A Narrative Review of Lumbar Fusion Surgery With Relevance to Chiropractic Practice

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ABSTRACT

Objective: The purpose of this narrative review was to describe the most common spinal fusion surgical procedures, address the clinical indications for lumbar fusion in degeneration cases, identify potential complications, and discuss their relevance to chiropractic management of patients after surgical fusion.

Methods: The PubMed database was searched from the beginning of the record through March 31, 2015, for English language articles related to lumbar fusion or arthrodesis or both and their incidence, procedures, complications, and postoperative chiropractic cases. Articles were retrieved and evaluated for relevance. The bibliographies of selected articles were also reviewed.

Results: The most typical lumbar fusion procedures are posterior lumbar interbody fusion, anterior lumbar interbody fusion, transforaminal interbody fusion, and lateral lumbar interbody fusion. Fair level evidence supports lumbar fusion procedures for degenerative spondylolisthesis with instability and for intractable low back pain that has failed conservative care. Complications and development of chronic pain after surgery is common, and these patients frequently present to chiropractic physicians. Several reports describe the potential benefit of chiropractic management with spinal manipulation, flexion-distraction manipulation, and manipulation under anesthesia for postfusion low back pain. There are no published experimental studies related specifically to chiropractic care of postfusion low back pain.

Conclusions: This article describes the indications for fusion, common surgical practice, potential complications, and relevant published chiropractic literature. This review includes 10 cases that showed positive benefits from chiropractic manipulation, flexion-distraction, and/or manipulation under anesthesia for postfusion lumbar pain. Chiropractic care may have a role in helping patients in pain who have undergone lumbar fusion surgery. (J Chiropr Med 2016;15:259-271)

Key Indexing Terms: *Manipulation; Chiropractic; Postoperative Periods; Spinal Fusion; Surgical Procedures; Operative*

INTRODUCTION

Lumbar spinal fusion procedures are commonly used treatments for an array of degenerative conditions.[1] Regardless of the type of surgical intervention, up to 61% of patients continue to experience chronic spinal pain after surgery.[2-4] The number of lumbar spinal surgeries has increased over the past several decades with 1 288 496 new posterior lumbar fusion operations reported in the United States alone between 1998 and 2008.[5] The reported prevalence of postoperative patients presenting to chiropractic clinics ranges from 2.3% to 12%.[6-8] Even with the increased frequency of postoperative cases, there is limited evidence on the safety and efficacy of chiropractic care in this population.

Management of chronic degenerative spinal conditions in the United States is estimated to cost nearly $85 billion annually, with a significant percentage attributed to the dramatic increase in the frequency of lumbar fusion procedures.[9-11] In 2004, more than $16 billion in hospital charges were attributed to over 300 000 spinal fusions.[12] Lumbar fusion procedures are performed for a wide array of indications, including correction of degenerative deformities, trauma, infection, tumor, and congenital anomalies,

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such as scoliosis.[1] The intention of spinal fusion is to restore anatomical alignment and biomechanics to as near normalcy as possible.[1] The application of these surgical fusions continues to expand as technological advances facilitate the ability to achieve a solid arthrodesis and understanding of the pathologic and biomechanical aspects of degenerative spine disease continues to progress.[13]

At present, there is no published article that reviews the literature on chiropractic and postfusion low back pain. Therefore, the purpose of this narrative review was to describe the most common surgical lumbar fusion procedures, address the clinical indications for lumbar fusion in degenerative cases, identify potential complications, and discuss published articles related to chiropractic management.

Methods

A review of the literature was performed using the PubMed database. Search terms included lumbar fusion and/or arthrodesis and their incidence, procedures, and complications, as well as postfusion chiropractic cases. The bibliographies of articles discerned to be relevant were also reviewed. PubMed was searched in April 2015 from the beginning of the record through March 2015. English language articles as well as other article types were included in the search with no other exclusion criteria. Articles found were identified and evaluated for their relevance to lumbar fusions. Studies were selected if they reported on lumbar fusion incidence, procedures, complications, and postfusion chiropractic care.

Results

One hundred-eighteen articles were selected by the authors on the basis of their relevance to lumbar fusion operative procedures, indications, complications, and postoperative chiropractic care. No articles provided a review of current management practices related to chiropractic practice for postfusion low back pain, and no articles reported a position statement on chiropractic assessment or care.

Discussion

Lumbar Fusion Operative Procedures

Fusion of the spine was first depicted in the scientific literature by Albee in 1911 as a treatment for tuberculous spondylitis.[14] In 1929, Chandler was the first to use spinal fusion for the treatment of lower back pain and sciatica.[15] Four years later, Mixter and Barr reported that intervention with discectomy provided relief for discogenic sciatic pain but did not relieve chronic lower back pain.[16] Barr proposed discectomy in conjunction with fusion to overcome this problem.[17]

The first reports of an anterior approach to fusion originated in the 1930s when Ito et al. used this approach to stabilize tuberculous spondylitis.[18] Early on, high rates of failure and neurovascular complications had been the major problems with this approach.[19] In the meantime, anterior approaches to the lumbar spine and anterior lumbar interbody fusion (ALIF) have evolved, and the ALIF technique is now especially preferred at the lumbosacral junction.[19] Anterior lumbar interbody fusion has an added advantage in that it can be combined with posterior lumbar interbody fusion (PLIF). The exposure of the anterior spine is classically performed through a left paramedial incision over the disk space to be fused. A retroperitoneal maneuver is made to expose the anterior spine. The vascular structures and the ureter are then expertly identified, commonly by a vascular surgeon, and retracted to avoid injury. Next, the anterior longitudinal ligament is incised, with special care taken to avoid injury to the hypogastric plexus. Damaged disk material and osteophytes are removed before the bony endplates can be prepared. From the anterior direction the surgeon then packs the bony graft into the implant and the surrounding disk space. Graft material most commonly comes from cadavers but can also be harvested from the patient's own iliac crest. The implant for ALIF is a single, wedge-shaped cage that has variable lordosis angles. These implants often have blades that penetrate the vertebra above and below to secure the position[20-25] (Fig 1).

In 1944, Briggs and Milligan presented a technique for posterior lumbar spinal decompression and fusion[26] (Figs 2 and 3). They described placement of interbody bone chips and a spinous process peg; however, they were not able to obtain successful postoperative fusion.[27] In 1953, Cloward first described the PLIF technique for treatment of a ruptured disk.[28] The posterior approach to reconstruction is often preferred in the lumbar spine because this causes lower morbidity compared with the anterior approach, and pedicle screws and rods or plates can be placed before dural retraction and dissection of the intervertebral disk.[1] Posterior lumbar interbody fusion employs a direct posterior approach to exposure of the spine. A midline incision allows access to the disk space of interest via an open 3- to 6-inch incision or sequential tubular dilators.[19] After exposure of the spine, the surgeon strips the erector spinae muscle from the lamina and sequentially performs a laminotomy, removes the ligamentum flavum, retracts nerve roots, excises damaged disk material, and performs endplate preparation. Dual ovoid-shaped spacers are then placed within the intervertebral disk space and supplemented by packed bone graft. Fluoroscopy is used to confirm the implant position, and the graft-filled space is then stabilized with pedicle screws and rods to immobilize the segment and allow fusion to occur.[29-31]

Transforaminal lumbar interbody fusion (TLIF) was first described by Harms and Rollinger in 1982[32] (Fig 4). Transforaminal lumbar interbody fusion, which is a modified and unilateral approach to PLIF, provides more lateral access to the disk space and reduces retraction of the