CASE REPORT

Case report: 122° kyphosis secondary to C5–L3 laminectomy and quadriplegia, surgical correction and 30-year follow-up

RB Winter¹ and BA Akbarnia²

¹Twin Cities Spine Center, Minneapolis, MN, USA and ²The San Diego Center for Spinal Disorders, San Diego, CA, USA

Study design: The study design was a case report with 30-year follow-up.

Objectives: In 1980, there were no pedicle screws available, so it was a great challenge to achieve correction and fusion in a patient with no laminae, and who was quadriplegic. Such a case with such a long follow-up has not been previously reported.

Methods: This is a single case report with an ultra-long follow-up. The patient underwent an anterior fusion from T3 to L4 via two incisions, and at a second stage, a posterior fusion from T3 to S1 using Luque rods and wires passed through the foramenae. After 2 years he underwent repair of two pseudarthroses with both anterior and posterior procedures.

Results: He achieved solid fusion following the pseudarthrosis repair. Although being a C7 quadriplegic all his life, he is totally independent in his activities of daily living, and is fully employed.

Conclusion: Correction and fusion can be achieved even in the absence of laminae and pedicle screws.

Spinal Cord (2011) 49, 1023–1024; doi:10.1038/sc.2011.24; published online 5 April 2011

Keywords: quadriplegia; kyphosis; surgical correction

Introduction

The advent of Luque sublamina wiring in the mid 1970's made a vast difference in our ability to achieve correction and fusion of paralytic deformities.^{1,2} This was especially true for insensate patients, such as those with paraplegia or quadriplegia.

Case report

This patient was noted at birth to have no motor function of his lower limbs. At the age of 2 months he underwent a C5–L3 laminectomy. The neurosurgeon found a benign intradural and extradural lipoma involving the entire spinal cord. He remained a C7 quadriplegic. After failed bracing, he was referred to the senior author in 1980 at age 12 years with a 122° kyphosis, correctable to 42° on supine hyperextension (Figure 1).

The first stage of surgery consisted of an anterior fusion from T3 to L4 through two thoracotomies with Zielke rod fixation from T10 to L4 and autogenous grafting up to T4. After 3 weeks, a posterior fusion of the facet joints and transverse processes from T3 to L4 and midline from L4 to S1 was carried out. Luque rods were wired to the spine by

passing the wires from inside the spinal canal out through the foramenae. Allograft bone was used throughout. The kyphosis was corrected to 45° (Figure 2).

After 2 years, he was noted to have increasing kyphosis to 79°. Treatment consisted of a posterior exposure, curettage of the L5–S1 pseudarthrosis with bone grafting, removal of 3 cm of the rods at the T7–9 level, passing of

- An unsupported lateral sitting view shows a 122° kyphosis at age 12.

Correspondence: Dr RB Winter, Clinical Research Director, Twin Cities Spine Center, 913 East 26th Street, Minneapolis, MN 55404, USA.

E-mails: jwinhaven@aol.com or education@tcspine.com

Received 28 January 2011; revised 17 February 2011; accepted 22 February 2011; published online 5 April 2011

Figure 1 A lateral sitting, unsupported radiograph at age 12 years, showing a 122° kyphosis from T1 to L3.

- A lateral sitting view following the anterior and posterior fusion in 1980. The kyphosis is 45°.

Figure 2 A lateral spine radiograph following the initial anterior and posterior fusion. The kyphosis is now 45°. The anterior instrumentation extends from T10 to L4.

new wires at four levels above and four levels below and then applying two 6.5 mm rods with correction to the weak area. After 1 week, the spine was approached anteriorly. Two pseudarthroses were noted, curetted out, bone grafted with autogenous rib graft and another Zielke device inserted for stabilization. The kyphosis was recorrected to 43°.

The fusion became solid, and no further surgery was necessary. He completed high school and college with a major in finance, and has worked the past 11 years for a financial company. He lives alone in his own apartment and is completely independent. He has been in good general health, his only medical problem being recurrent urinary tract infections. He operates his manual wheelchair two to three miles per day for function and exercise. He has had no skin breakdown problems. Examination by the junior author in 2010, that is, 30 years post surgery, showed loss of intrinsic muscles in the hands, a sensory deficit at the nipple line, mild hip and knee flexion contractures and well-healed skin incisions. Radiographs taken then showed a well-balanced spine, a kyphosis of 65°, and no scoliosis (Figure 3).

Discussion

The combination of a long anterior fusion, Luque rods and wires passed out through the foraminae, managed to solve his problem, even though a pseudarthrosis repair was

- An unsupported lateral view in 2010, 30 years after the original surgery. The kyphosis is 65°.

Figure 3 A full-length lateral view at follow-up showing the overall balance and the residual 65° kyphosis.

necessary to complete the treatment. Although the 'modern' spine surgeon might contemplate using pedicle screws at all levels, patients with spinal canal expansion due to tumors seldom have normal pedicle diameters.

A second issue is the expense. At current prices in the United States, each pedicle screw costs about \$1000.00. For a fusion from T2 to the sacrum, the implant costs alone would be approximately \$34 000.00 for the screws and another \$4000.00 for the rods. Perhaps we here can afford that, but in developing countries, that is impossible. For patients with neuromuscular scoliosis such as spinal muscular atrophy, Duchenne dystrophy and cerebral palsy, we still use rods and sublaminar wires, and have not found routine use of pedicle screws to be indicated.

Conflict of interest

The authors declare no conflict of interest.

References

- 1 Luque E. The anatomic basis and development of segmental spinal instrumentation. *Spine* 1982; 7: 256–259.
- 2 Allen BL, Ferguson RL. L-rod instrumentation for scoliosis in cerebral palsy. *J Pediatr Orthop* 1982; 2: 87–96.