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two methods may be used to determine whether an adequate interocclusal distance is present.

Observation

The patient is instructed to relax the lower jaw, lightly touch the lips together, and remain in this position while the lips are separated and the distance or lack of distance between the occlusion rims or artificial teeth is observed. When the lips are separated, a space of approximately 3 mm should be observed between the occlusion rims or artificial teeth (Fig. 1). Frequently, a patient will either open when the dentist is parting the lips or will keep the lips tense. When this happens, the procedure must be repeated a few times to enable the patient to relax and cooperate.

Movement of the mandible

While the patient is standing, he should be instructed to relax the lower jaw and lightly touch the lips together. With the mandible at the physiologic rest position, the patient should then be instructed to lightly close together until the occlusion rims or artificial teeth make contact. While the patient is closing, the lower border of the mandible is observed to see if there is movement from the rest position to physical contact (Fig. 2). If no movement of the mandible is observed, there is insufficient interocclusal distance, and the vertical dimension of occlusion should be reevaluated.

The closest speaking space is defined as the distance between the occlusion rims or artificial teeth when the patient is saying words that contain the sounds \(/s/\) or \(/\text{ch}/\). There should be a minimum of 1 to 2 mm of clearance between the occlusion rims or artificial teeth when the patient is making sounds which contain the letters \(/s/\) or \(/\text{ch}/\) (Fig. 3). Having the patient read aloud or count will also help in evaluating the closest speaking space.

If the teeth or rims contact during speech, the vertical dimension of occlusion is too great. However, if more than 1 to 2 mm of posterior speaking space exists, it does not automatically follow that the opening should be increased. The closest speaking space at the correct vertical dimension of occlusion for certain Class I and many Class II patients may be greater than 1 to 2 mm. When the closest speaking space is used to evaluate vertical dimension, the important feature is
that the teeth should not touch at any time during speech.

The use of speech to determine anterior tooth position and vertical dimension of occlusion has been discussed by Pound.8

When evaluating facial measurements, a few minutes should be spent observing and talking with the patient.

ACCURACY OF TWO METHODS USED TO DETERMINE VERTICAL DIMENSION OF OCCLUSION

As discussed by Smith,7 the Sorenson Profile Scale and chin-nose measurement using a millimeter ruler and tongue blade are two simple methods of determining and evaluating vertical dimension of occlusion that

The patient should be comfortable and should not exhibit any facial strain (Figs. 4 and 5). It is also helpful to question the patient about the comfort of the vertical dimension of occlusion that has been determined. This is not a time to be in a hurry; input from the patient at this time can prevent a multitude of future problems.
can be used to record a preextraction measurement of vertical dimension of occlusion for patients who are having immediate dentures made.

To test the accuracy and repeatability of these two methods, a group of 13 patients who were treated with at least one arch of an overdenture, were observed over a 2-year period. Any changes in the periodontal health of overdenture abutments, incidence and control of caries, and changes in the vertical dimension of occlusion were observed. At each appointment, the vertical dimension of occlusion was measured by having the patient bring the posterior teeth lightly together in centric relation and checking with the Sorenson Profile Scale and the chin-nose method.

The Sorenson Profile Scale measurement was taken by placing the nasion locator of the instrument firmly in the depression at the bridge of the nose and raising the chin seat until it lightly touched the most inferior and anterior border of the chin. The measurement was made to the nearest 0.5 mm (Fig. 6).

The chin-nose distance was determined by placing a plastic ruler under the base of the nasal septum and placing a tongue blade at a right angle to the ruler and bringing the tongue blade into light contact with the most inferior part of the chin (Fig. 7) The distance was recorded to the nearest 0.5 mm. All measurements were made independently, without prior knowledge of previous measurements from other examinations.

In addition, a cephalometric roentgenogram was completed at each recall examination using a standardized cephalometer. Each patient was instructed to have the posterior teeth in light contact while the roentgenogram was made.

The measurements from the cephalometric films were made between the nasion (nasofrontal suture)
and the menton (most interior point on the symphysis of the mandible) (Fig. 8). The films were perforated at these points, and a dial caliper measuring device was used to estimate the distance to the nearest 0.1 mm. To control tracing errors, the film for each patient was traced on semitransparent acetate paper using structures of high contrast such as the body of the mandible, base of skull, and the sella turcica as guides. The point nasion was punctured using a sharp point, and the point menton was registered using the mandible and symphysis as guides for placing the film.

The measurements taken from the cephalometric films and the measurements obtained by using the Sorenson Profile Scale and chin-nose distance were compared using the Pearson Correlation Coefficient and Student t-test.

RESULTS

Table I shows the decrease in millimeters of the vertical dimension of occlusion as measured by each of the methods described previously. The algebraic differences between the chin-nose and cephalometric measurement and the Sorenson Profile Scale and cephalometric measurement are shown parenthetically in each column.

Table I also shows the arithmetic mean error between the chin-nose and cephalometric measurement and the Sorenson Profile Scale and cephalometric measurement. The mean errors of the chin-nose and Sorenson Profile Measurements were computed to determine how close they were to the cephalometric measurements regardless of whether they were plus or minus.

The Pearson Correlation coefficient showed a significant correlation between the chin-nose and cephalometric measurement (0.4; \( P < .02 \)) and a highly significant correlation between the cephalometric and Sorenson Profile Scale measurements (\( P < .0001 \)).
DISCUSSION

Considering that the measurements were taken at yearly intervals, the measurements taken from both the Sorenson Profile Scale and the chin-nose methods were within reasonable limits when compared to the cephalometric films. It did not require a great amount of time to take the measurements. The chin-nose method of measuring vertical dimension of rest and occlusion is convenient, accurate, and practical because it requires no sophisticated or expensive equipment and is easily mastered.

Smith7 found that both the Sorenson Profile Scale and the chin-nose measurements were reliable methods to record a preextraction vertical dimension of occlusion. The chin-nose measurement was recorded in an average of 1.6 minutes,7 which was the approximate length of time used to record vertical dimension of occlusion in this study.

The measurement is difficult to record when a patient has a round facial profile or facial hair. In these situations, it is difficult, if not impossible, to place the tongue blade and millimeter ruler with consistent accuracy. The measurements are more consistent and accurate with patients who have a flat facial profile and absence of facial hair.

CONCLUSIONS AND SUMMARY

Two methods of determining vertical dimension of rest and occlusion were compared with measurements taken from cephalometric films to determine their reliability and accuracy. Both methods using the chin-nose and Sorenson Profile Scale measurements were reliable in recording preextraction vertical dimension of occlusion. The chin-nose measurement is convenient and one of its primary advantages is that the measurement is not taken from chin tissue, which is movable.

Regardless of the method used to record measurements, they should be evaluated by observing adequate interocclusal distance, closest speaking space, and absence of facial strain or patient discomfort.

REFERENCES


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