Assessment of spinal fusion rates in multi-level surgeries using lateral interbody cages and rhBMP-2

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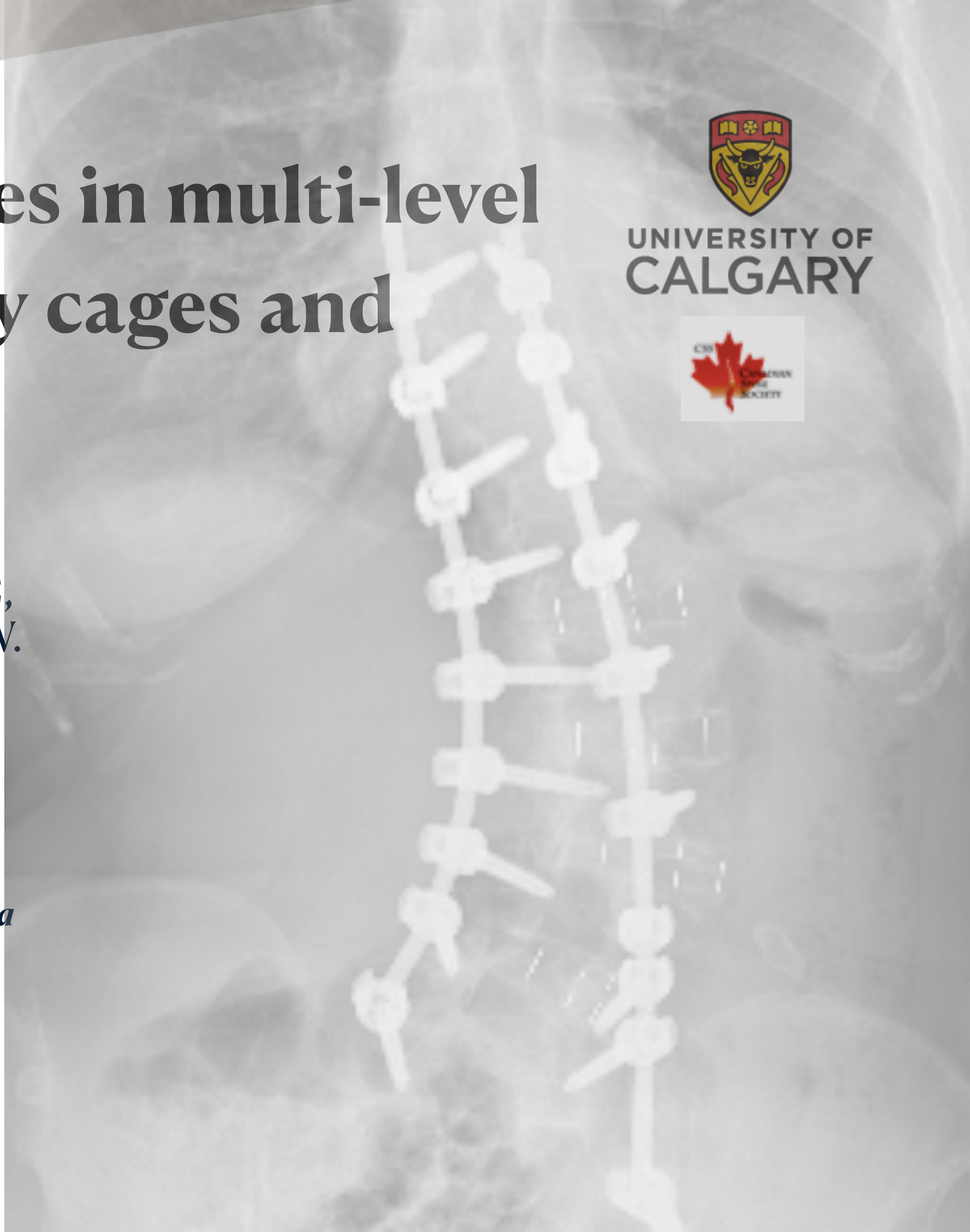

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Abstract

Background: Multilevel spinal fusion can improve quality of life in many degenerative spinal conditions, especially in adult spinal deformity surgery. Historically, adult spine deformity surgeries have been complicated with high pseudoarthrosis rates. Initial studies reported 10-15% rate of non-union and even higher rates with multiple-level constructs. Introduction of rhMBP-2 improved the success rates of interbody fusion and fusion rates achieved equivalence to that of the gold-standard iliac crest bone-graft (ICBG). Lateral lumbar interbody fusion (LLIF) allowed multi-level less-invasive access to the anterior lumbar spine. We hypothesize that fusion rates using lateral approach is better than historically published available data for spinal fusion.

Objectives: To investigate radiographic fusion rates with lateral interbody approach, utilizing rhBMP-2, in multiple-level spinal fusion for adult spinal deformities.

Methods: The University of Calgary adult spine deformity database was searched to identify eligible patients who have undergone two or more than two level LLIF in lumbar spine (T12-L5) between year 2010 to 2018. Patients only with supplemental posterior instrumentation spanning interbody fusion levels were included in the study. Plain coronal and sagittal 36-inch standing radiographs were obtained pre-operatively and during follow-up. Computed tomography (CT) scans were obtained in select patients with suspicion of non-union or implant-related complications.

Results: 206 eligible patients with complete follow-up records were available for analysis. Median operated levels per patient were 3 (IQR 3-4). Mean follow-up duration was 4.4 years (SD-1.9). 194 patients (94.2%) had radiological evidence of successful arthrodesis. 12 patients (6.2%) had radiological non-union at one interbody fusion level, of which only 1 (0.4%) underwent revision surgery for clinically significant pseudoarthrosis. 11 (5.3%) patients were clinically asymptomatic despite the radiological findings suggestive of pseudoarthrosis.

Conclusions: This series represents the largest cohort to date and represents the lowest pseudarthrosis rate in multiple-level interbody fusion. rhBMP-2 in LLIF can substantially decrease pseudoarthrosis rates in multi-level fusion procedures and can be considered as new gold-standard bone graft material in spinal fusions.

University of Calgary Adult spine deformity database: 430 (2008-2020)

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Eligible patients: 298
LLIF at two or more than two levels with supplemental posterior fixation

→ Excluded: 132
Single level LLIFs, Stand-alone LLIF, L5-S1 interbody fusion

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Patients with minimum 2 Years F/U: 234

→ Excluded: 64

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F/U imaging available for assessment of fusion: 206

→ Excluded: 28

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Patients included in final analysis: 206

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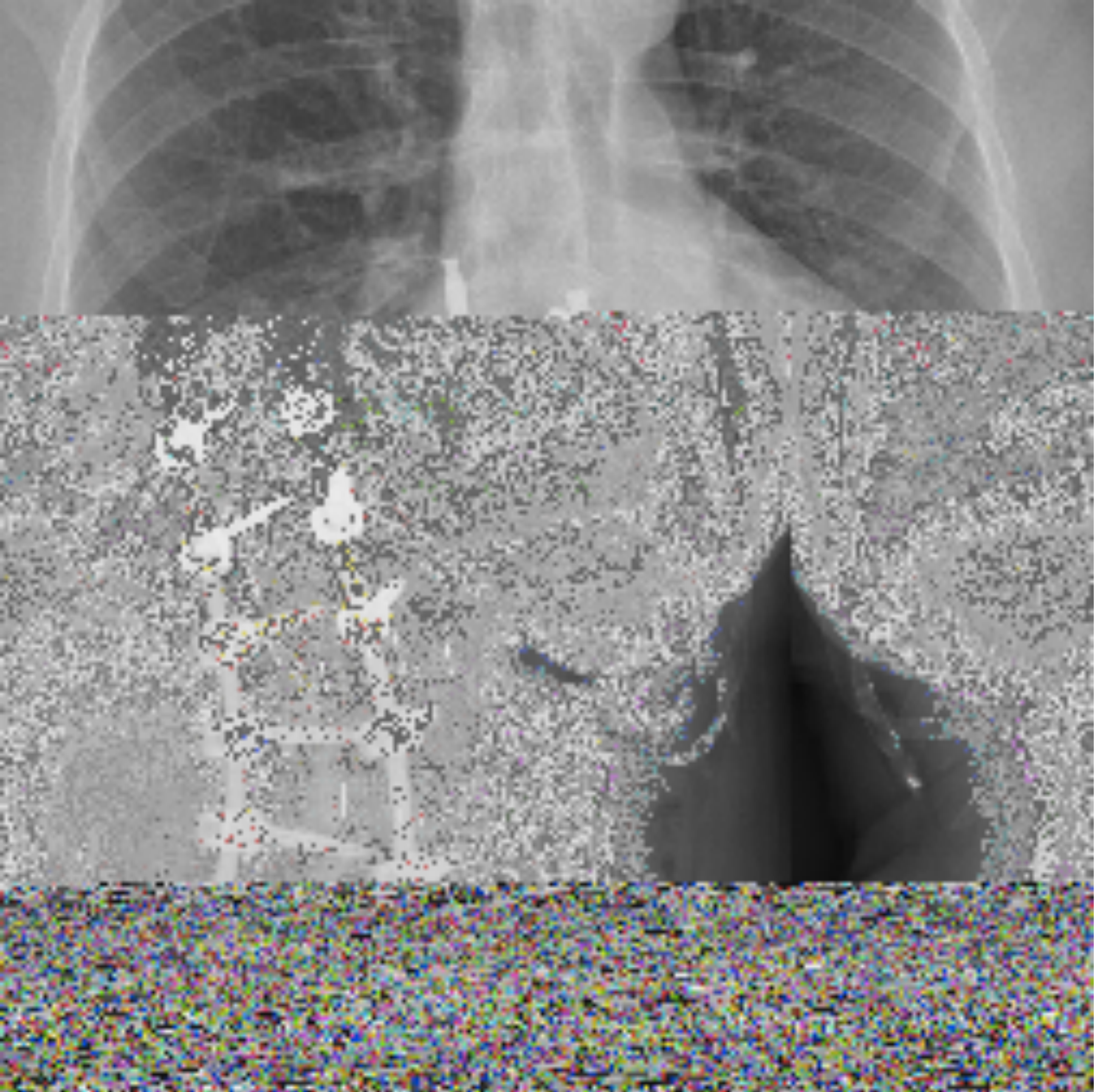

Radiographic characteristics utilized to determine inter body fusion status

Representative radiographic & CT images of patient with pseudoarthrosis; L2-3 pseudoarthrosis suggested by rod fracture across the inter body fusion level; CT demonstrates absence of bridging bone and lucency at graft-vertebral body interface. Red arrows in radiographs indicate rod fracture.

Questions/ Feedback: Please contact
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Thanks !