



Original Article

The use of three-column osteotomy in the treatment of rigid deformities of the adult spine[☆]



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ARTICLE INFO

Article history:

Received 17 January 2017

Accepted 6 March 2017

Available online 23 February 2018

Keywords:

Bone malalignment

Scoliosis

Osteotomy

Treatment outcome

Postoperative complications

ABSTRACT

Objective: To analyze and characterize data about clinical outcome and complication rates in three-column osteotomies (3 CO) for treatment of rigid adult spine deformity (ASD).

Methods: Baseline and postoperative clinical outcomes, considering the Oswestry Disability Index (ODI) and Scoliosis Research Society-22 (SRS-22) questionnaires, radiographic parameters, and demographic data of patients who underwent 3 CO procedure for fixed ASD treatment were collected. Surgical characteristics and reports of perioperative complications were recorded, as well as those that occurred at a minimum follow-up of 12 months.

Results: Ten patients underwent 3 CO and had a minimum follow-up of 12 months (mean 24 months). The patients showed significantly improved health-related quality of life scores (ODI, SRS-22 total, function/activity, pain, and appearance). They also presented a significant improvement in all radiographic parameters considered in the study. Taking into account the surgical procedure, the operative time was significantly higher in patients with staged procedure than in patients with single-stage surgery ($p = 0.003$), with similar estimated blood loss and complication incidence. There were ten complications in six patients (60%), with a mean of 1.0 complication per patient.

Conclusions: Despite of the high complication rates, 3 CO was an effective technique, considering clinical and radiographic outcomes, to treat complex cases of rigid ASD in a sample of patients operated in a Brazilian spine center, with a minimum follow-up of 12 months.

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<https://doi.org/10.1016/j.rboe.2017.03.016>

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O uso da osteotomia das três colunas no tratamento de deformidades rígidas da coluna vertebral do adulto

R E S U M O

Palavras-chave:

Mau alinhamento ósseo
Escoliose
Osteotomia
Resultado do tratamento
Complicações pós-operatórias

Objetivo: Analisar e descrever dados sobre o resultado clínico e as taxas de complicações em pacientes submetidos a osteotomia das três colunas (O3C) para o tratamento de deformidade da coluna vertebral no adulto (DCVA) rígida em um mesmo serviço no Brasil.

Métodos: Foram coletados dados clínicos, considerando os questionários Oswestry Disability Index (ODI) e Scoliosis Research Society-22 (SRS-22), e radiográficos pré- e pós-operatórios, além de dados demográficos, de pacientes submetidos a O3C para tratamento de DCVA rígidas. Também foram coletados dados sobre o procedimento cirúrgico e complicações perioperatórias e no seguimento dos pacientes, com tempo mínimo de 12 meses.

Resultados: O estudo incluiu dez pacientes com mínimo de 12 meses de seguimento (média de 24 meses). Houve melhoria significativa nos indicadores de qualidade de vida (ODI, SRS-22 Total, Função/Atividade, Dor e Aparência). Houve melhoria significativa de todos os parâmetros radiográficos analisados. Considerando o procedimento cirúrgico, o tempo de cirurgia foi significativamente maior nos pacientes com cirurgia estagiada do que naqueles com apenas um tempo cirúrgico ($p = 0,003$), foram similares o sangramento estimado e a incidência de complicações entre tais pacientes. Dez complicações foram observadas em seis (60%) pacientes, com média de uma complicação por paciente.

Conclusões: Apesar da elevada taxa de complicações, demonstrou-se que a O3C é uma técnica bem-sucedida considerando o resultado clínico e radiográfico no tratamento de casos complexos de DCVA rígida em uma amostra de pacientes operados em um serviço de saúde brasileiro, com mínimo de 12 meses de seguimento.

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Introduction

The prevalence of adult spinal deformity (ASD) has tended to increase, associated to population aging.^{1,2} In Brazil, a recent study showed a prevalence of 18.5% of ASD in outpatients, reaching 28.8% in individuals over 60 years of age.³ Among the causes of ASD, iatrogenesis is noteworthy after long lumbar arthrodeses; other causes include deformities associated with multiple fractures due to bone insufficiency (osteoporosis), rheumatologic diseases, such as ankylosing spondylitis, or even degenerative disc disease.⁴

The treatment of rigid ASD is of one of the major challenges in spinal surgery; these are often revision procedures, performed in elderly patients with comorbidities, and osteotomies are frequently required in order to achieve deformity correction.⁴⁻⁸ Schwab et al.⁹ described a classification system for spinal osteotomy, based on the extent of bone resection. The greater the resection, which increases the degree of instability, the greater the possibility in correcting the deformity. Thus, according to the three-column spine concept proposed by Denis,¹⁰ osteotomies that compromise the three-column stability have the greatest possibility of angular correction for the deformity.

However, three-column osteotomies (3 CO) present significant risks for patients, with a high incidence of potentially serious complications.^{4,6,8,11,12} The vast majority of the information on complication rates and clinical outcomes of 3 CO in the treatment of rigid ASD comes from studies of patients

operated in the United States; data on 3 CO patients in Brazil is scarce. The present study is aimed at analyzing and describing data on clinical outcome and complication rates in patients who underwent 3 CO for the treatment of rigid ASD in a single healthcare service in Brazil.

Material and methods

This is a retrospective observational analysis of a prospective database that included patients who underwent 3 CO surgical treatment for ASD in a single healthcare service. The data were analyzed after approval by the Research Ethics Committee of the healthcare service responsible for the study. Patients over 18 years of age with complete data and who had completed a minimum postoperative follow-up of 12 months were included.

Primary data were collected immediately prior to surgery, and included demographic data such as age, gender, body mass index (BMI), and history of prior surgery, as well as clinical and functional assessment using the Oswestry Disability Index (ODI) and the Scoliosis Research Society-22 (SRS-22), translated to and validated into Brazilian Portuguese.^{13,14} The data referring to the surgical procedure were: type of osteotomy (according to the classification proposed by Schwab et al.⁹), site of osteotomy, extent of arthrodesis (proximal and distal fusion level), use or non-use of a screw in the iliac bone, one-time or staged surgery, total surgery time, and estimated blood loss. In the postoperative follow-up, clinical and

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