

# **DISC SPACE PREPARATION FOR TRANSFORAMINAL INTERBODY FUSION USING NOVEL HYDROSURGICAL INSTRUMENTS**

# **OBJECTIVES**

The difficulty of disc preparation for unilateral TLIF using conventional instruments, which results in clearance of only 31% of removable disc material from the contralateral side<sup>1</sup>, is often not fully appreciated. Retained disc material can result in a challenging environment for bone fusion<sup>4</sup> and may lead to increased rates of pseudoarthrosis. The purpose of this study is to evaluate the effectiveness of new hydrosurgical tools in preparing the disc for unilateral TLIF in a cadaver model

# **METHODS**

Disc space preparation for TLIF was performed using a standard midline incision in a human cadaver model by fellowship trained spine surgeons. The hydrosurgical procedure was accomplished with a high-pressure fluidjet system (SpineJet<sup>™</sup> XL, HydroCision, Inc.) and compared to the use of conventional tools. After disc excision, 3x3 grids were superimposed on the endplates for analysis of nine disc space sectors. Endpoints were assessed by an independent evaluator and included: proportion of disc surface area cleared of soft tissue; proportion of available endplate decorticated and prepared for fusion; proportion of endplates preserved; and number of insertions and withdrawals of instruments required to complete the procedure.

# Table 1. Key Findings.

Parameter	Hydro Group	Conv. Group	p-value
Soft tissue removal (% total surface area)	95%	81%	< 0.001
Soft tissue removal (% posterior contralateral sector area)	88%	45%	< 0.001
Endplate prepared/decorticated (% total surface area)	86%	70%	< 0.001
Endplates damage (% damaged)	23%	56%	< 0.001
Instrument insertions and withdrawals per level (n)	36	102	< 0.001

### HYDROSURGICAL TREATMENT





CONVENTIONAL TREATMENT







Figure 3: Difficult Access to Posterior Contralateral Sector (Left) and Endplate Damage (Right)

## RESULTS

In the difficult to access, contralateral posterior quadrant, 88% removal of soft tissue from the available cross-sectional disc area was achieved, while 71% of the available endplate surfaces area was effectively prepared for fusion (see Figure 1). In contrast to hydrosurgical methods, typical conventional disc preparation was markedly restricted in the posterior contralateral quadrant (Figures 1,2). Overall, 60% fewer endplates in the hydrosurgical group showed moderate or severe endplate damage compared to conventional methods. Table 1 reports key findings from hydrosurgical versus conventional disc preparation.

# CONCLUSIONS

Previous work<sup>1,2,3</sup> has demonstrated that conventional instruments allow removal of only 69% of the disc volume considered necessary for adequate fusion preparation, and permit preparation of only approximately 60% of the available vertebral endplate surface area. Hydrosurgical disc preparation using SpineJet<sup>TM</sup> XL offers a promising alternative to conventional instruments.

<sup>1</sup>Javernick MA, Kuklo TR, Polly DW Jr. Transforaminal lumbar interbody fusion: unilateral versus bilateral disk removal--an in vivo study. *Am J Orthop* 2003;32(7):344-8; discussion 348.

<sup>2</sup>Weistroffer J, Manos R, Sukovich W. Transforaminal lumbar interbody fusion: minimally invasive versus open disc excision and endplate preparation. Paper presented at *Society of Military Orthopaedic Surgeons*, Vail, Colorado, December 2004.

<sup>3</sup>Fox B, Hardenbrook M, Manos R, Sukovich W, Weistroffer JK. Lumbar interbody fusion: the significance of endplate preparation. Poster presented at *North American Spine Society*, September 27-October 1, 2005, Philadelphia, Pennsylvania.

<sup>4</sup>Bae HW *et al.* Whitecloud clinical award finalist: cellular environments can alter performance of rhBMP-2 and induce pseudoarthrosis. Paper presented at *International Meeting on Advanced Spine Techniques* (IMAST), July 7-9, 2005, Banff, Alberta, Canada.

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