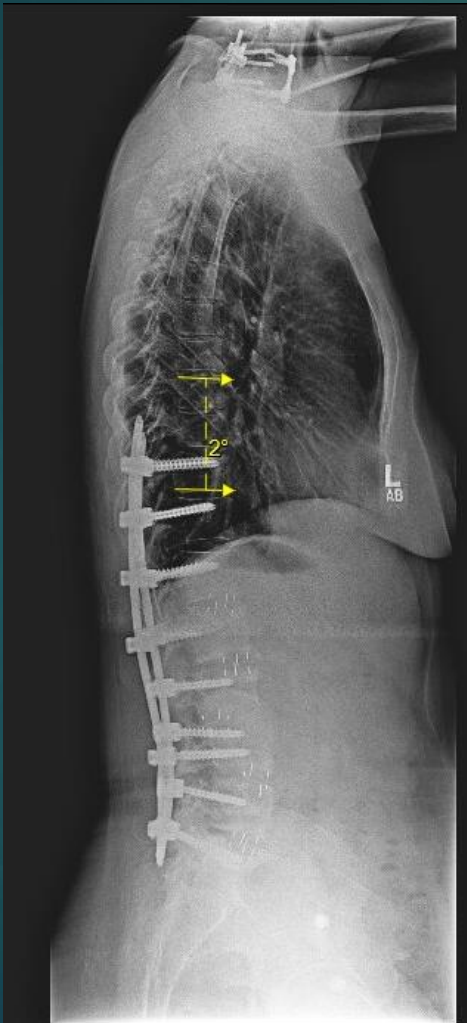
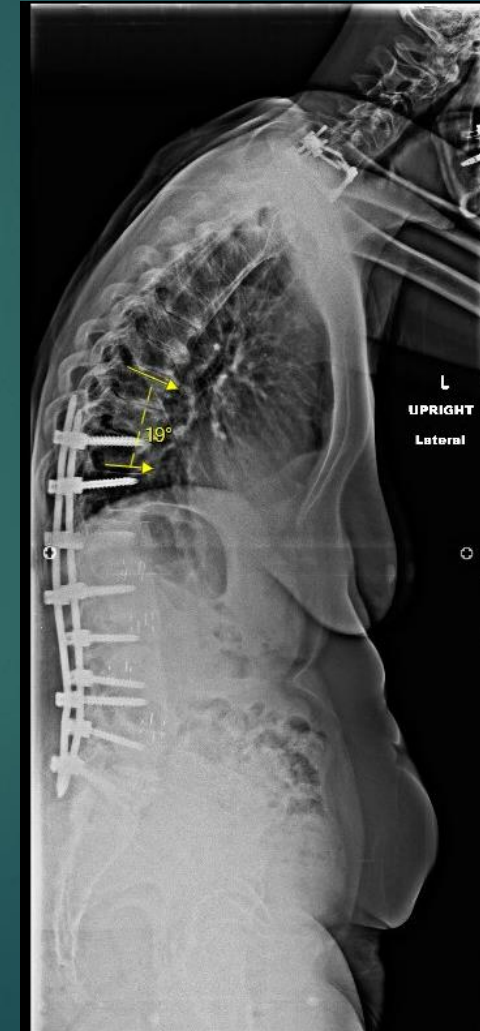


Does **UIV level** influence the Development of **PJK/PJF** in Patients Undergoing Circumferential Minimally Invasive Surgery for Adult spinal Deformity?- A **13-year** Analysis with Minimum 2-year Follow-up



JOSE H. JIMÉNEZ ALMONTE, MD
NEEL ANAND, MD
ANITA ANAND
BARDIA KHANDEHROO, MS
ANDREW CHUNG, DO
DAVID GENDELBERG, MD
BABAK KHANDEHROO, MD
SHEILA KAHWATY, PA-C



INTRODUCTION

- ▶ **Proximal junctional kyphosis** (PJK) is a commonly encountered clinical and radiographic phenomenon after spinal surgery that may lead to post-operative deformity, pain, and dissatisfaction.
- ▶ The exact mechanism underlying PJK remains unclear.
- ▶ It has been theorized that use of Circumferential Minimally Invasive Spine surgery (CMIS) with posterior pedicle screw instrumentation without posterior osteotomies limits dissection of the posterior muscular structures/tension band and may decrease the incidence of PJK compared to traditional posterior column osteotomy and open pedicle screw placement. However, this has not yet been conclusively demonstrated.

PURPOSE:

- ▶ This study was conducted to assess the influence of the upper instrumented vertebra (UIV) in the thoracolumbar junction in patients undergoing CMIS correction of adult spinal deformity (ASD).
- ▶ We hypothesized that UIV in the thoracolumbar junction does not influence the incidence of PJK in patients undergoing CMIS correction for ASD.



METHODS

A retrospective review of prospectively collected data registry of **409** patients who underwent CMIS correction of Adult spinal deformity from **Jan 2007 to Jan 2021**.

Inclusion Criteria:

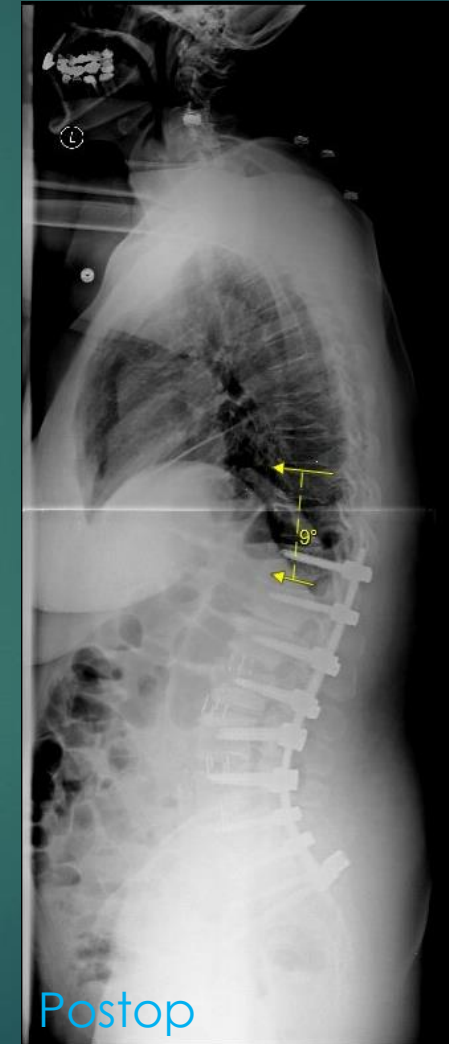
1. **ASD (COBB>50, SVA>95MM, PI-LL>20, PT>30)**
2. **3 OR MORE LEVELS INSTRUMENTED**
3. **MINIMUM OF 2-YEAR FOLLOW-UP**
4. **HAVING PRE-OP AND POST-OP FULL LENGTH 36" FILMS**
5. **HAVING UIV IN T10-L2 REGION**

INCLUDED **230 PATIENTS** (146 FEMALES AND 84 MALES) FOR THIS STUDY

Mean age: **67 years** (21-85 years)

PJK was defined as angle >10° and at least 10° greater than the baseline when measuring UIV to (UIV+2).

PJF was defined as any type of symptomatic PJK which required surgery



Methods

In all patients

1. **1st stage:** Multilevel oblique LLIF + L5-S1 OLIF/ ALIF
2. **Two days later:** The patients were ambulated, and a standing radiograph obtained
 - Based on this radiograph further correction of alignment, as age appropriate, was planned for the second stage.
3. **2nd Stage (Three days later):** MIS pedicle screws with aggressive rod contouring and derotation/translation was done. All the iliac screws were placed freehand directly into the ilium through the PIIS.
4. All patients were instrumented to the first proximal neutral parallel disc. MRI confirmed a normal to near normal disc proximally.

Results

- Mean follow-up was **97 months** (13-180).
- Total of **1389** levels were fused: Average of **6 levels/patient** (**3-8levels**, SD 2)

PJK/PJF incident per level

UIV	Radiographic			Total
	PJK	PJF	NONE	
L1	1 (2.7%)	2 (5.6%)	33 (91.7%)	36
L2	1 (1.9%)	1 (1.9%)	49 (96.2%)	51
T12	2 (3.7%)	2 (3.7%)	50 (92.6%)	54
T11	1 (3.8%)	3 (11.5%)	22 (84.6%)	26
T10	9 (14.3%)	3 (6.3%)	51 (80.9%)	63
TOTAL	14 (5.2%)	11 (5.6%)	205	230

❑ The chi-square statistic is 7.9207. The **p-value is .04768**. The result is **significant** at $p < .05$.

Results

Radiographic outcomes

	PJK patients	Non-PJK patients	P value
Pre-op SVA	79.35mm (9.55-177.8) SD 44.80	60.4mm (3.3-267) SD 51.5	P>0.05
Post -op SVA	47.57mm (4.2-146.34) SD 42.6	39.7mm (0-149) SD 30.4	P>0.05
Delta SVA	38.7mm (4.2-96.6) SD 30.3	33.4mm (0.5-192.2) SD 34.3	P>0.05
Pre-op PI/LL mismatch	19.5 (1.7-49.15) SD 12.7	18.4 (0.2-62.6) SD 14.7	P>0.05
Post-op PI/LL mismatch	11.6 (0.6-32.5) SD 8.4	10.2 (0.1-37.4) SD 7.2	P>0.05
Delta PI/LL Mismatch	11.3 (0.6-37.2) SD 10.4	9.9 (0-34) SD 7.7	P>0.05

Conclusion:

- ▶ Our study would suggest:
 1. In the appropriately selected and well-optimized patient, CMIS deformity correction is associated with a **low prevalence** of PJK and PJF than reported for open spinal deformity surgery.
 2. Stopping fusion at **T10** showed the **highest incidence** of PJK, whereas fusion to **T12** or below showed the **least incidence** of it.
 3. **Magnitude of correction** did not seem to have an influence on developing PJK/PJF.
 4. There were no catastrophic early failure and all 11 symptomatic patients had delayed slow onset of sagittal decompensation over the years.