## Efficacy of the Deuk Laser Disc Repair<sup>™</sup> for the Treatment of Single-Level Cervical Disc Herniation-Induced Radiculopathy and/or Myelopathy: A Retrospective Review of 30 Consecutive Cases.

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Background: Cervical disc herniation, with or without degenerative change, is the most common cause of cervical radiculopathy and myelopathy [x]. If conservative care and injective procedures fail, then surgical decompression may be required. The traditional, gold-standard surgical intervention for such conditions is the anterior cervical discectomy fusion (ACDF), which historically has afforded high fusion rates [x], low revision surgery, and patient satisfaction [x]. However, ACDF is not a panacea as it can result in adjacent segment disc disease (ASDD) with the passage of time, secondary to the perturbation of cervical spine biomechanics[x]. It is know that this phenomenon may necessitate a second surgical procedure at those adjacent levels. To this regard, alternatives to ACDF have been pursued [x] and, after favorable completion of stringent FDA IDE randomizedcontrolled trials [x], the public now has a surgical option that involves the implantation of an artificial cervical disc—i.e., the Prestige ST, Bryan, or ProDisc-C. All of these devices not only decompress and stabilize the target segment, they also (unlike ACDF) preserve target intersegmental motion, which in turn maintains biomechanical normality of the cervical spine. Such preservations have been theorized to reduce the phenomenon ASDD [x], thereby mitigating the need for future second surgery. A final negative attribute of Arthrodesis and ACDF is that the procedures are costly—they involve hospitalization—and carry a relatively long-term period of convalescence [x].

In 2005, Dr. Ara Deukmejian pioneered and patented an endoscopic laser disc decompression technique—the Deuk Laser Disc Repair<sup>™</sup> (DLDR)—that offers a minimally invasive option to both ACDF and arthrodesis for patients with cervical disc herniation-induced radiculopathy and/or myelopathy. In addition to ameliorating patient symptomatology, DLDR is an inpatient procedure that drastically reduces costs and convalescence.

**Study Design**: A retrospective review with two-year follow-up was performed on 30 consecutive patients, all of whom had undergone DLDR as performed by the senior author.

**Objective**: To determine the effectiveness of DLDR with regard to patient satisfaction, return to work, cost-effectiveness, preservation of cervical biomechanics, and prevention of ASDD.

**Methods**: The case files of 30 consecutive patients, all of whom suffered single-level cervical disc herniation-induced radiculopathy and/or myelopathy, were treated by the senior author with DLDR between 2005 and 2007. These files included successfully-completed outcome assessment tools: the Oswestry Disability Index (ODI), SF-36, and visual analog scale (VAS). Also included in the files

were preoperative radiographic assessments (neutral lateral, as well as flexion / extension studies) and a work assessment document.

At a minimum of two years, attempts were made to contact the cohort by mail and telephone. Twenty-eight of the 30 patients were successfully contacted and subsequently reevaluated at one of our medical clinics. Reevaluation included physical examination, repeat radiographic reassessment, completion of the same outcome assessment tools, and work assessment document.

Preoperative data was statistically compared to data collected at the two-year time point by way of Paired t-test.

**Results**: Of the 28 patients available for reevaluation at the two-year time point, there was a significant [x], statistically-verified reduction of patient pain scores; more specifically, the average drop was 61% (pre-VAS mean 7.7, two-year VAS mean (P < 0.01) table 1. There was also a reduction in ODI and SF-36 scores: 65% and 63% respectively. Radiographic assessment revealed no postoperative appearance of ASDD; however, there was a slight diminishment of the average disc height at the surgery level that approached clinical significance (p = 0.12). With regard to intersegmental motion, there was no statistical difference – indicating no perturbation of cervical biomechanics had occurred. Work assessment documentation was also favorable as it revealed a 62% increase in return to work. More specifically, of the patients who were not working preoperatively (n=28), 89% of them (n=25) were working at the two-year time point. And finally, none of the 28 patients required revision surgery.

**Limitations**: This was a retrospective analysis of relatively small cohort (n=30) that did not contain a control group, randomization or blinding.

**Conclusions**: At the two-year time point, this retrospective patient outcome study suggested that the Deuk Laser Disc Repair<sup>™</sup> (DLDR) was an efficacious treatment intervention for single-level cervical disc herniation-induced radiculopathy, with or without myelopathy. Furthermore, the procedure afforded high levels of patient satisfaction, was cost efficient, had a comparatively short convalescence period and produced a high return to work rate. There was, however, the discovery of non-statistically significant disc height loss at the operative level, which may be secondary to the natural progression of disc disease [x] and/or the operative procedure itself. A longer follow-up would be prudent to monitor this phenomenon. Based on the results of this study, a more intricate, randomized-controlled trial should be considered with a larger cohort and longer-term follow-up.

**Keywords**: Deuk Laser Disc Repair,<sup>™</sup> radiculopathy, myelopathy, anterior cervical discectomy fusion, arthrodesis, Bryan, Prestige ST, ProDisc-C.



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