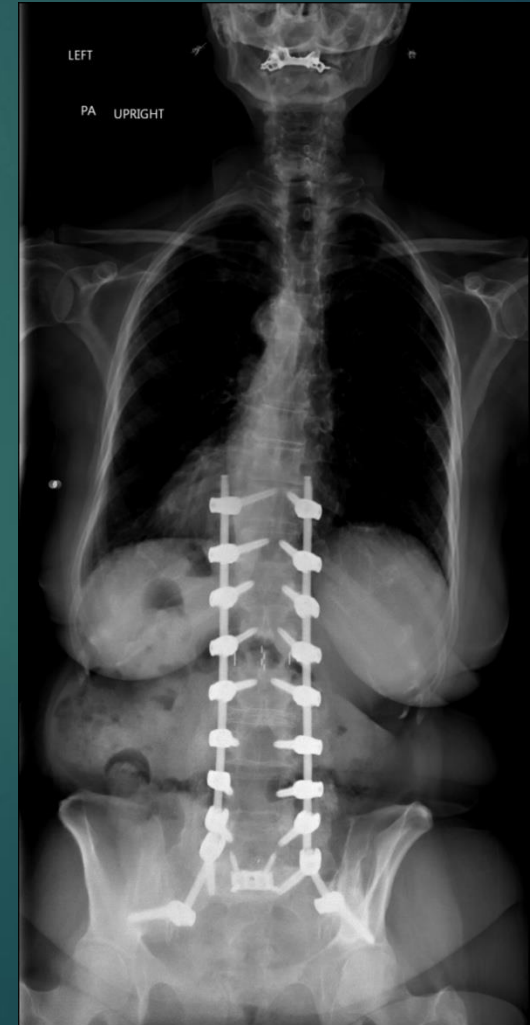


Is There a Correlation Between Degree of Facet Degeneration and Increase in Spinal Canal Volume after a Minimally Invasive Pre-psoas Interbody Fusion? –A Minimum 2 year Follow up Study



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INTRODUCTION

- The first stage of Circumferential minimally invasive (cMIS) correction of adult spinal deformity (ASD): **Lateral or oblique lumbar interbody fusion (OLIF)**: indirectly decompress the spinal canal, lateral recess, and neural foramen and subsequently resolve the radicular symptoms when properly performed.

One of the surgeons' concerns has been the presence of **facet arthropathy** which may impede the success of an interbody fusion that is not supplemented by a posterior decompression or facetectomy.

We assessed the clinical and radiological success of the indirect decompression after CMIS correction for ASD.

METHODS

A retrospective review of prospectively collected data registry of **254** patients who underwent CMIS correction of Adult spinal deformity from **Jan 2011 to Jan 2020**.

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 MRI/ CT SCAN**

INCLUDED 104 PATIENTS (71 FEMALES AND 33 MALES) FOR THIS STUDY

Mean age: **66.6 years** (22-84 years)

CMIS Protocol:

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.

METHODS

Total of **824 facets** were reviewed, and we assigned a pre-op grade (0-3) to the severity of the facet arthropathy (Table 1).

Grading of lumbar facet joint degeneration using CT/ MRI described by Weishaupt et al.

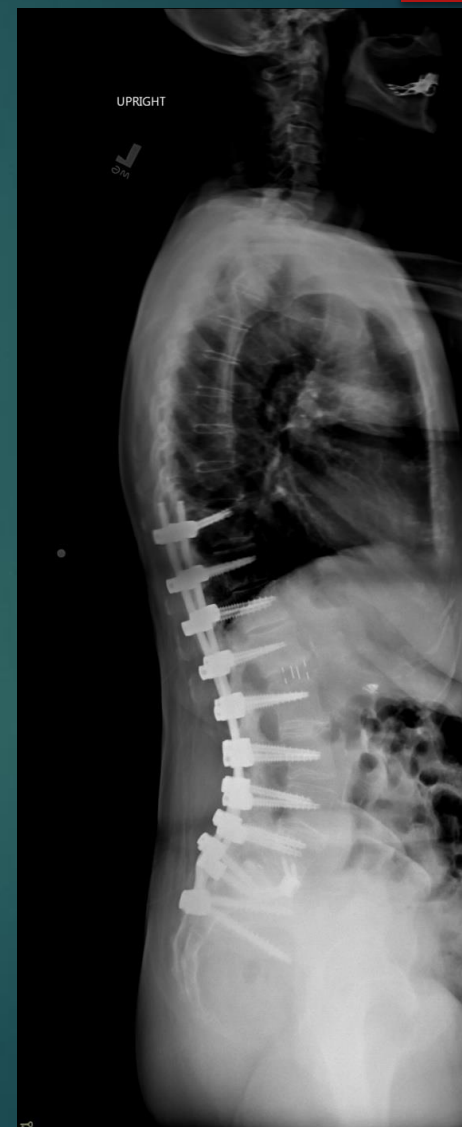
Facet Grade	Definition	Number
Grade 0	Normal facet joint space (2–4 mm width)	51
Grade 1	Narrowing of the facet joint space (<2 mm) and/or small osteophytes and/or mild hypertrophy of the articular process	218
Grade 2	Narrowing of the facet joint space and/or moderate osteophytes and/or moderate hypertrophy of the articular process and/or mild subarticular bone erosions	404
Grade 3	Narrowing of the facet joint space and/or large osteophytes and/or severe hypertrophy of the articular process and/or severe subarticular bone erosions and/or subchondral cysts	151

Results

- Mean follow-up was **69 months** (24-132).
- Mean level fused was **6 levels**(3-16)
 - A total of 412 interbody levels were fused

Facet Grading: **824 facets**

Level	Grade 0	Grade 1	Grade 2	Grade 3	Total
L1-L2	8	35	71	8	122
L2-L3	7	58	88	23	176
L3-L4	13	45	98	40	196
L4-L5	10	50	81	37	178
L5-S1	13	30	66	43	152



Results

Spinal Cross-sectional area (cm²)

	Total LIF done	Pre-op	Post-op	P value
L1-L2	61	2.3 (1.1-3.7) SD 0.64	3.4 (2.1-5.1) SD 0.69	P < 0.05
L2-L3	88	1.97 (0.83-4.10) SD 0.66	3.44 (1.9-5.8) SD 0.83	P < 0.05
L3-L4	98	1.82 (1-3.70) SD 0.63	3.53 (1.9-6.5) SD 0.89	P < 0.05
L4-L5	89	1.95 (1-4.9) SD 0.7	3.86 (2-6) SD 0.84	P < 0.05
L5-S1	76	2.50 (1.1-5.3) SD 1.09	5.08 (2.7-7.5) SD 1.05	P < 0.05

Results

Spina volume in pre-op **Grade 1 Facets**

	Pre-op (cm ²)	Post-op (cm ²)	P value
L1-L2	2.5 (1.3-3.2) SD 0.6	3.6 (2.8-4.5) SD 0.6	P < 0.05
L2-L3	2 (0.8-4.1) SD 0.89	3.6 (2.4-5.4) SD 0.95	P < 0.05
L3-L4	2 (1.1-3.1) SD 0.61	3.9 (2.9-5) SD 0.64	P < 0.05
L4-L5	2.1 (1.3-3.9) SD 0.92	3.7 (2.8-5.2) SD 0.65	P < 0.05
L5-S1	2.1 (1.2-3.7) SD 0.88	5.1 (3.6-6.1) SD 0.85	P < 0.05

Spina volume in pre-op **Grade 2 Facets**

	Pre-op (cm ²)	Post-op (cm ²)	P value
L1-L2	2.3 (1.2-3.7) SD 0.5	3.4 (2.1-5.1) SD 0.7	P < 0.05
L2-L3	2 (0.8-3.3) SD 0.61	3.5 (2-5.8) SD 0.73	P < 0.05
L3-L4	1.6 (1-3.4) SD 0.54	3.4 (2.1-6.5) SD 0.82	P < 0.05
L4-L5	2 (1.1-3.6) SD 0.60	4.1 (2.1-6) SD 0.85	P < 0.05
L5-S1	2.4 (1.1-5.3) SD 1.1	5.5 (3.2-7.5) SD 1.3	P < 0.05

Results

Spina volume in pre-op **Grade 3 Facets**

	Pre-op (cm ²)	Post-op (cm ²)	P value
L1-L2	2.3 (1.2-3.5) SD 0.9	2.9 (1.9-3.6) SD 0.5	P< 0.05
L2-L3	1.8 (1-3) SD .54	3.2 (2.2-5.2) SD 0.89	P< 0.05
L3-L4	2.1 (1-3.7) SD 0.68	3.6 (1.9-5.3) SD 0.91	P< 0.05
L4-L5	3.4 (2.3-4.2) SD 0.55	5.1 (3.2-7.5) SD 1.2	P< 0.05
L5-S1	2.8 (1.3-4.8) SD 1.04	4.8 (2.7-6.2) SD 0.80	P< 0.05

Conclusion:

Our study suggests that if the facets are **not fused**, the success of lateral/oblique interbody fusion in cMIS for ASD is **independent** of the **severity of facet arthropathy** posteriorly.