The Temporomandibular Joint Survey by Orthopantomo N-70

by

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Introduction

Recent progress in orthopantomography has made the diagnosis of TM joints easy and accurate. The great advantage of an orthopantomogram lies in the fact that the occlusal relations and functions as well as state of these joints can be observed at the same time. It is to be admitted, however, that findings concerning the TM joint on an orthopantomogram vary in terms of accuracy and clarity from individual to individual under survey, from mechanism to mechanism, etc.

From these considerations, the Department of Radiology, Nihon University School of Dentistry, Tokyo, Japan, concerned themselves with the development of Orthopantomo N-70 and, by the use of this newly developed mechanism, efforts have been made to refine standardized technique for TM joint radiography.

Material and Method

2.1 Positional relationship between Orthopantomo N-70 and TM joints.

The tomographic layer installed in this mechanism consists of part of two large arcs for the curved surface tomography of molars and part of somewhat smaller arc for the tomography of anteriors combined, as shown in Fig. 1. Because of this arrangement, in the routine positioning right and left mandibular processes correspond to a position a little outside respective tomographic areas (Fig. 2.1).

2.2 Special positioning for standardized TM joint.

When orthopantomography is attempted in the routine original positioning, pyramidis inside the temporomandibular joint in the Japanese of average constitution tends to be clearer than the rest and, for this reason, the joint structure itself will be obscured. Therefore, a special positioning is called for to obtain an accurate orthopantomography of the joint.

As a positioning benchmark, we selected the maximum width between right and...
left molars within the tomographic area, i.e., at a position of 67mm posteriorly from the front tomographic circle, and a subject placed at this position was made to incline anteriorly (Fig. 2.2). But even with the anterior transposition only parts of the right and left mandibular processes came within the scope of tomographic area, hence an imperfect image. Accordingly, the condyle to be projected was further biased inward to about 10mm by keeping it in parallel to the median sagittal plane. By this procedure, the condyle could be successfully brought into the scope of tomographic area (Fig. 2.3).

2.3 *Ear-rod adaptor.*

The Orthopantomomo N-70 incorporates the cephalostatic apparatus as one of its basic constructions. The ear-rod for the cephalostat is made of transparent acrylic resin. An adaptor for this ear-rod for the purpose of special positioning above has been manufactured from dental self-curing resin (Fig. 3).
Findings

3.1 Basic experiments.
With the mandible of a Japanese adult skull with the average constitution, 1.0mm metallic wires were respectively pasted on the outside of short axis of mandibular condyle, center and inside. Some elastic plates of a uniform thickness were placed between its articular surface and the condyle and thus rendered firm. On the orthopantomograph of the skull taken in this manner, a central image of the mandibular condyle could be clearly obtained for a satisfactory interpretation of an object structure.

3.2 Clinical findings.
Randomly selected 20 students at Nihon University School of Dentistry were subjected to the orthopantomography in this method (Fig. 5-A, -B and -C).
Necessary measurement benchmarks are given in Fig. 4.
Two orthopantomographs taken of each subject by appointment were traced on acetate sheet. The following differences between the measurements at first and second orthopantomograms were noted.

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The differences between measurement data were further subjected to t-test ($\alpha = 0.05$). However, the difference was not statistically significant.

**Discussion**

With orthopantomography, it is absolutely necessary that the center of temporomandibular joint should be positioned inside the tomographic area. As a practice, the orthopantomographs often become obscure because of difference in the TM joint structure and individual forms. Therefore, the establishment of a standardized technique is called for, by means of which it is possible to obtain accurate orthopantomographs on great part of subjects.
In orthopantomographing the TM joint, TAMMISALO[1] of Finland reported that a favorable result could be achieved at a position of 70mm anteriorly to the standard position. YAMANO[2] of our Department established a standardized technique for pantomography and constructed mathematical formulae for the movement of jaws. In the present study, the measurement of TM joint image followed the method proposed by LUNDBERG and WELANDER(4).

RICHARDSON, LANGLAND and SIPPY[3] equipped the orthopantomographic apparatus with a cephalostat of their own invention and thus standardized the positioning technique.

The authors drew heavily on the achievements of those investigators and tried to establish a standardized technique applicable to the Orthopantomo N-70. The method of the authors is somewhat different from that of Tammisalo but the concept of positioning the TM joint in the tomographic area is identical. Radiographic effects are also quite similar.

**Conclusions**

The study using the Orthopantomo N-70 for the radiography of TM joints elicited the following conclusions.

1. Different orthopantomographic apparatus have different tomographic area. For this reason, it is necessary to find out optimal conditions for a given apparatus and then establish a standardized technique for it.

2. With the Orthopantomo N-70, the center of mandibular condyle is transpositioned posteriorly to 67mm from the central portion of front tomographic area, and the mandibular region on the part of a subject is biased to the median sagittal plane by 10mm from what is normally used as a routine radiography.

**References**