



Original article

Posterior three-column osteotomies for the treatment of rigid thoracic kyphosis – a case series[☆]



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ABSTRACT

Objective: To evaluate the results and complications of a series of patients who underwent three-column osteotomy using the posterior approach for correction of complex cases of rigid dorsal kyphotic deformity.

Methods: Review of clinical records and images of 15 consecutive cases of pedicle subtraction osteotomies, bone-disk-bone osteotomies, or vertebral column resection, recording the etiology, type and level of osteotomy, extension of fixation, complications, and pre- and post-surgical measurements of the sagittal curves and pelvic parameters.

Results: Six pedicle subtraction osteotomies were performed, one of which in two adjacent vertebrae, as well as two bone-disk-bone osteotomies and seven vertebral column resection, two of which were performed in two adjacent vertebrae. The mean correction was 39.3° for the angular kyphosis and 33.9° for dorsal kyphosis. The corrections were similar regardless of the kind of osteotomy, the operated spinal segment, or the approach in one or two levels, but this may be a sample effect.

Eight complications were observed in six patients (40% of cases): two medical complications, five early and one late surgical complication (over 90 days after surgery). There were three reoperations within less than one year from the initial surgery and one case of persistent paraparesis. Clinical complications were resolved without sequelae. There was no significant loss of correction during the segment, except in two cases of major mechanical failure due to a junctional segment fracture.

Conclusion: Despite being complex and aggressive procedures, prone to various complications, osteotomies with resection of the three columns are highly effective in the correction of rigid kyphotic deformities and safe enough to justify its use in selected cases.

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Osteotomias posteriores de três colunas para tratamento de cifose dorsal rígida – Série de casos

R E S U M O

Palavras-chave:

Osteotomia
Cifose
Curvaturas da coluna vertebral
Doenças da coluna vertebral

Objetivo: Avaliar os resultados e as complicações de uma série de pacientes submetidos a osteotomias das três colunas por abordagem posterior para correção de casos complexos de deformidade cifótica dorsal rígida.

Métodos: Revisão dos prontuários e das imagens de 15 casos consecutivos de osteotomias de subtração pedicular, osteotomias osso-disco-osso ou vertebrectomias posteriores totais, com registro das etiologias, tipo e nível de osteotomia, extensão da fixação, complicações e medidas pré- e pós-cirúrgicas das curvas sagitais e dos parâmetros pélvicos.

Resultados: Foram feitas seis osteotomias de subtração pedicular, uma em duas vértebras adjacentes e duas osso-disco-osso e sete vertebrectomias posteriores totais, duas em duas vértebras adjacentes. As médias de correção foram de 39,3° para a cifose angular e 33,9° para a cifose dorsal total. As correções foram semelhantes, independentemente do tipo de osteotomia usado, do segmento espinhal operado ou da abordagem em um ou dois níveis, mas isso pode ser efeito da amostra.

Ocorreram oito complicações em seis pacientes (40% dos casos), duas clínicas, cinco cirúrgicas precoces e uma cirúrgica tardia (mais de 90 dias após a cirurgia). Houve três reoperações com menos de um ano da cirurgia inicial e um caso de paraparesia mantida. As complicações clínicas foram resolvidas sem sequelas maiores. Não houve perda de correção significativa durante o segmento, exceto em dois casos de falha mecânica maior por fratura de segmento juncional.

Conclusão: Embora sejam procedimentos complexos, agressivos e sujeitos a complicações, as osteotomias com ressecção das três colunas são altamente eficazes na correção das deformidades cifóticas rígidas e seguras o bastante para justificar seu uso em casos selecionados.

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Introduction

The development of spinal surgery has led surgeons to face increasingly complex cases, aiming not only at spinal decompression and stabilization, but also at deformities correction and the spine biomechanical balance restoration.¹

In the last decade, subtraction osteotomies have become popular in the management of spinal deformities^{2,3} and have begun to be used in a wide range of situations. The focuses of this study are pedicular subtraction osteotomy (PSO), bone-disk-bone osteotomy (BDB), and vertebral column resection (VCR), all of which are posterior, middle, and anterior resection techniques through a single posterior access that can be used in very rigid deformities, with three-column arthrodesis or ankylosis, providing significant angular corrections in a single level without elongation of the anterior column of the spine (Fig. 1).

Material and methods

This was a retrospective study of 15 cases of patients with rigid dorsal kyphotic or kyphoscoliotic deformities of several etiologies, surgically treated, whose postoperative follow-up ranged from 6 to 60 months (mean of 36 months). Data from charts and measurements of spine curves were collected by the

four-line Cobb method. Lumbar lordosis and dorsal kyphosis were measured between the points of inversion of the curve, regardless of the level (Fig. 2). In cases where more than one surgery was performed, results considered measurements taken after the last approach.

Surgical technique

Patients were operated on a conventional surgical table, positioned in a manner that allowed transoperative maneuvers of hyperextension of the trunk or thighs, either through the controls of the table or through access to the positioning pads. Intraoperative neurophysiological monitoring was available in only eight cases (53%). The extent of the fixation was defined based on current principles of deformity correction; in all cases, it was sought to use a minimum of six anchorage points above and below the osteotomy. Wide laminectomy and disarticulation of the ribs were performed at the level to be osteotomized and at the levels above and below it. In more complex cases, secondary to tumors, infections, or associated with scoliosis, laminectomy and osteotomy were performed in a manner that was adapted to the pathology, comprising more levels or conducted asymmetrically. Nerve roots were sacrificed only when necessary to allow bone resection. An intersomatic cage was not used.

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