTE – SURGICAL SCARS: *Keep in mind that scars can be a source of both nociceptive, and neuropathic pain. The key is to take your pinwheel, and search for pinprick hypersensitivity ('pinprick hyperalgesia') around the scar, surrounding dermatomes or peripheral nerve territories. Sometimes, scar tissue formation can cause hypersensitive neuromas, which become tethered in the subcutaneous scar tissue. You can also attempt to palpate surrounding subcutaneous nerves by hand, and assess their sensitivity along their course – (i.e. hypogastic, genitofemoral and subcostal nerves). From the perspective of manual therapy, treating the scar and surrounding thoracolumbar fascia is important, as they too are sources of nociception. They should be treated, in combination with facilitating the glutes and core musculature. In these cases, be sure to co-treat with the patient's physician, as they might be candidates for neuropathic medication (i.e. Neurontin, pregabalin, duloxetine).*

CLINICAL APPLICATION & CONSIDERATIONS

Evaluation of the Post-Operative Spine: History and Physical Examination

- There is a need to differentiate between myofascial, arthrogenic and radicular/neural pain.
- Chronic neural pain (visceral, sympathic, phantom pain) is diffuse, poorly localized and not well described anatomically. Patients sometimes complain of cramping, aching, and tight or burning sensations – similar to myofascial pain. It might also include hyperalgesia (heightened sensitivity to pinprick) or allodynia (innocuous stimulation become painful with stimulation), highlighting the need for a comprehensive neurological evaluation.
- A FULL neurological examination, including reflexes, all sensory modalities, motor, cerebellar and cranial nerves should be performed. An assessment of the saddle area (inner thigh, areas adjacent to the gluteal cleft, and inguinal region) should not be forgotten. Pathological reflexes should be assessed to rule out myelopathy.
- Also, a typical spinal examination, including range of motion, orthopaedic testing, palpation. Hip examination is also indicated (don't forget to assess the hip, to assess for the presence of 'hip/spine syndrome' – see Related Reviews below).
- Neurodynamic testing procedures, such as SLR and femoral nerve stretch, should also be performed.
- Observing how well the patient performs various exercises (qualitative analysis of stabilization

capacity) such as the Bird Dog, or plank, are also useful. (WRITER'S NOTE: *perhaps even more useful here, is observing the patient's ability to ambulate unassisted, and the way they transition from seated-to-standing, standing-to-seated, seated-to-lying down. Do they perform these movements using a lumbosacral flexion motion preference, which likely aggravates their pain? It is likely that improving their ability to perform these truly functional patterns over time will decrease their pain and increase their ability to perform more exercise, by virtue of offloading the injured tissue)*.

Evaluation Procedures for the Post-Operative Spine

- It is important to identify anatomic aberrations radiographically for definitive treatment and prognostication. Small seromas, edema and subcutaneous tissue injury are normal. New laminectomy defects may produce a normal mass effect that often decreases in 30-60 days post-surgery.
- Generally, MRI is the modality of choice. It allows for evaluation of soft tissues, bone marrow and intraspinal content. Epidural fibrosis demonstrated on MRI should be interpreted with caution, as it often presents without symptoms. This finding is more important if nerve root thickening and displacement are visualized. The most important finding to look for is a recurrent disc herniation. Infection should be suspected if fluid collects in the paraspinal area, in the anterior epidural space, adjacent to the involved disc or if there is psoas enhancement. Contrast-enhancement with fat saturation is even more helpful for identifying infection.
- CT scans are used for bone and abnormal calcification assessment. They're very helpful when misplaced or loosened hardware is suspected.
- Plain film radiographs (AP, lateral, obliques, flexion/extension) are important to diagnose structural problems.
- Nerve conduction study/electromyography (NCS/EMG) can be helpful for area localization and prognosis of neuropathic pain. This is especially important if there is a pre-surgery study to compare with. It is also helpful to rule in/out single nerve root and multi-level disease. Be sure to interpret the results of these modalities with caution: MRI is more sensitive than EMG for diagnosing the cause of radicular pain, but EMG is more specific for the presence of radiculopathy. WRITER'S NOTE: *you want to align the findings on an NCS/EMG with the clinical findings and the patient's complaint. If an L4 radiculopathy is detected, but the patient's complaints are within the S1 dermatome, and the Achilles reflex is subdued, then the patient requires further analysis. Sensory nerve conduction velocity abnormality might be found too, which can imply involvement of the dorsal root ganglion (particularly at L5).*

Treatment Considerations

- Typically, management of FBSS patients is overseen by General Practitioners (MDs), anaesthesiologists, physiatrists, neurologists and physiotherapists/chiropractors. In many cases, specialists will make recommendations to be implemented by primary care givers.
- Pharmacologic intervention can include: NSAIDs, acetaminophen, muscle relaxants, central anti-spastic medications (i.e. Baclofen, Tizanidine), antidepressants, gabapentinoids, and opioids. Those responsible for prescribing medication(s) must take into account the mechanism for the patient's pain (myofascial, neuropathic, joint, etc). WRITER'S NOTE: *keep in mind that medications such as Baclofen are for centrally-mediated muscle spasms (sources from the CNS – spinal cord injury, Multiple Sclerosis etc.), while ones such as cyclobenzaprine (i.e. Flexeril, Flexmid and Amrix) are for peripheral sources of spasm.*

- There are large psychosocial burdens associated with FBSS. Patients often lose their jobs and their ability to physically function. Patients' mood, affect and libido are often depressed, creating a poor quality of life. On top of that, patients are often marginalized because they are underinsured after job loss and are chronically habituated to expensive medication. In spite of opioid use, these individuals still often report 10/10 pain.
- It is important to manage your patient's expectations as well as your own. Complete pain relief might not be reasonable. Instead, the expectation of pain control, increased activity and enjoyment might be attainable. Education is paramount, as addressing the deleterious effects of prolonged immobility and deconditioning is essential.

Interventional Pain Treatments and Surgery

Facet Interventions:

- Z-joint injection, medial branch block and radiofrequency neurotomy/ablation (RFA; essentially, burning the nerves to the facet joints) are often used to address axial pain.
- These can often be used for the diagnosis of a pain syndrome, as well as therapeutically.
- Positive diagnostic response for medial branch block is dictated by an 80% reduction after 2 blocks with concordant responses. RFA is then done to provide sustained analgesia. Using this standard, efficacy is reported to offer 60% of patients with 90% relief after 12 months; 87% of patients have greater than 60% pain relief. However, effects are not permanent, which raises a concern with overutilization.
- Medial branch block can paralyze the multifidus muscle, negatively affecting segmental stabilization and potentially movement. This brings up the necessity of retraining the musculature after the intervention. RFA should be reserved for the most refractory cases, where quality of life is significantly hampered.

Epidural Steroid Injection (ESI):

- Typically indicated (and effective) for epidural fibrosis, disc disruption and spinal stenosis causing radicular pain.
- Good effects have been noted, with functional improvement between 55-70% of patients. However, its efficacy has been questioned in recent studies (6).
- The lumbar epidural space can be approached in 3 ways: translaminar, transforaminal and caudal. These are typically performed with fluoroscopic guidance.
- Dural puncture occurs in as many as 20% as cases.
- Transforaminal approaches are often cited as more effective than translaminar.
- Caudal ESI is a more global delivery – the roots of lumbosacral plexus can be bathed all at once. This method can also be done to lyse adhesions, using a Racz catheter.
- Global efficacy of ESI is controversial. Generally, short-term relief is better than long-term relief. Additionally, acute and subacute pain patients seem to respond better than those with chronic pain (> 3 months). The author reports that 60-70% have a good response for some duration of time, while 30% have little to no benefit.
- ESIs, therefore, are best served as an ADJUNCT therapy for the treatment of FBSS.

Sacroiliac Joint (SIJ) Injection:

- SIJ injection is the gold standard for diagnosing SIJ pain.
- SIJ pain occurs between 16-43% post-lumbosacral fusion (7). It is an important differential to lumbosacral radiculopathy, as it can manifest with referred pain down the leg.
- SIJ pain has been attributed to capsular/ligamentous tension, shear forces, extraneous compression, hypo/hypermobility, aberrant joint mechanics, and myofascial/kinetic chain imbalance. The SIJ ligaments are richly innervated – if hypermobility of the joint occurs post-lumbar segmental fusion, the increased motion at the SIJ might trigger pain.
- A 50% reduction in symptoms is considered therapeutic. Pain relief has been noted to last anywhere from 6 weeks – 12 months. Injections show approximately 60% success rate at decreasing pain by 50% (7).
- Much like ESI, it is an adjunct therapy.

Intrathecal Pumps and Spinal Cord Stimulators (SCS):

- These are systemic pain control mechanisms and are typically used after the abovementioned procedures have failed.
- Analgesia through the use of intrathecal pumps has been shown to be effective in FBSS – 88-92% of patients have reported satisfaction.
- Side effects of intrathecal pumps can be great, including urinary retention, constipation, equipment malfunction and catheter tip granulomas. Psychological evaluation and a trial with temporary catheter are recommended, before permanent implantation to assure effectiveness.
- SCS is becoming more common in the treatment of refractory FBSS. In this procedure, a pulse generator buried subcutaneously is connected to electrodes within the epidural space over the dorsal columns. It is proposed to work via the gate control theory. Results are typically better for those with radicular/neuropathic pain (leg pain > back pain).
- WRITER'S NOTE: *The stimulator's electrodes are placed over the dorsal columns. They emit a vibratory input to the CNS (transferred via the dorsal columns, to the somatorsensory cortex). Instead of lancinating/radicular pain into the hand or foot, the patient might experience a constant vibration sensation within the dermatome of the stimulated segment. The way it works in our hospital, is that every candidate undergoes a psychological evaluation. Should a psychiatrist/psychologist conclude that refractory symptoms are secondary to psychosocial overlay, the patient will not undergo surgery, because the statistical likelihood of success is much lower in that population.*

A Global Approach

Different practitioners find different reasons for a person's pain. Surgeons might see a structural problem that need to be corrected, while manual therapists see motion abnormalities that need to be changed. All practitioners have legitimate concerns, and all should be addressed; FBSS is a biopsychosocial phenomenon. The components of interrupting the pain cycle, muscle guarding, anxiety, disuse atrophy and deactivation are commonly seen in patients. Complete pain relief is not often achieved after surgery, and rehabilitation strategies must be individualized to improve physical function. Also, the components of psychosocial function and mood need to be addressed. Treatment of FBSS demands a global set of clinical skills and a team approach. You MUST manage your patient's expectations: it is almost impossible to totally eliminate their pain, and most require multimodal management. Many times, the most effective treatment strategies involve providing the patient with

tools to manage their pain on their own, such as breathing techniques, positions of postural relief, mindfulness, cognitive behavioural therapy techniques, or appropriate medication.

STUDY METHODS

This was a clinical commentary and a review of the literature by the author. No statistical analysis or meta-analysis was done. Also, no data search details were included.

STUDY STRENGTHS / WEAKNESSES

Weaknesses

- A large component of these cases involve psychosocial overlay. This paper barely scratched the surface of its involvement in the development and proliferation of FBSS. Specific things to identify are: the nature of the initial injury (ex. traumatic, repetitive strain); pre-existing depression, anxiety, etc.; the presence or absence of Post-Traumatic Stress Disorder after trauma; chronicity of pain prior to initial injury, which increases psychosocial strain and; open court cases, or involvement of workplace insurance. This is but a small list of possible psychosocial problems that can be involved in the onset of FBSS. Future writing on this topic should address this component of FBSS in a more detail.

Strengths

- The author was very realistic in the success/failure of specific interventions, and promotes a multimodal approach to care.
- The author also discussed the potential risk factors for developing FBSS.

Additional References

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