

# The Impact Of Hydrosurgical Instruments & BMP On Minimally Invasive Lumbar Fusion Outcomes

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**Background Context:** Minimally invasive interbody techniques have become increasingly applied. The difficulties of adequate disc space preparation using the unilateral posterior approach and the resulting negative impact on the environment for fusion have been well documented. To address these challenges, new devices have been developed to improve disc space preparation and biologic materials have been applied.

**Purpose:** The purpose of this analysis is to compare the surgical, functional, pain, and fusion long term outcome data from patients treated by minimally invasive unilateral transforaminal interbody fusion (MITLF) with and without the application of recombinant bone morphogenetic protein (rhBMP-2, INFUSE<sup>®</sup>, Medtronic Sofamor Danek, Inc., Memphis, TN), and with and without hydrosurgical devices (SpineJet<sup>®</sup>, HydroCision, Inc., Billerica, MA)

**Study Design:** This is a non-randomized, prospective series of patients treated by MIS TLIF by a single surgical group, for diagnoses of spondylolisthesis, disc herniations with radiculopathy and/or back pain, and degenerative disc disease in a group with the mean age of 48 years. Minimally invasive TLIF techniques were applied to each case. Variables included use of water-jet technology to prepare the interbody space with standard bone grafts versus the use of BMP.

**Patient Sample:** There were 248 MITLIF's performed with 129 one level and 119 two level cases. Conventional instruments were used in 172 cases, 68 of which received rhBMP. Hydrosurgical instruments were used in 76 cases without rhBMP. Followup period was a minimum of 18 months with a mean of 22 months.

**Outcome Measures:** Fusion rates via CT and dynamic xray were obtained.

**Methods:** Fusion success was assessed at 18 months postoperatively on thin slice CT images by two independent radiologists blinded to the methods and materials used. Additionally, postoperative radiculitis was documented and classified as either immediate, early or late occurring.

**Results:** Radiographic fusion rates were 91.3% for the conventional instruments/no rhBMP group; 96.6% for the conventional instruments/with rhBMP group; and 93.6% for the hydrosurgery group (not statistically significant). Functional (ODI) and pain (VAS) improvements were similar for all groups. Post operative radicular pain (post-surgery and late onset) occurred in 8.7% for the conventional instruments/no rhBMP group; 22% for the conventional instruments/with rhBMP group ( $p = 0.001$ ); and 3.9% for the hydrosurgery group. Reoperations occurred in the follow-up period for 3.8% for the conventional instruments/no rhBMP group; 10.3% for the conventional instruments/with rhBMP group ( $p = 0.048$ ); and 3.9% for the hydrosurgery group.

**Conclusion:** As shown previously, rhBMP can improve fusion rates compared to conventional methods ( $p = 0.045$  in this study). However, no statistically significant improvement is seen when compared to the hydrosurgery group ( $p = 0.142$ ). In addition, the rhBMP group showed significantly higher rates of reoperation ( $p = 0.040$ ) and post operative radicular pain ( $p = 0.001$ ); while the hydrosurgery group had a similar rate of reoperation as that seen with the conventional methods without rhBMP and significantly fewer incidents of post operative radiculopathy ( $p = 0.010$ ) when compared to conventional methods with or without rhBMP.

**FDA Device/Drug Status:** Hydrocision: Approved for this indication.; NA: This abstract does not discuss or include any applicable devices or drugs.; NA: