Clinical and radiographic outcomes in single-level transforaminal lumbar interbody fusion with polyetheretherketone or porous tantalum cages

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Disclosures: C. Shih: None. C. Lee: None

ABSTRACT INTRODUCTION: The modulus of elasticity of porous tantalum (TM) cage was close to the cancellous and subchondral bone, and its friction coefficient was higher than other cage materials. The porous structures of TM cage act as a scaffold to provide bone ingrowth. A review of published papers demonstrated the bone fusion rate of TM cage was about 90% to 100%. However, there is a paucity of such research about comparison of clinical and radiographic outcomes between polyetheretherketone (PEEK) cages and porous tantalum cages in transforaminal lumbar interbody fusion (TLIF). In this study, we compared the surgical results including the clinical and radiographic outcomes of TM and PEEK cages in a comparable patient collective that was operated under identical operative settings.

METHODS: From Feb., 2013 to Oct., 2015, total 88 patients were included retrospectively under the diagnosis of unilateral foraminal stenosis and received single-level TLIF in our institution. All patients received the standard TLIF procedures: 1. midline skin incision with bilateral Wiltse approach for pedicle screws placement, 2. after adequate decompression of lesion side and appropriate cleaning of the disc and endplates, about 5 cc morselized bone graft was impacted into the disc space,3. then followed with cage implanting and rod fixation. Preoperative and postoperative clinical outcomes were obtained, including visual analogue score (VAS), Oswestry Disability Index (ODI), and EuroQol five dimensions questionnaire (EQ5D). Besides, the radiographic evaluations including peri-cage osteolysis, cage migration and subsidence ratio (Fig. 1), were also recorded at initial post-operative plain films, 6 months later, and one year.

RESULTS SECTION: The baseline characteristics of patients were demonstrated as Table. 1. There were 47 cases implanted with TM cage (group 1), and 41 cases with PEEK cage (group 2). In the clinical outcomes, there were no statistical differences of intra-operative blood loss and surgical time (the blood loss and surgical time of group 1 were 439ml and 232 minutes; the group 2 were 482ml and 230 minutes). The VAS was comparable of the two groups, but the group 2 was superior in ODI than group 1 at one-year follow-up (Table.2). There were no statistically differences in fusion rate and the average subsidence ratio at one-year follow-up (the fusion rate and average subsidence ratio of group 1 were 93.6% and 9.76%; in group 2 were 92.6% and 9.79%). The risk factors of nonunion and subsidence ratio were analyzed, and the statistical results demonstrated the failed fusion was highly correlated with aging; the average age of fusion group was 54.6 year-old, the nonunion group was 70.5 year-old, the correlation coefficient was 0.314, p=0.003. The subsidence ratio was negative correlated with body height, the correlation coefficient was -0.326, p=0.002.

DISCUSSION: Our study demonstrated that the cage materials were not influenced the subsidence ratio and failed fusion. Literature review revealed the one-year fusion rate of PEEK cages was 60-70%. However, in our study, the fusion rate of PEEK cage was 92.6%, and the result was comparable to TM cage. We suggested that appropriate cleaning of the endplates for bone transplant vascularization and routine massive morselized impacting bone graft for the disc space before cage implanting were critical for successful interbody fusion. Our study revealed the major risk factor of failed fusion was aging; it may be related to the decreasing of bone formation. The subsidence ratio was negative correlated with body height, the average body height of our patients with subsidence ratio more than 15% was 154 cm, and that of the others was 161 cm. We supported it may be due to an oversizing cage. The main limitations of this research include its retrospective design, small sample size, and related shorter follow-up period.

SIGNIFICANCE: If an adequately prepared disc space and sufficient morselized bone graft were available, we concluded that clinical and radiographic outcomes of unilateral foraminal stenosis treated with single-level TLIF were similar in these two cages.

REFERENCES:

ACKNOWLEDGEMENTS: I would like to express my sincere heartfelt thanks to my supervisor, Dr. Lee, for his invaluable advice, constant encouragement and precise modification.