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SURGICAL STRATEGY FOR ADULT DEGENERATIVE SCOLIOSIS: EVALUATION, MANAGEMENT AND RESULTS

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ABSTRACT

Study design: In Adult Degenerative scoliosis ("de novo") controversy remains over the indications of surgical intervention, overall about the choice between local treatment of the cause of pain (segmental decompression) or the structural treatment of the cause of the deformity (correction of sagittal or coronal unbalance). **Objective:** We conducted a comprehensive review of the literature and our clinical experience to define reliable choises of more appropriate treatment and decide when to address the stenosis alone and when to include the deformity. **Methods:** A prospective analysis of a series of 66 patients with degenerative scoliosis of the lumbar spine and surgical treated. **Results:** In the results was not observed a statistically significant correlation between the amount of the scoliotic curve correction and the outcome clinical improvement, while a significant correlation between the sagittal balance correction and the clinical result. **Conclusions:** Restoring lumbar lordosis and sagittal balance take precedence over scoliosis correction.

KEYWORDS: 1. The indication for surgery and the type of surgery to be performed, involves complex decision-making, 2. Levels of treatment help to decide when to address the stenosis alone and when to include the deformity, 3. Restoring lumbar lordosis and sagittal balance take precedence over scoliosis correction.

INTRODUCTION

Adult scoliosis is defined as a spinal deformity in a skeletally mature patient with a curve measuring > 10° Cobb.[1]

While adult idiopathic scoliosis refers to a patient with a history of AIS with increasing symptoms or progression of the deformity into adulthood, in de novo ADS the curve develops during adulthood due to the degeneration of spinal motion segments.[2,3]

Generally, the deformity begins as the intervertebral disc starts to deteriorate, with degeneration and lack of competency of the posterior elements, axial rotation of the involved spinal segments, lateral olisthesis and ligamentous laxity.[4]

The rewiev of literature shows that these curves have roughly a 1:1 female/male ratio with a mean age of 70.5 years at the time of presentation, with a prevalence inversely proportional to curve magnitude (10°, 10–20° and > 20°curves with 64, 44, and 24% of prevalence, respectively). Furthermore patient age and sex seems not affect curve progression in this category of deformity.[5]

Conversely curves with Cobb angles > 30°, an apical rotation greater than Grade II, a lateral olisthesis > 6 mm, and an intercrest line through L-5 appear to have a higher degree of progression.[4]

In contrast with adolescent deformity, where pain or disability are not frequently present while magnitude of the curve plays a significative role in surgical indication, in adult deformity the aspects relevant to take the decision of surgical treatment are symptoms of spinal stenosis and back pain, radiculopathy and dysfunction that correlate with segment degeneration and imbalance.[6,7,8]

Surgical treatment is only an option when the non-surgical options fails or arise neurological deficits and several options have been proposed: neural

decompression alone, decompression with limited fusion or curve correction with extended fusion to all the curve or curves.[1,8]

We conducted a prospective analysis of a patients series with degenerative scoliosis of the lumbar spine, treated surgically, to define levels of treatment and in order to decide when to address the stenosis alone and when to include the deformity.

MATERIALS AND METHODS

We conducted a comprehensive review of the literature and our clinical experience through the prospective analysis of a series of 66 patients (24 males and 42 females) of average age of 64.8 years with degenerative scoliosis of the lumbar spine, surgically treated. The average follow-up was 4.9 years (max: 12.1 and min 2.0 years).

Has been made a pre-clinical, post-surgical and the FU evaluation through the neurological objectivity, Oswestry Disability Index (ODI), SF-36, visual analogic scale of back pain and radicular pain (1-10), radiographic assessment by standard RX, CT and MRI. The radiographic assessment showed: the imbalance AP (cm), the LL unbalance (cm), the entity of the curve (°Cobb), lordosis (°) and the vertebral rotation (°Perdriolle).

RESULTS

The clinical evaluation at follow-up showed that the **74.2%** of patients (49/66) was satisfied with the clinical results while 25.8% were disappointed. Patients were significantly improved in the ability to perform heavy tasks, light activity, the opportunity to participate in social events, the sleep / rest phase, and the walking ability (Fig 1).

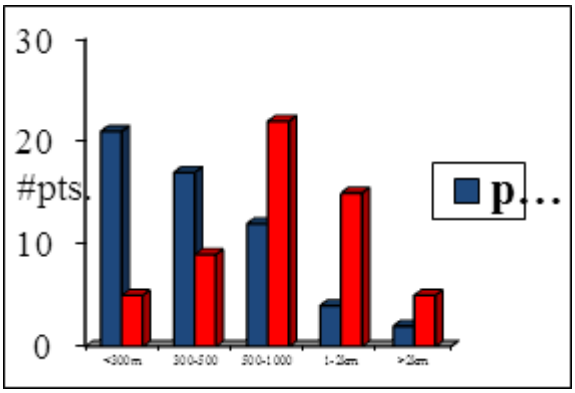

Fig. 1: Improving of walking ability after the surgery.

Patients reported significant improvements in life / depression quality, in their low back pain, and the use of drugs. Results also showed the significative improvement of ODI during the time, and 68.2% of patients (45/66) improved by at least 20 points.

The best clinical results were observed in patients who underwent focal treatment of the cause of the pain (fig 2 and fig 3).

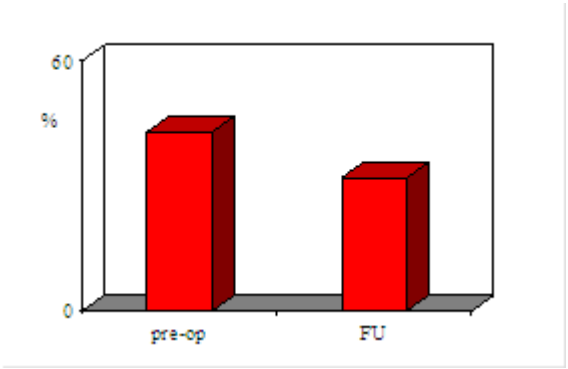

Fig. 2: O.D.I. in structural correction group.

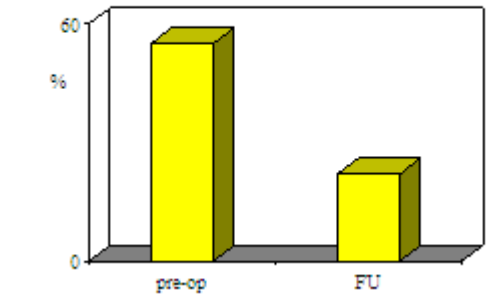

Fig. 3: O.D.I. in segmental decompression group.

Through the radiographic assessment wasn't observed a statistically significant correlation between the amount of correction of the scoliotic curve and improving clinical outcome (Tab. 1), while significant correlation between the correction of sagittal balance and the clinical outcome was detected (Tab. 2).

Table 1: Correlation between the correction of the curve and clinical outcome.

	Preop	Postop	% Correction	FU	Loss of correction (%)
Curve ° Cobb	65.3	32.6	50.1	35.7	- 3.4
lordosis	21.5	33.4	55.4	32.2	- 3.6

Table 2: Correlation between the correction of sagittal balance and the clinical outcome.

Lordosis	Preop	Postop	% Corr	FU	Loss of correction (%)
Satisfaied patients (41/66)	25.3	39.2	55.0	37.9	- 3.3
Not satisfaied patients (15/66)	19.4	26.5	36.6	24.8	- 6.4

We observed 24 cases of complications that included: devices mobilization (6 screws in patients with osteoporosis, with 1 implant removal and 1 reoperation), 3 dural tears, 3 wound dehiscence, 6 post-operative low back pain, 2 post-operative sciatica, 2 epidural fibrosis. We haven't observed any neurologic lesions, infections and devise brokage.

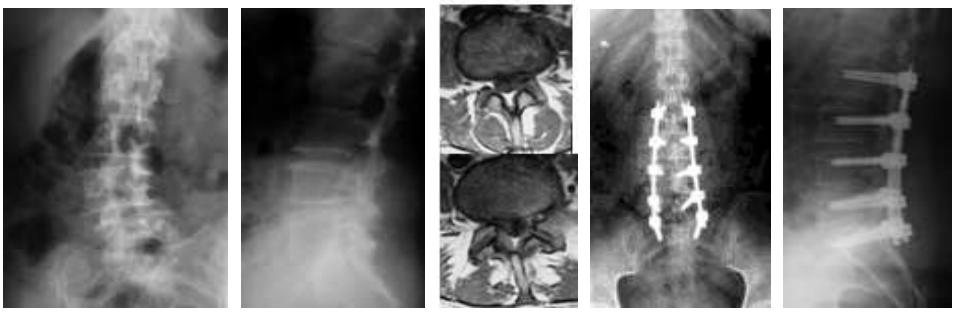

Fig. 4: A 56 years old female patient with L2-S1 and complete cauda equine syndrome, treated with L3-L5 decompression and L2-S1 instrumented posterior arthrodesis, with complete neurologic recovery.

Fig. 5: A 68 years old female patient presented kyphosis, mild scoliosis and claudication, treated with segmental decompressione, sagittal deformity correction and posterior arthrodesis.

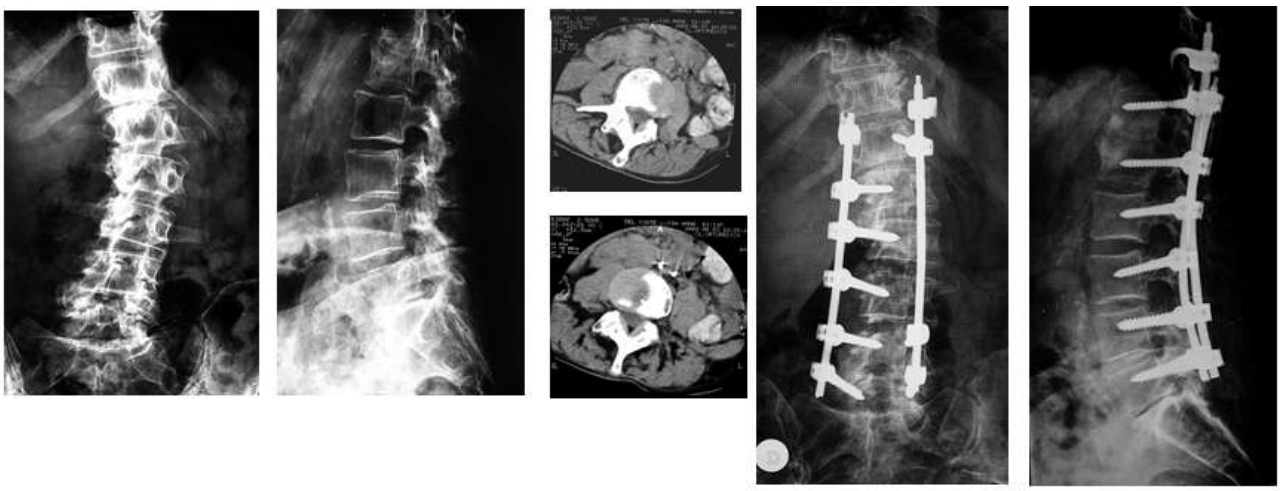

Fig. 6: A 68 years old male patient with lumbar scoliosi and neurogenic claudicatio, treated with L3-L5 decompression, posterior arthrodesis T11-L5 and complete neurologic recovery.

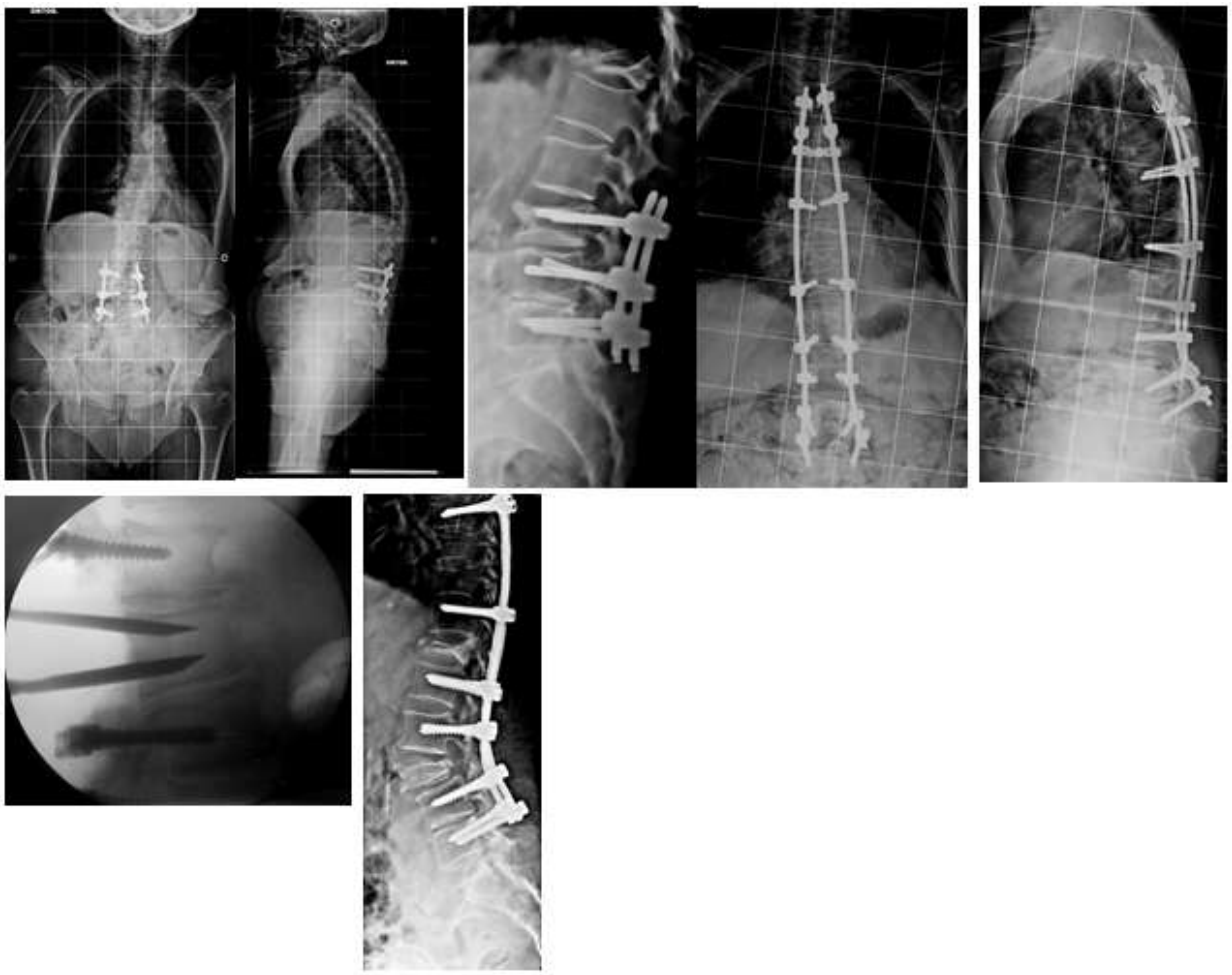

Fig. 7: M. 69 years old, treated with psterior instrumentation L3-L5, that cifo-scoliosi con lombalgia ortostatic lumbar pain, Treated with L3 PSO and posterior instrumentation with sagittal balance correction.

DISCUSSION

Adult Degenerative scoliosis ("de novo") is a prevalent pathology among the aging population, located in the thoracolumbar/lumbar spine and concurrent neurological compromises are also common.

Nonoperative treatment options are indicated when there are no significant stenotic, radicular, and/or backpain symptoms, including curves < 30° with < 2 mm of subluxation, with anterior osteophytes and sagittal and coronal balance.[9]

The indication for or against surgery and, more specifically, the type of surgery to be performed, involves complex decision-making and the review of literature confirm this controversy.[6,9]

From a review of several publications we evidenced that specific treatment options are offered when correlation occurs between clinical and specific radiographic findings, particularly, L-3 and L-4 endplate angulations, lumbar lordosis, thoracolumbar kyphosis, and lateral olisthesis.[10]

Lumbar curves with > 30–40 ° and/or 6 mm of olisthesis on presentation are also considered for operative intervention.

Moreover, curve progression more than 10° and/or an increase in subluxation > 3 mm as well as increasing clinical symptomatology or progressive neurological deficits are indicators for surgical option.[4]

Several orientations of treatment have been proposed: decompression alone, decompression with limited fusion or curve correction with extended fusion to all the curve or curves.

As proposed by Transfeldt et al and Silva F.E. in their publications, six distinct levels of operative treatment are available for ASD and include the following: I, decompression alone; II, decompression and limited instrumented posterior spinal fusion; III, decompression and lumbar curve instrumented fusion; IV, decompression with anterior and posterior spinal instrumented fusion; V, thoracic instrumentation and fusion extension; and VI, inclusion of osteotomies for specific deformities.[6,8]

P. Berjano et al has proposed a classification of degenerative segment disease in adult with deformity of the lumbar spine to establish a surgical plan regarding selective fusion and methods of correction. They defined four main categories: Type I (limited non apical segment disease) and type II (limited apical segment disease) that can be treated by fusion of a selective area of the curve. Type III (extended segment disease-apical and nonapical) needs fusion of all the extension of the coronal curve; Type IV (sagittal and/or coronally imbalanced spine) usually needs aggressive correttive procedures, including osteotomies.[11]

We discuss a suitable approach to help guide surgical treatment, including decompression, instrumented posterior spinal fusion, anterior spinal fusion, and osteotomy, based on clinical and radiographic analysis of the mechanical stability of the deformity and sagittal balance.

In our results was not observed a statistically significant correlation between the amount of the scoliotic curve correction and the outcome clinical improvement, while a significant correlation between the sagittal balance correction and the clinical result has been highlighted.

Results analisys show that the focal treatment (decompression) (alone or adding instrumentation limited to the area of the decompression) is suitable for patients with a short scoliotic curve (< 30°), a little laterolistesys (< 2mm), no back pain or deformity symptoms in a relative balanced patient.

In this cases the curve correction has a relative value and the target of the surgery is decompress neurological structures inside stenotic canal.

The correction with posterior decompression and ostheosyntesis-arthrodesis is indicated in patients with a curve > 30°, associated to apical rotation grade 3, frontal e/o sagittal listesys, considerable sagittal unbalance with necessity of correction.

The entire lumbar curve in addition to the necessary decompressions is included in the instrumented fusion when symptoms of primary back pain are associated with the spinal deformity.

Because often this group of patients has multiple comorbidities, unfortunately these adult deformity corrective procedures carry a high complication rate, first of all infections, CSF leaks (especially among revision cases), implant failures, junctional kyphosis, adjacent segment degeneration, and pseudarthrosis. Systemic complications include myocardial infarction, pneumonia, ileus, urinary tract infections, deep venous thrombosis, and superior mesentery artery syndrome.[13,14,15]

The majority of elderly patients with degenerative scoliosis are menopausal female, so osteoporosis is a major concern in the surgical treatment of adult scoliosis because complicated by the weak bone where implants are more difficult to be anchored and fixed, making the instrumented fusion prone to instrumentation-related complications.

In conclusion, levels of treatment help to decide when to address the stenosis alone and when to include the deformity. Our results, according to the literature, show that restoring lumbar lordosis and sagittal balance take precedence over scoliosis correction.

Considering surgical morbidity in the aged population, however, determination of proper treatment for this complex condition is not easy task but a beneficial outcome in properly selected patients is also anticipated.[12,16,17]

REFERENCES

1. Aebi M. The adult scoliosis. Eur Spine J, 2005; 14: 925–948
2. Benner B, Ehni G: Degenerative lumbar scoliosis. Spine, 1979; 4: 548–552
3. Grubb SA, Lipscomb HJ, Coonrad RW: Degenerative adult onset scoliosis. Spine, 1988; 13: 241–245
4. Pritchett JW, Bortel DT: Degenerative symptomatic lumbar scoliosis. Spine, 2003; 18: 700–703,
5. Korovessis P, Piperos Sidiropoulos P, Dimas A: Adult idiopathic lumbar scoliosis. A formula for prediction of progression and review of the literature. Spine, 1994; 19: 1926–1932.
6. F. E. Silva and L. G. Lenke. Adult degenerative scoliosis: evaluation and management. Neurosurg Focus, 2010; 4; Volume 28.
7. Ploumis A, Transfledt EE, Denis F: Degenerative lumbar scoliosis associated with spinal stenosis. Spine J., 2007; 7: 428–436.
8. Transfeldt EE et al. Surgical outcomes of decompression, decompression with limited fusion, and decompression with full curve fusion for degenerative scoliosis with radiculopathy. Spine, 2010; 35: 1872-75.
9. Pati Everett CR, Patel RK: A systematic literature review of nonsurgical treatment in adult scoliosis. Spine, 2007; 32(19 Suppl): S130–S134.
10. Schwab FJ, Smith VA, Biserni M, Gamez L, Farcy JP, Pagala M: Adult scoliosis: a quantitative radiographic and clinical analysis. Spine, 2002; 27: 387–392.
11. P. Berjano et al. classification of degenerative segment disease in adult with deformity of the lumbar or thoracolumbar spine. Eur Spine J., 2014; 23: 1815-1824.
12. Kee-Yong Ha, MD, PhD, Won-Hee Jang, MD, Young-Hoon Kim, MD, PhD, and Dong-Chul Park, MD.. Clinical Relevance of the SRS-Schwab Classification for Degenerative Lumbar Scoliosis Clinical Relevance of the SRS-Schwab

Classification for Degenerative Lumbar Scoliosis SPINE, 2016; 41(5): E282–E288.
13. Bridwell KH, Lenke LG, Baldus C, Blanke K: Major intraoperative neurologic deficits in pediatric and adult spinal deformity patients. Incidence and etiology at one institution. Spine, 1998; 23: 324–331,.
14. Baron EM, Albert TJ: Medical complications of surgical treatment of adult spinal deformity and how to avoid them. Spine, 2006; 31(19 Suppl): S106–S118
15. Williams EL: Postoperative blindness. Anesthesiol Clin North America, 2002; 20: 605–622.
16. Albert TJ, Purtill J, Mesa J, McIntosh T, Balderston RA. Study design: health outcome assessment before and after adult deformity surgery. A prospective study discussion. Spine, 1995; 20: 2002–2004.
17. Deyo RA, Cherkin DC, Loeser JD, Bigos SJ, Ciol MA Morbidity and mortality in association with operations on the lumbar spine. The influence of age, diagnosis, and procedure. J Bone Joint Surg Am, 1992; 74(4): 536–543.