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RADIOLOGICAL EVALUATION OF CIRCLE OF WILLIS AND VERTEBRAL ARTERIES IN RA CERVICAL SPINE : A COMPARISON OF THE CASES WITH AND WITHOUT RA

Introduction

Cervical pedicle screw provides rigid fixation even in fragile bone including RA, however, it is risky for some patients with small pedicles or anatomical variations in vertebral arteries (VA) and circle of Willis (CW). In addition, vertebral artery hypoplasia has been considered as a risk factor of posterior circulation ischemia. The purpose of this study was to reveal characteristics of VA and CW in RA cervical spine using magnetic resonance angiography (MRA).

Materials and Methods

51 RA patients who underwent cervical reconstruction and 77 non-RA patients were reviewed. All non-RA patients presented cervical spondylotic radiculopathy or myelopathy. The mean ages of RA and non-RA group were 65.4 years and 52.4 years, respectively. ALL subjects underwent three-dimensional time-of-flight MRA of the CW and VA at 1.5T system. CW was classified as incomplete type when either anterior or posterior configurations demonstrated a deficient vessel segment. Asymmetric VA was defined as: diameter of the recessive side < 70% of the dominant side. Frequency of the incomplete type and lack of bilateral posterior communicating arteries (PCoAs) were evaluated. Also, incidence of asymmetric VA was examined. These results were compared between two groups.

Results

Compared with non-RA patients, RA patients demonstrated significantly higher incidence of asymmetric VA (61% versus 29%, $P<0.01$), and the asymmetric VA combined with lack of bilateral PCoAs (24% versus 5%, $P<0.01$). There is no difference in the frequency of incomplete type (68% versus 52%), and lack of bilateral PCoAs (35% versus 25%) between two groups.

Conclusion

The CW is considered an important collateral pathway in maintaining adequate cerebral flow in patients with bilateral VA occlusion. The incidence of asymmetric VA was higher in RA patients compared to non-RA patients. Importantly, the incidence of asymmetric VA combined with lack of bilateral PCoAs is as high as 23% in RA patients, which may result in fatal complications in case of intraoperative VA injury on the dominant side. Therefore, preoperative planning should be carefully performed especially in RA patients.