

Clinical Study

Degenerative lumbar scoliosis in elderly patients: dynamic stabilization without fusion versus posterior instrumented fusion

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Abstract

BACKGROUND CONTEXT: Posterolateral fusion with pedicle screw instrumentation is currently the most widely accepted technique for degenerative lumbar scoliosis in elderly patients. However, a high incidence of complications has been reported in most series. Dynamic stabilization without fusion in patients older than 60 years has not previously been compared with the use of posterior fusion in degenerative lumbar scoliosis.

PURPOSE: To compare dynamic stabilization without fusion and posterior instrumented fusion in the treatment of degenerative lumbar scoliosis in elderly patients, in terms of perioperative findings, clinical outcomes, and adverse events.

STUDY DESIGN: A retrospective study.

PATIENT SAMPLE: Fifty-seven elderly patients were included. There were 45 women (78%) and 12 men (22%) with a mean age of 68.1 years (range, 61–78 years). All patients had degenerative de novo lumbar scoliosis, associated with vertebral canal stenosis in 51 cases (89.4%) and degenerative spondylolisthesis in 24 patients (42.1%).

OUTCOME MEASURES: Clinical (Oswestry Disability Index, visual analog scale, Roland-Morris Disability Questionnaire) and radiological (scoliosis and lordosis corrections) outcomes as well as incidence of complications.

METHODS: Patients were divided into two groups: 32 patients (dynamic group) had dynamic stabilization without fusion and 25 patients (fusion group) underwent posterior instrumented fusion. All the patients' medical records and X-rays were reviewed. Preoperative, postoperative, and follow-up questionnaires were obtained to evaluate clinical outcomes.

RESULTS: At an average follow-up of 64 months (range, 42–90 months), clinical results improved similarly in both groups of patients. Statistically superior scoliosis and final lordosis corrections were achieved with posterior fusion (56.9% vs. 37.3% and -46.8° vs. -35.8° , respectively). However, in the dynamic group, incidence of overall complications was lower (25% vs. 44%), and fewer patients required revision surgery (6.2% vs. 16%). Furthermore, lower average values of operative duration (190 vs. 240 minutes) and blood loss (950 vs. 1,400 cc) were observed in the dynamic group than in the fusion group.

CONCLUSIONS: In elderly patients with degenerative lumbar scoliosis, pedicle screw-based dynamic stabilization was less invasive with shorter operative duration, less blood loss, and lower adverse event rates than instrumented posterior fusion. Scoliosis curve reduction and lumbar lordosis were superior after fusion; however, dynamic stabilization achieved satisfying values of both these parameters, and these results were stable after an average follow-up of more than 5 years. Furthermore, there was no difference between the two techniques in terms of functional clinical outcomes at the last follow-up. © 2014 Elsevier Inc. All rights reserved.

Keywords:

Degenerative lumbar scoliosis; Dynamic stabilization; Posterior instrumented fusion

FDA device/drug status: Investigational (Dynesys System [Zimmer Spine]).

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EVIDENCE & METHODS

Context

Posterior dynamic stabilization (PDS) has been suggested as an alternative to rigid fixation and fusion for a variety of degenerative lumbar conditions. The authors report their experience using one such system for adults with degenerative scoliosis.

Contribution

In a retrospective review of outcomes in unmatched groups treated with either a PDS or a rigid fusion, the authors found similar clinical outcomes. Correction of deformity was superior with fusion, but less morbidity and need for revision was noted in the PDS group.

Implications

PDS is currently used at many centers in Europe, though less widely accepted in the US. Whereas early positive reports were published from company sponsored studies, these results have not been reproduced by independent (non-industry-funded) studies that suggested that PDS is perhaps inferior to fusion. This study provides further data on assigning the potential role of PDS for lumbar degenerative conditions. Unfortunately, as the groups were neither randomized nor well-matched, this study cannot resolve the question of when, if ever, this new technique may be a better choice than standard decompression alone with fusion.

Introduction

Degenerative lumbar scoliosis, also described as de novo or primary degenerative scoliosis [1], is a frequent disease in the elderly population. Its incidence is reported to be from 6% to 68% [2–5] and increases with age [6]. Two different studies [3,7] followed adults without a previous scoliosis and reported 7 [7] and 12 years [3] later, respectively, the development of a de novo scoliosis; the incidence was quite similar in both series: 36.7% [7] versus 34.4% [3].

Degenerative curves are located at thoracolumbar or lumbar levels and must be distinguished from degenerated preexisting idiopathic scoliosis. The degenerative curves in question develop de novo after skeletal maturity with no history of scoliosis. Decreased bone density was initially considered to be the cause of de novo lumbar scoliosis [2]. At present, asymmetric degenerative changes of the disc, vertebral body wedging, and facet joint arthritis are held to be the predominant causes [1,3,8,9]; disc degeneration appearing to be the starting point [3,8]. In the adult population, lateral end plate osteophytes longer than 5 mm and asymmetric tilt of a disc space greater than 3° are risk factors for development of de novo scoliosis [3].

Lumbar de novo scoliosis is frequently associated with degenerative spondylolisthesis and stenosis [6,10–12].

Moreover, progression of degenerative scoliosis can lead to decreased lumbar lordosis [6,8,13].

In elderly patients, medication for painful symptoms associated with degenerative scoliosis should be limited to short-term use [11]. Although nonsurgical procedures have unproven long-term efficacy in these patients [14], surgical treatment should be considered only after their failure.

The most frequent indication for surgical treatment is neurogenic claudication, followed by severe pain refractory to nonoperative procedures and progressive neurologic deficit [11,15]. Moreover, progression of scoliosis alone without other symptoms rarely warrant surgery in elderly patients [10].

Decompression alone has been proposed: it obtained satisfying results in patients with mild degenerative scoliosis and stabilizing osteophytes [16]. However, many authors [1,10,17,18] presented poor results, related to the progression of deformity.

Posterolateral fusion with pedicle screw instrumentation in addition to decompression is currently the most widely accepted technique [1,10,11,19–21]. However, the incidence of complications resulted high, ranging from 20% to 80% [1,17,20,21]: factors appearing to play important roles include older than 65 years, medical comorbidities, blood loss, and number of levels fused. In one study, excessive intraoperative blood loss was found to be the most significant risk factor for early postoperative complications [20]. The arthrodesis can increase operative time and blood loss and consequently the incidence of complications, especially in elderly patients [19,22,23]. In patients older than 75 years undergoing spinal fusion, one large cohort study reported a complication rate 1.9 times greater than that of age-matched patients who had surgery without fusion [22].

The purpose of this study was to consider dynamic stabilization without fusion, using Dynesys implants (Zimmer Spine, Minneapolis, MN, USA) as an alternative to fusion in elderly patients with degenerative lumbar scoliosis, as reported in a previous study [24]. The Dynesys device was introduced by Dubois et al. [25] in 1994. In vitro study demonstrated that Dynesys stabilized unstable spine segments sufficiently to be considered as a potential option to replace fusion [26]. This was confirmed in patients with degenerative spondylolisthesis treated by decompression and Dynesys instrumentation instead of arthrodesis; the dynamic stabilization device remained stable in most patients and prevented progression of spondylolisthesis [27,28]. Especially, the purpose of the present study was to reduce the incidence of complications after posterior fusion, such as adjacent segment degeneration, which generally occurs proximal to posterior instrumentation, and has been reported primarily after short lumbar fusion [20,21]. In a recent study, Cahill et al. [29] suggested that the adjacent problems at the proximal end of a scoliosis construct may be completely eliminated with the use of a transition rod at the most proximal level. The hypothesis of our study was that the choice of a dynamic system could lead to similar results, permitting to perform a short stabilization

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