

Clinical Study

Radiologic and clinical outcomes comparison between single- and two-level pedicle subtraction osteotomies in correcting ankylosing spondylitis kyphosis

Hui Xu, MD, PhD^{a,b}, Yonggang Zhang, MD^b, Yongfei Zhao, MD^b, Xuesong Zhang, MD^b, Songhua Xiao, MD^b, Yan Wang, MD^{b,*}

^aDepartment of Orthopedics, Liaocheng People's Hospital, 67 Dongchang W. Rd, Liaocheng, Shandong Province 252004, China

^bDepartment of Orthopedics, The General Hospital of Chinese People's Liberation Army (301 hospital), 28 Fuxing Rd, Beijing 100853, China

Received 11 January 2014; revised 30 July 2014; accepted 15 September 2014

Abstract

BACKGROUND CONTEXT: Single pedicle subtraction osteotomy (PSO) has been used to correct ankylosing spondylitis (AS) kyphosis successfully, but this approach seems insufficient to correct severe kyphosis. Two-level PSO has been attempted to correct advanced kyphosis in recent years. However, studies have not yet compared outcomes between single and double PSOs, and the indications to perform two-level PSO are unclear.

PURPOSE: This study aimed to compare the radiologic and clinical outcomes between single- and two-level PSOs in correcting AS kyphosis.

STUDY DESIGN: This work is a retrospective cohort study.

PATIENT SAMPLE: Sixty patients were included. Thirty-seven underwent single-level PSO, and 23 underwent one stage two-level PSO.

OUTCOME MEASURES: The radiologic analysis included thoracic kyphosis, thoracolumbar junction, lumbar lordosis, pelvic index, chin-brow vertical angle (CBVA), sagittal vertical axis (SVA), and pelvic tilt (PT). Clinical assessment was performed with a Scoliosis Research Society-22 (SRS-22) outcomes instrument. The operative time, blood loss, and complications were also documented.

METHODS: All of the aforementioned measurements were recorded before surgery, after surgery, and at the last follow-up. The outcomes were compared between the two groups.

RESULTS: The operating time was 232 ± 52 minutes for single- and 282 ± 43 minutes for two-level PSOs. The blood loss was $1,240 \pm 542$ mL (Level 1) and $2,202 \pm 737$ mL (Level 2). The total spine correction was $43.2^\circ \pm 15.1^\circ$ (Level 1) and $60.6^\circ \pm 19.1^\circ$ (Level 2) ($p < .001$), the SVA correction was 13.2 ± 10.6 cm (Level 1) and 23.6 ± 10.2 cm (Level 2) ($p < .001$), and the PT correction was $10.1^\circ \pm 11.6^\circ$ (Level 1) and $15.2^\circ \pm 10.8^\circ$ (Level 2) ($p < .001$). The CBVA correction was $50.6^\circ \pm 17.8^\circ$ (Level 1) and $51.4^\circ \pm 18.6^\circ$ in (Level 2) ($p > .05$). All patients could walk with horizontal vision and lie on their backs postoperatively. The SRS-22 improved from 1.7 ± 0.4 to 4.2 ± 0.8 in the two-level group and 1.8 ± 0.8 to 4.3 ± 0.7 in the single-level group. The fusion of the osteotomy was achieved in each patient. The complications were similar in both groups.

CONCLUSIONS: Pedicle subtraction osteotomy is an effective method to correct kyphosis with AS. Most patients can be successfully treated by single PSO. In severe patients, two-level PSO may be preferable because its correction ability is greater and spine curvature is better than that

FDA device/drug status: Not applicable.

Author disclosures: **HX:** Nothing to disclose. **YZhan:** Nothing to disclose. **YZhao:** Nothing to disclose. **XZ:** Nothing to disclose. **SX:** Nothing to disclose. **YW:** Nothing to disclose.

YZhan and HX contributed equally to this manuscript.

This study did not receive funding, and we have no conflict of interest to report.

* Corresponding author. Department of Orthopedics, The General Hospital of Chinese People's Liberation Army (301 hospital), 28 Fuxing Rd, Beijing 100853, China. Tel.: (86) 10-66939430; fax: (86) 10-88219862.

E-mail address: profwangyan@163.com (Y. Wang)

of single-level PSO. However, two-level PSO requires an increased operating time and results in increased blood loss. Nevertheless, the complications were similar between the two groups. © 2015 Elsevier Inc. All rights reserved.

Keywords: Ankylosing spondylitis; Kyphosis; Osteotomy; Pedicle subtraction osteotomy; Sagittal deformity; Spine

Introduction

Ankylosing spondylitis (AS) is a chronic inflammatory seronegative arthropathy that primarily affects the axial skeleton [1]. Thoracolumbar kyphosis deformity is common in late-stage patients that can lead to cosmetic and functional impairments with a decrease in quality of life [2]. Corrective spinal osteotomy is necessary for these patients to improve their appearance and daily life function [3]. Three methods are mainly used to correct thoracolumbar kyphosis caused by AS: Smith-Petersen open- and closed-wedge osteotomies (SPOs) and pedicle subtraction osteotomy (PSO). Vertebrae column resection is rarely used to treat this type of deformity. Because of the concern of viscera distraction in SPO and rigid disc space, which limits corrective ability of SPOs in AS patients, PSO has recently become increasingly popular to correct kyphosis deformity.

Single PSO has been used to successfully correct AS kyphosis [4]. However, the sagittal balance alignment standard is still mismatched in some patients with severe kyphosis after surgery. Single PSO can correct kyphosis by approximately 30° to 40° [5–8], but the correction angle needs to exceed 60° in severe patients. Thus, two-level PSO was proposed to treat advanced kyphosis deformities. Two-level PSO includes two osteotomies in two skipped vertebrae. This approach can theoretically provide more than 60° of correction, but the procedure is more challenging. Many spinal surgeons cite concerns of longer operation times, blood loss, and complications.

Some authors have recently reported the use of two-level PSO for minor cases [9]. However, these studies lacked a comparison of the operation time, blood loss, complications, and clinical and radiologic results between single- and two-level PSOs. The indications, contraindications, and decision-making process for two-level PSO remained unclear. Since 2007, a large series of PSO, including single- and two-level PSOs have been performed on patients with AS in our hospital, and the results were reviewed and analyzed.

Methods

Patients

Patients who underwent PSO for thoracolumbar kyphosis caused by AS in our hospital from January 2007 to December 2011 were reviewed. The diagnosis of AS was made based on clinical features, radiographic features, and laboratory tests. The chief complaint of patients was

that they could not look straight ahead, lie supine in bed, and cosmetic concerns. Patients with fractures and those who underwent surgery for pseudarthrosis were excluded. The patients' age, sex, height, photographs, radiographs, Scoliosis Research Society-22 (SRS-22) questionnaires, and clinical records were prospectively collected in our department database. The patients were divided into two groups by single- or two-level PSOs.

Clinical and radiologic assessment

The operation time, blood loss, and complications were well documented. An SRS-22 outcomes instrument was implemented before surgery, after surgery, and at the last follow-up.

Full-length free standing radiographs of the whole spine and pelvis were obtained before surgery, after surgery, and at the last follow-up for all patients. The radiologic measurements included thoracic kyphosis (TK) (T1 superior end plate to T12 inferior end plate Cobb angle), thoracolumbar junction (TLJ) (T11 superior end plate to L2 inferior end plate Cobb angle), lumbar lordosis (LL) (T12 inferior end plate to S1 superior end plate Cobb angle), pelvic index (PI), pelvic tilt (PT), and sagittal vertical axis (SVA). The chin-brow vertical angle (CBVA) was measured on the pre- and postoperative photographs of patients who could stand naturally. The corrections of these parameters were defined as last follow-up measurement minus the preoperative measurement.

Statistics analysis

The patients' clinical, radiographic, intraoperative, and postoperative data were separately described as the average \pm standard deviation in the single- and two-level PSO groups. The parameters were compared between groups using *t* and χ^2 tests with a significance level of .05. A paired *t* test was used to compare the postoperative and preoperative data (SPSS 19.0; SPSS Inc., Chicago, IL, USA).

Decision making and surgical plan

Senior spine surgeons in our department assessed all patients before devising a surgical plan. Decision making depended on the clinical symptoms and the standing radiologic films. The first step was to decide whether the surgery should be performed. Indications for osteotomy surgery included the following: 1. the trunk was bent forward, preventing patients from looking ahead and lying on their

Download English Version:

<https://daneshyari.com/en/article/4096545>

Download Persian Version:

<https://daneshyari.com/article/4096545>

[Daneshyari.com](https://daneshyari.com)