Complications Following Anterior Cervical Fusion Using Hydroxyapatite from Long-term Follow-up

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Aims: Using strut iliac bone to perform anterior cervical fusion (ACF) is a standard method. We started ACF using hydroxyapatite ceramics (HA) to prevent donor site complications in 1992. There have been several reports concerning the complications on the use of HA in ACF. The purpose is to evaluate the clinical and radiographic complications of ACF with HA from long-term follow-up and to confirm the efficacy of HA for ACF.

Methods: Group 1 included 89 patients that underwent ACF using HA without anterior plate. Group 2 included 34 patients that underwent ACF using HA with anterior plate. The average age and follow-up period of group 1 were 54 years and 9 years (> 7 years). Those of group 2 were 61.4 years and 8 years (>7 years). Radiographic complications involved pseudoarthrosis, subsidence of grafted HA, clear zone around HA, changes of lordotic angle of the fused segment, displacement and crack of HA. Clinical complications involved infections, neurological deteriorations and re-operations. Pseudoarthrosis was determined when there was anterior or posterior displacement more than 1.0 mm and/or change of lordotic angle of the fused segment more than 3 degrees by flexion and extension views. Subsidence of grafted HA was measured as the loss of height of fused segment. All cases without anterior plate used Philadelphia collar for two -three months.

Results: In group 1, 5.6% cases showed clear zone around HA without instability. 94.3% cases showed solid fusion without clear zone around HA and instability. 56% cases had subsidence of HA with an average of 1.6 mm (range, 1-3 mm). 13.4% cases revealed decrease of lordotic angle of the fused segment with an average of 2.8 degrees (range, 1-4 degrees). Cracks of HA were recognized in 15.7%. No collapse and no displacement of HA were observed. Two cases with postoperative hematoma and infection needed re-operation. In group 2, 100% cases showed solid fusion without instability and clear zone around HA. There was no case with crack of HA and screw breakage. 23.5% cases had subsidence of HA with an average of 1.7mm (range, 1-4 mm). No case showed loss of lordotic angle of the fused segment. There was no case with infections and neurological deterioration. One case with 3-level ACF that had screw back out immediately after surgery needed re-operation by bending the plate. Recovery rates of group 1 and group 2 were 63.6% and 61.9% respectively.

Conclusions: We showed the long-term outcomes of ACF with HA. Both groups had no serious clinical complications and revealed satisfactory neurological recovery rate. Using anterior plating for ACF with HA predominantly decreased subsidence rate of HA and loss of lordotic angle of the fused segment. In addition, the use of anterior plate prevented cracks of HA. Crack of HA is a new complication not seen in standard ACF using iliac bone. But, those cracks of HA have never produced pseudoarthrosis and re-operation. Long-term results of ACF using HA with or without the use of anterior plate were excellent. We conclude that our method is both a safe and a less invasive method of ACF that brings no complications of donor site.