

## Correction and stabilization of a double major adult idiopathic scoliosis from T5/L5

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### Keywords

Double major idiopathic adult scoliosis · Adult deformity · Degenerative scoliosis

### Introduction

Adult scoliosis is defined as a spinal deformity in a skeletally mature patient with a Cobb angle of more than 10° in the coronal plain. Adult scoliosis can be separated in four major groups [1]: *Type 1* primary degenerative scoliosis (“de novo” scoliosis). *Type 2* secondary degenerative adult scoliosis on the base of an adolescent idiopathic scoliosis or other forms of scoliosis as well as a consequence of a secondary pelvic obliquity; for example due to a hip pathology and lumbar-sacral anomalies. *Type 3* adolescent idiopathic scoliosis during adult life without any relevant degenerative changes mostly in patients aged 40 or over. *Type 4* scoliosis secondary to metabolic bone disease as for example osteoporosis.

There are obviously other classification systems, which rely on the form and location of the curves as in the adolescent scoliosis or are based on their prognosis [9, 11]. Sometimes it is difficult to determine exactly what the primary cause of such a curve is, specifically in progressed curves. There is, however, a quite uniform pathomechanism of development of adult curves and the clinical

presentation is either characterized by back pain with/without leg pain, progression of the curve and occasionally neurological deficit. The treatment differs from the adolescent curves in so far that the goal usually is to treat the leading symptom(s) and not to treat an X-ray or cosmesis. Diagnostic evaluation includes static and dynamic imaging, usually myelo CT, which is more precise than an MRI as well as invasive diagnostic procedures like discogrammes, facet blocks, epidural and root blocks and immobilization tests. They may correlate with the clinical and the pathomorphological findings and may also lead to the least invasive and most rational treatment for the patient. The surgical management consists of either decompression, correction, stabilization and fusion procedures or a combination of all. A surgical procedure is usually complex and has to deal with a whole array of specific problems like the age and the general medical condition of the patient, the length of the fusion, the condition of the adjacent segments, the condition of the lumbosacral junction, osteoporosis, and possibly previous scoliosis surgery and last but not least usually with a long history of chronified back pain and muscle imbalance which may be very difficult to be influenced.

### Case description

This 54-year-old female patient suffers from a significant scoliosis since adolescent age. Scoliosis made increasing problems in the last years. The major findings were progression of the curve and the patient’s perception that she gradually is collapsing in her height. This process was combined with back pain, however, with only little leg pain. Curve measures 68° in the thoracic area and 60° in the thoraco-lumbar area. The thoracolumbar curve and the

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lumbar spine shows massive degenerative changes and the functional X-rays by maximal side bending and traction demonstrates a certain potential of correction of the deformity of the patient. In addition the patient has a history of a breast cancer which is under control since several years. Otherwise this patient is still in good health and the moment to do the surgery is probably ideal before she has additional medical problems due to aging.

### Surgical procedure

Adult scoliosis type 2 treated by a posterior approach only, under a rigorous posterior release and facet joint osteotomies. The last segment L5/S1 is still in a pretty good condition. It has been decided to omit this segment from the fixation in order to protect the iliosacral as well as the hip joints. Furthermore, we would like to demonstrate a progressive exposure of the whole spine, step by step minimizing blood loss. In order to diminish additionally blood loss, controlled hypotension and the cell saver are used. Neurological integrity during surgery is controlled by neuromonitoring during the whole surgery. A complete correction is not the target since the preoperative balance in the AP and lateral view is not so bad and should be maintained through the surgery. Therefore the major goal is to stop further collapse and to achieve only partial correction of a balanced spine. The principles of the surgical procedure consist of a systematic osteotomy of the facet joints and partially of the lamina specifically at T11/12, T12/L1, L1/2, L2/3, L3/4 as well as L4/5 in order to mobilize the spine. The instrumentation is used from T5 to L5 with USS 1 in combination with screws from the USS 2. In the first step, the thoracolumbar junction is exposed by a small incision and instrumented with pedicle screws. Then the incision is extended cranialwards in order to instrument the thoracic spine. After full completion of the screw placements, the lumbar spine is prepared, osteotomized and instrumented. Finally the first rod is introduced at the lumbar spine on the left side (convexity) to correct the coronal plane as well as maintaining lordosis. With a domino connector, a second rod is added to the first one for the thoracic spine on the left side. The left side of the whole curve is now fully instrumented. This leads to a sufficient correction to use only one solid rod on the right side from T5 to L5. Cross connectors are added. The surgery is completed by a fusion with autologous bone which has been harvested from the spinous processes and by freshening the laminae of the instrumented vertebrae.

Total blood loss was 800 ml and the surgery time 4 h. Postoperatively the patient moved both legs strongly and symmetrically.

### Postoperative procedure

Mobilization out of bed the first day after surgery with a soft brace for the lumbar spine. Isometric exercises for the abdominal and paravertebral muscles. Thrombosis prophylaxis with Fraxiparin.

### Discussion and conclusions

This case demonstrates the possibility to treat complex adult scoliosis by a posterior approach only when a rigorous posterior release combined with facet joint osteotomies and partial lamina osteotomies are done and the correction is performed with pedicle instrumentation [5].

Whether the lumbosacral junction should be included or not in such a long fusion is debated. Usually an individual solution for a specific patient has to be decided for [7].

Depending on the general condition of the patient in each case a decision must be taken: should the fusion be extended along the whole deformity or whether a short fixation and fusion are not sufficient for the specific patient's problem [8]. Complications of the surgery are pretty frequent, however, if indications are carefully done this procedure yields a success rate of approximately 70% with significant pain reduction and functional improvement [10, 12].

Since this is still a major procedure, specifically for elderly patients with a relevant medical history, minimal invasive procedures may become more and more important for this specific pathology [2–4].

Whether the posterior surgery needs to be combined in specific segmental problems with interbody fusion remains equally debatable [6, 13].

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