Introduction

Medialized cortical screw fixation has been proposed as a new fixation technique of the lumbar spine for degenerative conditions requiring fusion procedures. This technique allows full decompressive laminectomy and fusion with fixation through a central minimally invasive technique. There has been initial biomechanical testing of this technique demonstrating equivalent pullout strength compared to the Weinstein technique of pedicle screw fixation. This study examines the initial clinical outcomes of this technique, complications, outcomes, and evolution of the technique compared to a matched cohort of patients treated with traditional placement of pedicle screws.

Methods

Retrospective review of prospectively collected data of the first 43 patients treated with cortical screw technique that had completed at minimum 3 months follow up. A matched cohort of 48 patients treated with traditional pedicle screw fixation was compared. All patients were treated with posterior fusion through the facets and a transforaminal lumbar interbody fusion (TLIF) and posterior spinal fusion (PSF) with cortical screw fixation.

Preoperative comorbidities were reviewed. Intraoperative and immediate post-operative complications were recorded. Estimated blood loss was recorded. Clinical improvements were measured with Oswestry disability index and VAS pain scoring.

Results

91 patients were included in the study, 43 patients receiving cortical screw technique and 48 matched controls receiving pedicle screw technique. The average age of all patients was 60.6 ± 14.6 years with no difference in age (p=0.871) between the cortical screw group (62.1 ± 14.9) and the pedicle screw group (59.5 ± 14.4). The groups were also equally matched for gender, BMI, previous surgery and comorbidities. (See chart below) Patients undergoing the cortical screw technique had significantly lower estimated blood loss (190.7 ± 142.2 ml) as compared to the pedicle screw technique (306.4 ± 259.2) (t test, p=0.015). Each group had similar pre-operative and post-operative visual analog and Oswestry disability index scores. Both groups showed a significant improvement in VAS Back, Leg and Oswestry Index Scores pre-operatively to post-operatively. Both groups had similar major and minor complication and non-union rates. Postoperative complications include 1 bone overgrowth from fusion with bone morphogenic protein and 1 nonunion with hardware loosening.

Conclusions

The early clinical application of cortical screw fixation for lumbar fusion for degenerative conditions demonstrates no early hardware failure or hardware related complications. The one non-union with hardware loosening occurred with fixation at the sacrum. The technique and screw choice have been modified.

Findings suggest that in a matched cohort cortical screw fixation had similar VAS Back and Leg and Oswestry Disability outcomes to pedicle screw fixation. In addition, cortical screw fixation had the added benefit of having a significantly lower estimated blood loss. This initial report supports the use of cortical screw fixation for routine use in the treatment of degenerative lumbar conditions.

Significance

Cortical fixation for lumbar fusion in early follow up appears safe and effective in fusion procedures for degenerative conditions.