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Lumbar fixation using the cortical bone trajectory fixation. A single surgeon experience with 3 year follow up

Objective: Pedicle Screw Fixation with a Cortical Bone Trajectory (CBT) has emerged as an effective alternative to traditional techniques of lumbar fusion especially in osteoporotic patients. The proposed benefits of CBT screws include a stronger grip in the elderly and osteoporotic population and low surgical morbidity. We present a prospective study with a 3-year follow-up of 80 patients operated on by the same surgeon.

Material: Method Eighty patients submitted in lumbar fusion using the cortical bone trajectory fixation by the same surgeon were included in the study. The outcomes, Oswestry Disability index (ODI), back pain Visual Analogue Scale (VAS), leg pain VAS, walking distance, opioid use, non-opioid analgesia use and Euroqol 5D-5L index, were measured pre-operatively and during the 1- and 3-years postoperative follow-up visit. Time from surgery, indication for surgery, intervertebral cage insertion, BMI, and their interactions were analyzed as predictors in a separate mixed-effects model for each outcome. We assessed all outcomes as one group of patients but we also elaborate on a classification scheme based on a combination of radiological and dynamical assessment of micro-instability, macro-instability, and Spondylolisthesis.

Results: The relationship between the outcomes and time showed considerable inter-patient heterogeneity, as all intercepts (all $p<.001$) and the linear trend temporal slopes for walking distance ($p=.019$) and non-opioid analgesics use ($p<.001$) varied across patients. The intercepts and the linear trend slopes for non-opioid use were significantly correlated ($p=.039$). Time from surgery significantly predicted all outcomes ($p<.001$). Intervertebral cage insertion was associated with significantly less opioid use ($p=.017$). The indication for surgery significantly modified the effect of time on the ODI ($p=.042$) and the VAS for leg pain ($p=.025$). Moreover, higher BMI was also associated with a significantly steeper linear trend in the VAS for leg pain ($p=.028$). Among patients with microinstability, the linear trend for the Euroqol 5D-5L index was significantly steeper with, rather than without spondylolisthesis ($p=.024$).

Conclusions: In all patients who underwent CBT-based lumbar fusion, there was a steep trend towards improvement in terms of ODI, VAS score for leg pain, and opioid use at 1 year following surgery. Patients with normal BMI and micro-instability alone had a decline in the rate of improvement at 3 years while the rest continued to show improvement at 3 years post-procedure. Spinal fixation and fusion using CBT show satisfactory outcomes. Larger series and a double-blind randomized trial would be helpful for further identifying the pros and cons of this technique.

Keywords: Cortical Bone Trajectory, Spondylolisthesis, Micro-Instability.

Biography

Vasileios Arzoglou is a Consultant Neurosurgeon with interest in Complex Spine Surgery. He has extensive experience in Minimally Invasive Spine Surgery with special interest in Oncology and Minimally Invasive Surgery for short Segment Degenerative Deformities. He is a substantive NHS consultant in the University Hospital of Hull and is the primary investigator for the Masters D2 trial in Hull.

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