



Avoiding Surgery: Successful Weight Loss as an Alternative Treatment for Degenerative Spine Disease

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Abstract

Degenerative spine disease, such as spinal stenosis, is a common condition characterized by the narrowing of the spinal canal, resulting in the compression of the spinal cord and nerve roots. Surgical interventions are frequently recommended, but alternative non-invasive treatment options are being explored. Previous studies suggest a correlation between obesity and spinal stenosis; however, further investigation is needed to elucidate the specific effects of weight loss on this condition. This case report presents two patients, aged 73 and 23, who successfully managed their spinal stenosis through a conservative treatment plan focused on weight loss and lifestyle modifications. The treatment plan involved providing a newly developed one-page decision aid tool combined with a 10–20-minute educational dialogue between the surgeon and patients. This process guided the patients in adopting a low-carbohydrate diet and engaging in regular exercise, resulting in significant weight loss and notable improvements in their symptoms and mobility. These outcomes illustrate the potential of weight loss as an alternative to surgery and its ability to improve the quality of life of individuals with degenerative spine disease.

As a result of the rise in the incidence of spinal stenosis and obesity, practitioners should consider weight loss as a possible primary treatment. This case report emphasizes the importance of considering weight loss as a conservative treatment for spinal stenosis and how physicians can use a motivational approach with an evidenced-based decision-aid tool to guide patients. More research including larger prospective studies, is warranted to understand better the role of weight loss in managing spinal stenosis and related degenerative spinal conditions.

Keywords: Spinal Stenosis; Spondylolisthesis; Neurogenic Claudication; Decision Aid Tool; Obesity; Weight Loss

Abbreviations

BMI: Body Mass Index; CRP: C-Reactive Protein; ESI: Epidural Steroid Injection; LSS: Lumbar Spinal Stenosis; MRI: Magnetic Resonance Imaging; NSAIDs: Nonsteroidal Anti-Inflammatory Drugs; SPORT: The Spine Patient Outcomes Research Trial

Introduction

Degenerative spine disease such as spinal stenosis is a significant cause of disability worldwide [1]. These degenerative spine conditions involve the gradual loss of normal structure and function of the spine over time [2]. Spinal stenosis is characterized by the narrowing of the central spinal canal or neural foramen, leading to the abnormal compression of the spinal cord and nerve roots [2]. Although there are less common etiologies, spinal stenosis most commonly arises from degenerative arthritis affecting the spine, such as ligamentum flavum hypertrophy, facet joint osteoarthritis, disc degeneration, and spondylolisthesis [2]. Patients typically

present with neurogenic claudication due to intermittent compression and/or ischemia of neural structures within an intervertebral foramen or the central spinal canal [3]. Symptoms of claudication are discomfort in the lower lumbar spine, buttocks, and thighs, sometimes extending to lower legs and feet [4,5], numbness and tingling in the legs, and leg cramps at night [6]. Conservative treatments for spinal stenosis include analgesic drugs such as nonsteroidal anti-inflammatories (NSAIDs), physical therapy, neuromodulation, epidural steroid injections (ESIs), bracing, and acupuncture [7]. If conservative treatment fails, then surgical management is recommended.

A total of 266 million individuals worldwide have been found to have degenerative spine disease annually [1]. The prevalence of spinal stenosis increases with age, and in the United States alone, it impacts over 400,000 individuals [9]. It is the leading cause of spinal surgery among individuals aged 65 and above [9]. Obesity

has been identified as a risk factor for developing spinal stenosis along with other degenerative spine disease [10]. The prevalence of obesity in America has consistently risen since 1999 [11]. The obesity epidemic, combined with the aging population, has further increased the prevalence of degenerative spine disease and the use of surgical management in the United States [1,10,11].

This case report presents a 73-year-old man with a history of lumbar spinal stenosis with associated spondylolisthesis and a 23-year-old man with thoracic and lumbar spinal stenosis. Initially, surgery was recommended to both patients, but they opted for a conservative treatment plan centered on weight loss.

The treatment plan incorporated several components to support the patient’s progress, such as a one-page decision aid tool and educational dialogue. This dialogue included a simple biomechanical explanation for how weight loss could help alleviate axial low back and radicular pain [12,13]. Through a motivational approach, the physician explained the steps needed to accomplish weight loss, including daily exercise, low-carbohydrate dietary (Paleo) changes, setting weight goals and expectations, and tracking their progress daily [14]. This new approach was warmly received by the two patients and led to both patients achieving a weight loss of more than 15 lbs (6.8 kg) after their initial visits. The weight loss resulted in a significant reduction of pain and improvement in their posture and gait. This cost-effective treatment plan ultimately allowed them to avoid surgery.

Limited research has examined the impact of weight loss and lifestyle modifications on patients with spinal stenosis and related degenerative spinal conditions. We found that conservative treatment plans focused on weight loss significantly improved patients’ spinal stenosis symptoms without surgical intervention. These cases also highlight how this in-clinic, direct surgeon-to-patient educational and motivational approach could lead to the enhancement of the patient’s quality of life and the avoidance of surgery.

Case Presentation 1

A 73-year-old man with a history of mild idiopathic scoliosis presented to our clinic. He reported 7 out of 10 intermittent lower back and posterior left leg pain and intermittent right lateral leg paresthesia consisting of tingling and numbness. The patient reported significant challenges with standing and walking more than 900 feet. He sought care at another spine center where he underwent physical therapy, received nonsteroidal anti-inflammatory drugs (NSAIDs), and received three rounds of epidural steroid injections (ESIs). Although he experienced temporary relief from his symptoms lasting 2-4 weeks following each round of ESIs, his condition persisted, and surgery was recommended at the outside facility. Before seeking treatment at our clinic, to manage his pain,

the patient relied on a daily intake of naproxen and acetaminophen. On presentation to our clinic, the patient weighed 206.7 lbs (93.8 kg) and his body mass index (BMI) was 33.1. Physical examination showed a good standing posture, with a stable non-antalgic gait, and intact bilateral lower extremity strength and sensation.

Standing lateral x-ray revealed spondylolisthesis of the L3-4 level (Figure 1A). MRI of the lumbar spine showed signs of significant spinal stenosis (Figure 1B) and revealed a 5 mm anterolisthesis at the L3-4 level (Figure 1C). Weight loss was then offered as a potential conservative treatment option for this patient, and a 1-page decision aid tool was reviewed with the patient to review the reasons for this approach, and how it could be accomplished through exercise, a low carbohydrate diet, and weight tracking. This dialogue was conducted by the surgeon and took approximately 10-20 minutes. At the 3-month follow-up, the patient had lost approximately 17 lbs (7.7 kg), or 1.4 lbs/week, resulting in a BMI of 30.5. He reported significant improvement in his walking ability, which increased from 900 feet to 1 mile. He reported an improvement in his lower back and posterior left leg pain, which dropped from 7/10 to 3/10. His intermittent paresthesia in the right lateral leg resolved. He also reported that he was less dependent on naproxen and acetaminophen for pain management and expressed excitement about his progress.

Both the patient and treating physician reached a mutual agreement to continue with the weight loss program and to schedule

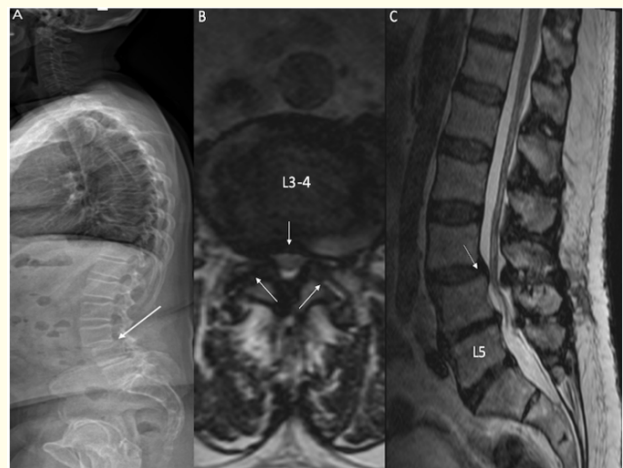


Figure 1: X-ray and MRI imaging of patient from Case 1.

1. The lateral spine X-ray revealed L3 on L4 anterolisthesis (white arrow) measuring 6 mm.
2. T2 axial MRI showed signs of severe central and lateral recess stenosis and facet hypertrophy (white arrows) of the L3-4 segment.
3. T2 mid-sagittal MRI of the lumbar spine revealed an L3-4 anterolisthesis (white arrow) measuring 5 mm with severe central stenosis at L3-4

follow-up appointments if any “red flag” symptoms such as bladder and bowel incontinence, saddle anesthesia, progressive weakness, clumsiness, numbness or shooting extremity pain were to develop in the future. Remarkably, the patient achieved the desired outcome of avoiding surgery through successful weight loss.

Case Presentation 2

A 23-year-old man with a history of obesity, hypertension, asthma, and mild idiopathic scoliosis presented with a wide-based gait, imbalance, and subjective bilateral leg weakness (right > left). The patient reported a 3-year history of progressive bilateral sciatic pain, clumsiness, difficulty walking, and urinary and bowel incontinence. He was previously seen by a local chiropractor, which along with stretching provided initial relief. The patient weighed 353.8 lbs (160.5 kg). BMI was 41.41. Physical examination included a wide-based unstable gait and difficulty walking 10 meters, with 5 beats of clonus bilaterally. The patient’s MRI revealed a congenitally small canal with intervertebral disc bulging and ligamentum flavum hypertrophy resulting in severe stenosis (Figure 2A) and significant lumbar spinal stenosis (Figure 2B and C).

The patient expressed a preference to explore conservative treatment options further rather than undergoing surgical inter-

and weight tracking. This dialogue was conducted by the surgeon and took approximately 10-20 minutes. The patient followed up a year later after his first appointment with greatly improved bilateral leg weakness, balance, and increased walking ability. His urinary and bowel incontinence had resolved, and he was satisfied with his progress. The patient had lost 85 lbs (38.6 kg), and weighed 268.8 lbs (121.9 kg), with a new BMI of 31.5. The patient decided to continue with the weight loss program and has continued to maintain an improved quality of life with conservative treatment.

Discussion

The rising prevalence of obesity, debilitating degenerative spine conditions, and surgical interventions for patients’ low back pain and spinal claudication are trending upward [10-12]. Wang, *et al.* reported that by 2030, 78% of American adults are projected to be overweight or obese [11]. Over 102 million individuals around the world are diagnosed with spinal stenosis and low back pain annually [15]. The annual population-based incidence of lumbar spine fusions and decompressions increased by 155% in 21 years from 1997 to 2018 [16]. The retrospective cohort study done by Deyo, *et al.* concluded that rehospitalization rates within 30 days increased to 7.8% for patients undergoing surgical decompression and 13% for patients having more complex fusion procedures [17].

Weight loss is occasionally mentioned as part of conservative care, but the responsibility for achieving it is typically placed solely on the patient, primary care physician, or dietician [14]. Furthermore, weight loss is usually recommended in preparation for spinal surgery, as well as for hip and knee arthroplasty [10,18]. We believe that an evidence-based one-page decision aid tool along with a motivational approach from the surgeon could improve treatment outcomes and avoid surgery for patients with spinal stenosis and other degenerative spinal conditions.

The findings of this case report suggest that weight loss can be effective in mitigating the need for spinal surgery in patients with spinal stenosis and other degenerative spine disease. The two patients presented in this report, a 73-year-old and a 23-year-old man, both experienced significant improvement in their symptoms and avoided surgery through successful weight loss. Conservative treatments for spinal stenosis include analgesic drugs, physical therapy, epidural steroid injections, and acupuncture [7]. However, surgical techniques such as decompression and spinal fusion may be recommended if these treatments fail to provide relief [9]. The decision to pursue surgery can be daunting for patients, as it carries inherent risks, is costly, and requires a lengthy recovery process [9,17]. Therefore, alternative treatment options that can effectively alleviate symptoms and improve quality of life without the need for surgery are highly desirable. Many studies have examined the various treatment options for improving the symptoms caused

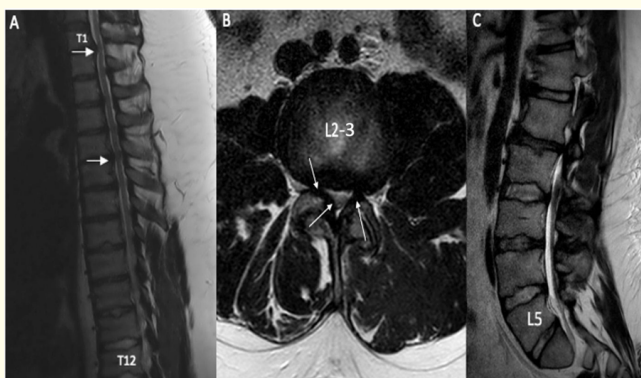


Figure 2: MRI imaging of patient from Case 2.

1. T2 mid-sagittal MRI of the thoracic spine revealed a congenitally small spinal canal with severe stenosis (white arrows).
2. The T2 axial view of the L2-3 segment revealed severe central and lateral recess stenosis, and facet hypertrophy (white arrows).
3. T2 mid-sagittal MRI of the lumbar spine with congenitally small spinal canal and severe stenosis.

vention due to his young age and concerns regarding surgical risk. Weight loss was then offered as a potential conservative treatment option for this patient, and a 1-page decision aid was reviewed with the patient to review the reasons for this approach, and how it could be accomplished through exercise, low carbohydrate diet,

by spinal stenosis. While weight loss is recommended before performing spine surgery to get a BMI at or below 35-40 [10,19,20], we have not been able to identify any studies to date which show the benefit or effectiveness of weight loss for the actual treatment of degenerative spine conditions such as spinal stenosis. The Spine Patient Outcomes Research Trial (SPORT), one of the largest spinal stenosis studies to date, compared patient outcomes after non-operative and surgical treatments [21]. Physical therapy, regular visits with the surgeon, NSAIDs, opioids, and ESIs were the non-operative treatment options considered but not weight loss [21].

Obesity has been identified as a risk factor for developing spinal stenosis and worsening symptoms [10]. The increase in body mass and altered load on the spine, along with the decrease in relative muscle mass compared to non-obese individuals has been shown to increase the strain on the spine, more specifically the lumbar region [22]. The spine is what keeps the human body upright against the forces of gravity and increased weight has been linked to increased risk of intervertebral disc herniation [22,23].

The mechanical forces exerted on the spine due to increased body mass, along with systemic inflammation due to an increase in chronic circulating inflammatory chemicals from active adipose tissue, can contribute to the compression of neural structures and the progression of spinal degeneration [9,24]. Specifically, the cytokines, growth factors, and other inflammatory factors associated with weight gain can alter the properties of cartilage, synovium, ligamentum flavum, and bone matrix, which can lead to hypertrophy of the ligamentum flavum and disc degeneration, increasing the odds of developing spinal stenosis and similar degenerations [25,26]. Previous studies have shown associations between obesity, low back pain, and spinal stenosis (e.g., degenerative disc disease and facet arthritis) [23], including radiating pain and numbness in the legs, buttocks, and thighs [27]. Briggs, *et al.* published a study in 2013 with results that showed significant associations between increased C-reactive protein (CRP) levels representing systemic inflammation, obesity, and the odds of reporting low back pain, including radiating pain down the legs, buttocks, and numbness and tingling in these same regions [28]. A 20-year prospective cohort study of 360,000 patients found significant evidence that patients who are obese or overweight have an increased risk of developing lumbar spinal stenosis and worsening symptoms [27]. This is multicausal involving obese-specific pathogenetic pathways, but it is still unclear whether weight loss can reduce the symptoms or progression of spinal stenosis [23,28].

Studies suggest that weight loss can contribute to a reduction in general lower back pain, although its impact on specific conditions like spinal stenosis and other degenerative spine disorders has not been reported [28]. Warren, *et al.* utilized a finite element model

(FEM) to demonstrate that an increase in body weight leads to a proportional rise in compressive force loading on the lumbosacral spine [29]. They found that for each percentage increase in body weight, the compressive force loading on the lumbosacral spine increases by at least two to three times that amount. This correlation is strengthened when weight gain is localized to the abdomen [29]. This multiplication effect, when explained to the patient using simple biomechanics, can be used to motivate them to pursue weight loss. A concise one-page decision aid tool was developed by our team to help patients understand this concept and aid them in deciding to pursue weight loss as a treatment for their condition.

This case report adds to the evidence that obese and overweight patients have an increased risk of acquiring spinal stenosis and other degenerative spine conditions, and that weight loss and potentially the anti-inflammatory effects of low carbohydrate dietary changes, and increased endorphins and strength and endurance from exercise can improve symptoms of these diseases. There was radiological evidence of moderate to severe lumbar spinal stenosis in both patients, with one patient showing additional signs of associated spondylolisthesis, and the other patient also showing signs of myelopathy with severe thoracic spinal stenosis-with symptoms significantly improving with this low cost conservative approach. The patients failed all other conservative treatments, including NSAIDs, physical therapy, chiropractic, and several rounds of ESIs. However, weight loss led to improved symptoms and decreased severity of symptoms as more weight was lost.

Conclusion

Spinal stenosis and other degenerative spine disease are significant causes of morbidity [9]. These two cases emphasize the impact that weight loss can have as a primary conservative treatment for spinal stenosis and degenerative spine conditions alike. It also exhibits how an evidenced-based one-page decision aid tool, along with a motivational educational approach from the surgeon can help inspire patients to achieve their treatment goals. Future research should include larger retrospective and prospective studies to further explore the benefits of weight loss in the management of spinal stenosis and related degenerative spine conditions, and how these benefits can be obtained more directly through the surgeon and their team.

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