Imaging Diagnosis of Atlanto-occipital Joint and Surgical Planning for Craniocervical Instability in Rheumatoid Arthritis

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INTRODUCTION: High cervical articulations are easily involved in rheumatoid arthritis, and the pathology or surgical treatment for atlantoaxial instability has been reported by many authors in the past. On the other hand, the pathological status of the atlanto-occipital (C0-C1) joint has not received much attention. Atlanto-occipital joint is also a significant component of the cranocervical junction, and lesions at this articulation must not be overlooked to recognize the true cause of craniocervical vertical subluxation (VS). The purpose of this study is to identify atlanto-occipital (C0-C1) joint pathology in rheumatoid cervical disorders and to utilize the obtained information for surgical planning.

METHODS: Seventy cervical spine surgery cases were retrospectively reviewed. (Surgical method: atlantoaxial arthrodesis; 16, occipito-cervical fusion; 16, occipito-thoracic fusion; 35, multilevel laminoplasty; 3) Coronal and sagittal laminogram, multidirectional reconstruction CT, and MRI at the craniocervical junction were examined pre-operatively to search for the pathology of O-C1 articulations. In VS cases, sequential lateral views of plain X-rays of the cervical spine during pre-op. direct skull traction were also examined to detect which parts were reduced.

RESULTS: Coronal tomograms or coronal reconstruction CT at the craniocervical junction are useful tools for identifying craniocervical pathology, and they revealed several types of atlanto-occipital abnormalities including erosion of joint surface, enlarged joint space, cystic lesion of lateral mass or condyle, lateral slip of occiput on atlas, bone loss of joints, and ankylosis. Coronal or axial MRI also showed abnormal synovitis of C0-C1 or C1-C2 joints, and its compression to the neuroaxis were demonstrated. C1-C2 joint abnormalities were revealed in all VS cases, half of which also had various types of C0-C1 lesions. In VS cases, pre-op. vertical realignment (reduction) by direct skull traction was achieved at C0-C1 in 35% of the cases and at C1-C2 in 46%, thereby providing clues to the main levels of pathology in VS cases.
DISCUSSION & CONCLUSION: In rheumatoid patients, VS is a terrible instability which makes the patient bedbound. In addition, stabilization and fusion from the occiput are not so easy in patients with severely eroded C0-C1 joints and poor general condition. For these reasons, craniocervical lesions including C0-C1 joint pathology should be accurately identified in every patient with a rheumatoid disorder of the cervical spine, and consideration given as to how to prevent vertical subluxations. In stabilization surgery at high cervical area, surgical options should be based not only on the atlantoaxial pathology but also on the pathology of C0-C1 joint.

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