

Effects of endplate coverage and intervertebral height change on heterotopic ossification following cervical disc replacement

Abstract

Background: Biomechanical factors including endplate coverage and intervertebral disc height change may be related to heterotopic ossification (HO) formation after cervical disc replacement (CDR). However, there is a dearth of quantitative analysis for endplate coverage, intervertebral height change and their combined effects on HO.

Methods: Patients who underwent single-level or two-level CDR were retrospectively reviewed. Radiological data, including the prosthesis-endplate depth ratio, intervertebral height change, posterior heterotopic ossification (PHO) and angular parameters, were collected. Logistic regression analysis was used to identify the potential risk factors. Receiver operating characteristic curves were plotted and the cutoff values of each potential factors were calculated.

Results: A total of 138 patients with 174 surgical segments were evaluated. Both the prosthesis-endplate depth ratio ($P<0.001$) and postoperative disc height change ($P<0.001$) were predictive factors for PHO formation. The area under the curve (AUC) of the prosthesis-endplate depth ratio, disc height change and their combined effects represented by the combined parameter (CP) were 0.728, 0.712 and 0.793, respectively. The risk of PHO significantly increased when the prosthesis-endplate depth ratio $< 93.77\%$ ($P<0.001$, OR=6.909, 95% CI 3.521-13.557), the intervertebral height change ≥ 1.8 mm ($P<0.001$, OR=5.303, 95% CI 2.592-10.849), or the CP representing the combined effect < 84.88 ($P<0.001$, OR=10.879, 95% CI

5.142-23.019).

Conclusions: Inadequate endplate coverage and excessive change of intervertebral height are both potential risk factors for the PHO after CDR. The combination of these two factors may exacerbate the non-uniform distribution of stress in the bone-implant interface and promote HO development.

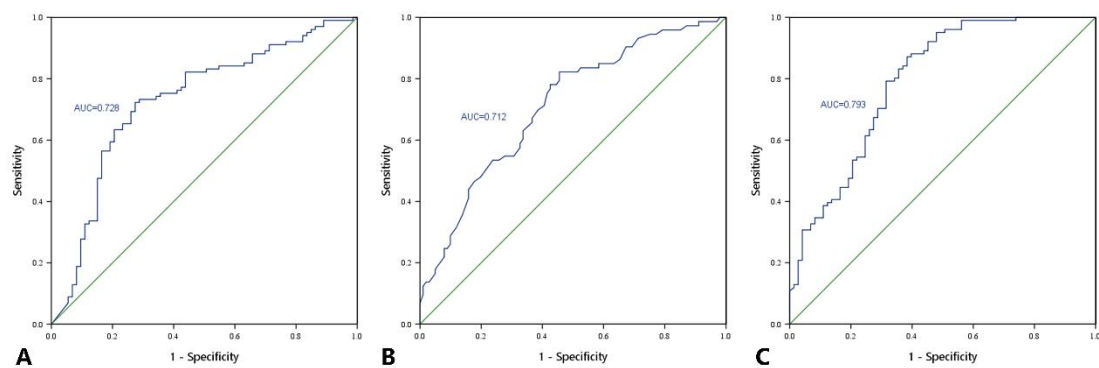


Fig. 1 ROC curve of prosthesis-endplate depth ratio (A), intervertebral height change (B), and CP (C) for the prediction of posterior heterotopic ossification. The AUC are 0.728, 0.712, and 0.793, respectively. ROC curve, receiver operating characteristic curve; CP, combined parameter; AUC, area under the curve.