Spine Deformity

www.spine-deformity.org

Spine Deformity 4 (2016) 217–224

Correction of Pelvic Obliquity After Spinopelvic Fixation in Children With Cerebral Palsy: A Comparison Study With Minimum Two-Year Follow-up

Oussama Abousamra, MD, Tristan Nishnianidze, MD, Kenneth J. Rogers, PhD, ATC, Ilhan A. Bayhan, MD, Petya Yorgova, MS, Suken A. Shah, MD*

Department of Orthopedics, Nemours/Alfred I. duPont Hospital for Children, 1600 Rockland Road, Wilmington, DE 19803, USA

Received 2 April 2015; revised 23 October 2015; accepted 10 November 2015

Abstract

Study Design: Single institution cohort data were collected prospectively and reviewed retrospectively.
Objectives: This study aims to compare outcomes among three different instrumentation types: unit rod, iliac screws, and sacral alar iliac (SAI) screws in terms of pelvic obliquity correction in children with cerebral palsy (CP).
Summary of Background Data: The optimal choice for spinopelvic fixation in CP scoliosis with pelvic obliquity is controversial.
Methods: Patients with minimum 2 years' follow-up were divided into three groups according to instrumentation type and matched based on preoperative pelvic obliquity and coronal major curve magnitude. Radiographic measurements included horizontal pelvic obliquity angle (PO), spinopelvic angle (SPA), coronal and sagittal Cobb angles, and T1 pelvic angle. Procedures were performed in one pediatric institution between 2004 and 2012. All measurements were performed by a single independent reviewer who was not involved in the procedures.
Results: Seventy-seven patients (42 unit rod, 14 iliac screw, and 21 SAI screw) were included. Gender and age distribution was similar across all groups (56% males, 44% females, mean age 13.5 years). Mean follow-up was 3.6 years. Comparing pre- and postoperative measurements, there was a significant decrease ($p < .05$) in PO, SPA, and coronal major cob angle in all groups. No significant loss of correction occurred during follow-up. Postoperatively, TPA improved in all groups. Nonsymptomatic loosening was noted in 59% of unit rods, 57% of iliac screws, and 52% of SAI screws. One prominent iliac screw needed removal. One nonsymptomatic rod fracture, one infected pseudarthrosis, and one rod malposition occurred in unit rod group.
Conclusions: This study suggests that for correction of pelvic obliquity in cerebral palsy scoliosis, iliac and SAI screws were similar to the unit rod in comparative effectiveness and implant safety profile.
Level of evidence: Therapeutic study, Level III.
© 2016 Scoliosis Research Society.

Keywords: Cerebral palsy; Pelvic obliquity; Spinopelvic fixation; Sacral alar iliac

Introduction

Spinal deformity remains a highly challenging aspect in the management of children with cerebral palsy [1,2]. The incidence of spinal deformity has been reported to be around 25% and tends to increase in severely involved children with less walking ability [1-3]. Scoliosis is the most common deformity with an incidence as high as 74% in children with quadriplegic cerebral palsy who are non-ambulatory [3]. Characteristically, the curve extends into the pelvis, causing pelvic obliquity and creating coronal and sagittal imbalance [4,5]. This multidimensional deformity often requires spinopelvic fixation, a procedure that adds more complexity and challenge to scoliosis management in cerebral palsy [5,6].

The optimal choice for spinopelvic fixation is still controversial [6]. Many methods have been described in

Author Disclosures: OA (none); TN (none); KJR (none); IAB (none); PY (none); SAS (grants from the Setting Scoliosis Straight Foundation, during the conduct of the study; grants from the Setting Scoliosis Straight Foundation, grants and personal fees from DePuy Synthes Spine, Inc., outside the submitted work).

*Corresponding author. Department of Orthopedics, Nemours/Alfred I. duPont Hospital for Children, 1600 Rockland Road, Wilmington, DE 19803, USA. Tel.: (302) 651-5904; fax: (302) 651-5951.

E-mail address: Suken.Shah@nemours.org (S.A. Shah).

2212-134X/$ - see front matter © 2016 Scoliosis Research Society.
http://dx.doi.org/10.1016/j.jspd.2015.11.001

adult and pediatric patients [3,5-9] and improvements have been made to achieve better results with less complications [8]. The techniques of deformity correction depend highly on a patient's functional status and the curve's structural features [5]. In children with cerebral palsy, a well-balanced posture preserves walking ability in ambulatory patients [1] and provides pain-free seating that facilitates hygiene care and may prevent later complications in patients with no walking ability [2,5]. The Galveston technique, using smooth intrailiac rods, had been widely used for spinopelvic fixation since it was proposed by Allen and Ferguson in the 1980s [5,9]. Good results were reported, and this method became the gold standard for neuromuscular spinal deformity correction [5] along with the unit rod, which is a U-shaped rod, linked with unibody construction at the proximal end and smooth iliac limbs for distal fixation [10]. Because of the difficult learning curve for this technique [6,8] and advances in segmental spinal instrumentation, newer methods were developed and gained popularity [3,5-9]. Iliac screws that can be directed into the ilium and connected to longitudinal rods by offset connectors are used commonly [8], and more recently, many surgeons have adopted the sacral alar iliac (SAI) screw technique, first described by Sponseller and Kebaish [6,8], which uses a starting point deeper than the posterior superior iliac spine (providing more soft tissue coverage and less prominence), on the sacrum directed into the ilium, thus obviating the need for an offset connector since the implant lines up with the spinal anchors [6,8].

Comparison studies have not been frequently done for spinopelvic fixation in the population with cerebral palsy [5]. This study aims to compare pelvic obliquity correction among three different methods: Galveston unit rod, iliac screws, and SAI screws—based on our experience at a single institution.

Materials and Methods

All patients with spastic cerebral palsy who had spinopelvic fixation with a minimum of 2-year postoperative follow-up were included in the study. Cohort data were collected in a prospective manner at one pediatric institution over the last 10 years. Demographic, clinical, and radiographic data were reviewed retrospectively. Patients were divided into three groups according to pelvic fixation type (group A: unit rod, group B: iliac screws and group C: SAI screws) (Fig. 1A-C). Groups B and C were included as they were due to the small number of patients. Group A was randomly selected from a large number of patients (112 patients) to have comparable group sizes (double size of group C). No significant difference was found between the groups regarding preoperative pelvic obliquity and coronal major curve magnitude. Preoperative functional status was classified according to the Gross Motor Functional Classification System (GMFCS) [11]. Anteroposterior and lateral spine radiographs, including the hips, were taken in the sitting position as recommended for nonambulatory patients [12,13]. Preoperative, postoperative, and last follow-up radiographs were reviewed. The classification developed by Lonstein and Akbarnia [4] was used to classify preoperative curves.

Pelvic obliquity was measured by two angles; horizontal pelvic obliquity angle (PO) which is made by a line drawn through the proximal points of both iliac crests and a line parallel to the lower end of the roentgenogram [12,14] and the spinopelvic angle (SPA), which is formed by a line through centers of T1 and L5 and a line perpendicular to the iliac crests line [15,16] (Fig. 2A). Cobb's method [17] was used to measure the coronal major and sagittal curves. Kyphosis was measured between T2 and T12 [18], and lordosis was measured between T12 and S1 [18,19]. In order to evaluate sagittal balance and reconstruction, the T1 pelvic angle (TPA) was measured as the angle defined by a line drawn from T1 to the middle of the femoral head axis and a line from that axis to the middle of the S1 endplate [20] (Fig. 2B).

Implant loosening was defined, as described by Yazici et al., on the anteroposterior pelvic radiographs (windshield wiper sign) as the largest distance from the implant across the radiolucent zone to bony sclerosis in any direction, and it was graded as follows: grade 1, no radiolucency; grade 2, less than 1mm; grade 3, 1 to 2 mm; and grade 4, more than 2 mm [5,21]. All radiographs were inspected to record implant breakage and pseudarthrosis. Implant prominence or pain and infection were recorded from the medical charts.

Surgical procedures were performed by four pediatric orthopedic surgeons at a single pediatric institution. All

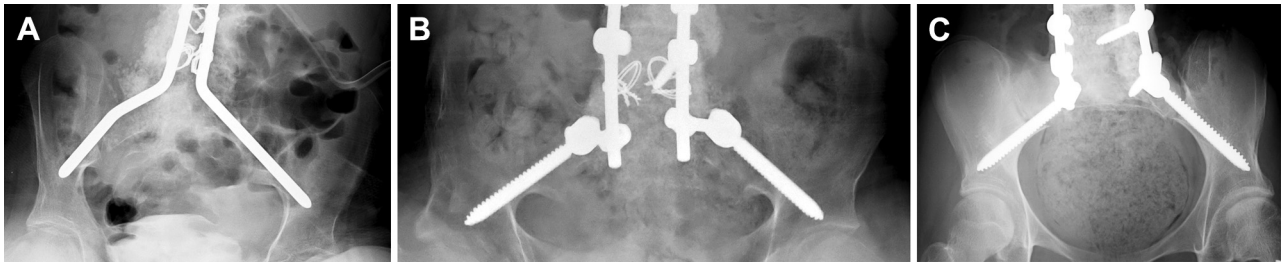

Fig. 1. Anteroposterior pelvis radiographs show three types of spinopelvic instrumentation. (A) Unit rod, (B) iliac screws, and (C) sacral alar iliac (SAI) screws.

Download English Version:

https://daneshyari.com/en/article/4095386

Download Persian Version:

https://daneshyari.com/article/4095386

Daneshyari.com