Evaluation of the Temporomandibular Joint by Using 4 Dimensional MRI Part 2: Optimum Contrast of Imaging Characteristic by Examination of the Signal Intensity, SNR and CNR

Namrath Chatchaiyan

The Nippon Dental University School of Life Dentistry at Niigata, Japan

**Purpose:** Recently, Magnetic Resonance Imaging Technique is remarkably progressive. Temporomandibular joint (TMJ) can be observed during mandibular opening and closing movement. We used 4 Dimensional MRI Technique to describe the movement by taking the image of opening and closing mouth 1 time, for evaluation of the temporomandibular joint.

The purpose of this study was to establish the optimum contrast of the imaging characteristic of 2 Dimensional MR Fluoroscopy and 4 Dimensional MRI techniques with True-FISP sequence, by examination of the signal intensity and the contrast of TMJ structures on the imagings, for evaluation of the TMJ.

**Materials and methods:** This study examined in 3 joints from 3 subjects. All subjects had no abnormality in temporomandibular function. MRI examinations were performed on a 1.5 Tesla MR System (Philips Company) with a phased array coil. The images were acquired using 2 Dimensional MR Fluoroscopy technique with True-FISP sequence. Sagittal images of each TMJ were taken in the closed mouth position, obtained by setting various Flip angles with 10-degree interval between 10 degree and 100 degree. The contrasts of the images were evaluated in 4 main anatomical structures of TMJ; Intermediate zone of articular disc, Bilaminar zone, Condylar head, and Lateral Pterygoid muscle, with graph of signal intensity, graph of Signal-to-Noise Ratio (SNR), and graph of Contrast-to-Noise Ratio (CNR).

**Results:** Main anatomical structures of TMJ had the highest signal intensity at Flip angle 30 degree. Graph of SNR showed the peak at Flip angle 30 and 40 degree. CNR of articular disc and related structures showed high value in all 3 points at Flip angle 40 degree. On visual evaluation, 4 anatomical structures of TMJ were also distinguished on the imaging at Flip angle 40 degree.

**Conclusion:** These results suggest that at Flip angle approximate 40 degree is suitable for obtaining the optimum contrast of imaging characteristic for evaluation of the temporomandibular joint region by using 4 Dimensional MRI technique with True-FISP sequence.