

Department of Dentistry

Katsuhiko Hayashi, *Professor*
Takeshi Takayama, *Assistant Professor*

Shigeru Suzuki, *Associate Professor*

General Summary

1. Measuring the condylar height in patients with anterior disc displacement (ADD) without reduction using panoramic radiographs
2. Quantitative analysis of a new anatomical indicator of articular surface of condyle (ASC) in the diagnostic image
3. Clinical study of oral appliance (OA) in the treatment of obstructive sleep apnea (OSA) in our hospital

Research Activities

Measuring with panoramic radiographs of condylar height in patients undergoing ADD without reduction

The condylar height of affected side was significantly lower than on the unaffected side in patients who have ADD without reduction.

The aim of the study was to measure the condylar height with panoramic radiographs in patients without osteoarthritis who had undergone ADD without reduction (208 patients, 416 joints). These diagnoses were confirmed with magnetic resonance imaging at the Department of Oral and Maxillofacial Radiology and Diagnosis in Tsurumi University Hospital. We quantitatively and statistically compared differences of right and left condylar heights of these patients. We found that condylar height was significantly lower on the affected side than on the unaffected side. According to the study, panoramic radiographs are useful for screening patients who have undergone ADD without reduction.

Quantitative analysis of a new anatomical indicator of the ASC (anterior condylar ridge) in the diagnostic image.

The ASC is a site where morphological changes occur in temporomandibular disorders, but its anatomical indication is unclear. The anterior edge of the ASC coincided with the anterior part of the condyle on the basis of double-contrast enhanced computed tomography (CT) of the temporomandibular joint (TMJ) and has been named the “anterior condylar ridge.” The aim of the study was to quantify the position of the anterior condylar ridge with sagittal CT images of the double-contrast enhanced CT of the TMJ.

The joints of 20 patients (3 male and 17 female, age, 13 to 59 years; median age, 28 years) were examined through double-contrast enhanced CT of the TMJ. The reconstructed sagittal images were used to mark the mandibular condyle attachment in the lower joint space. As a position by the bone morphology, we drew a perpendicular line from the connecting line between the lowest point of the eminence and the tympanic fissure (posterior process) to the anterior part of the condyle; this line was marked as the

anterior edge of ASC. The distance between the these marked points were measured twice by 2 observers on different dates, and statistical processing was performed on its reliability.

As a result of measurements by the 2 observers, the intraclass correlation coefficient within the 2 observers was 0.994 to 1.000. In addition, the intraclass correlation between each of the 2 observers was as high as 0.996, which means that the measured values are reliable.

The mandibular condyle attachment in the lower joint space and the anterior ridge of the condyle showed almost the same position on the image, and the anterior condylar ridge was suggested to be an effective index for image diagnosis.

Clinical study of OA in the treatment of OSA in our hospital

We perform OA treatment for patients with OSA in cooperation with the departments of otolaryngology, psychiatry, and respiratory medicine in dentistry of The Jikei University School of Medicine. We conducted a clinical study to clarify the characteristics of patients with OSA when OA treatment has problems.

The subject consisted of 146 patients who we treated with OA for 5 years from January, 2014 through December 2018. The OSA had been diagnosed at specialized medical institutions. We examined sex, age, severity of the sleep breathing disorder, treatment regimen, and treatment effect.

Of the 146 patients, 116 were men and 30 were women. Of the patients, 73% were aged 40 to 69 years. The severity of OSA was mild in 42 patients, moderate in 70 patients, and severe in 34 patients. The treatment regimen was OA only in 127 patients, of whom 9 had discontinued continuous positive airway pressure (CPAP) treatment, and a combination of OA and CPAP in 19 patients. Of all patients who had undergone OA treatment, 32 (22%) never visited the hospital for follow-up, and 65 (44%) underwent polysomnography for determining effects. The OA treatment was considered to have been effective if the apnea-hypopnea index (AHI) became less than 5 times/hour or became less than 50% of that before treatment. Therefore, OA treatment was considered effective in 43 patients (66%) of 65 patients who underwent polysomnography.

In the comparison of AHI before and after OA treatment, AHI decreased significantly in all severity. When the multiple imputation that considered missing values as a sensitivity analysis was performed, the results were similar.

About 20% of the whole never visited the hospital for follow-up, and less than half of the whole underwent PSG for determining effects. Therefore, it is important to patients that we enlighten the need of a follow-up and determining effects effect for OA treatment. AHI before and after OA treatment significantly decreased and we confirmed high usefulness of the OA.