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Higher rate of proximal junctional kyphosis seen in patients with Risser grade 3

Radiographic incidence of PJK continued to increase up to a minimum 2-year follow-up.

LOS ANGELES — Results of a study presented at the North American Spine Society Annual Meeting showed no clear risk factors for development of proximal junctional kyphosis or proximal junctional failure among patients with adolescent idiopathic scoliosis, as well as a low rate of long-term consequences and reoperations.

"After looking at this population, we found the incidence of PJK, proximal junctional kyphosis, is low," **Andrew J. Pugely, MD,** in the department of orthopedics at University of Iowa, told *Orthopedics Today*.

Pugely and colleagues identified 253 patients who underwent posterior spinal fusion for adolescent idiopathic scoliosis (AIS) and had 2-year follow-up and consistent radiographs that allowed proper measurement of the patients' proximal junctional (PJ) makeup.

Andrew J. Pugely

"We applied two separate definitions that are commonly used for defining PJK. This was development of change in radiographic PJ angle at both 6 weeks and then measured again at final follow-up, which ranged from 2 years minimum up to several years," Pugely said at the meeting. Definitions of PJ angle greater than 10° and 20° were also used. Researchers identified the risk factors associated with PJK development and described long-term complications.

At 6-week follow-up, there was an incidence of radiographic PJK of 10% and 0.4%, respectively, when investigators applied the definitions of PJ angle greater than 10° and greater 20°.

"At the final follow-up, minimum of 2 years, that incidence rose to over 25% of radiographic PJK and 4.3% if the 20° threshold was applied," Pugely said.

When the 10° definition was used, radiographs showed 65 patients had PJK and 188 patients did not have PJK at final follow-up.

Pugely said patients with Risser grade 3 had a higher incidence of PJK. Patients with a Lenke 5 spine curve who were fused up to the upper thoracic spine with a nonstructural thoracic curve had a slightly higher incidence of PJK.

"The key factor is there was only one reoperation in this entire cohort associated with a proximal junctional problem," Pugely said. "That was one out of 253 or an incidence of less than 0.1%."

In the interview with *Orthopedics Today*, Pugely said results of this study are reassuring to surgeons and, due to the low reoperation rate identified, assures them to not be alarmed by early signs of PJK in patients with AIS.

"All future research is and will continue to be directed at studying this problem from occurring in adults because the reoperation rate is unacceptably high, it is extremely expensive, patient outcomes are not as good when it happens, and so it may never be totally solved," Pugely said. "What will likely happen is we will get more precise at predicting, before surgery, who will get one of these devastating complications afterward." – *by Casey Tingle*

Reference:

Pugely AJ, et al. Paper 164. Presented at: North American Spine Society Annual Meeting; Sept. 26-29, 2018; Los Angeles.

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Disclosure: Pugely reports no relevant financial disclosures.

PERSPECTIVE

Jeffrey A. Goldstein, MD

The importance of this study is it reaffirms to us that PJK, or worse proximal junctional failure, is less of a concern in the pediatric population undergoing surgery for AIS than the adult population that undergoes surgery for malalignment. Rates of reoperation for PJK in the pediatric group are also lower than the adult population with radiographic evidence of PJK. The condition appears more benign. This single-surgeon series using hybrid constructs provides follow-up with an average of 3.7 years by an experienced scoliosis surgeon.

Similarly, low rates of clinically significant PJK in surgery for AIS have also been reported by members of the Harms Study Group. Risk factors for PJK in this group appear to include shorter instrumentation, greater postoperative changes in sagittal contour and loss of thoracic kyphosis. There is also the suggestion that all screw constructs may lead to higher levels of PJK relative to hybrid constructs. However, there may be little clinical significance.

Further investigation into the use of soft landings or tethers proximally may demonstrate some beneficial effect on this radiographic finding. The authors should be congratulated on their data collection and providing this follow-up.

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Disclosures: Goldstein reports he is a member of the editorial board for *The Spine Journal*.

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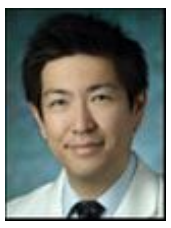

Sheng-fu Larry Lo, MD

The excellent single-surgeon retrospective study by Pugely and colleagues sheds important insight onto the archnemesis of deformity surgery: PJK. The researchers present a series of 253 patients who underwent AIS surgery with mean follow-up of 3.7 years, showing that patients who were more skeletally mature (Risser grade 3), had thoracolumbar or lumbar major curves (Lenke 5) or shorter constructs (upper instrumented vertebra T4 vs. T2), were more likely to develop radiographic PJK in a univariate analysis, with Risser grade 3 demonstrating statistical significance as well in a multivariate analysis. Although PJK risk factors are less characterized in the AIS population compared to the adult degenerative scoliosis population, this study gives us important insight into this, as well as shows the overall safety of surgery from a reoperation perspective, as only one of 253 patients required a reoperation. Future multicenter studies looking at PJK in patients with AIS are needed to better understand the relationship of radiographic PJK to clinically significant PJK that requires a revision operation.

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