THE SPEAKING METHOD IN MEASURING VERTICAL DIMENSION

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THE exact measurement of the natural vertical dimension is most essential in the successful practice of many phases of dentistry. It has been found that the greatest cause of full denture difficulties is the failure to duplicate the normal vertical dimension. In occlusal reconstruction, many fine dentists have found, through experience, that increasing the vertical dimension for patients with supposedly shortened vertical dimension ended in failure.

The dental profession realizes that it has never had an accurate, scientific, and practical method with which to measure the patient's natural vertical dimension. It is now possible by the use of the speaking method to measure a patient's vertical dimension *before* the loss of the remaining natural teeth, and to record this in terms of millimeters, and to reproduce this measurement in full dentures at a later date. The terminology of the initial report[1] has been simplified to describe the same method of measuring vertical dimension. The revision of the dental terminology helps to avoid the present-day confusion in the study of vertical dimension and jaw relationship.

It is now possible to prove scientifically by the speaking method that vertical dimension must not be increased.[2] Those dentists who reconstruct the occlusion of patients will generally find that failures can be avoided by completing the treatment without the increase of vertical dimension. If this dimension should be increased, this treatment must be based on scientific proof and not on the opinion of the operator.

THE SPEAKING METHOD

The method of measuring vertical dimension is discussed in order to present the practical means for its use. The patient is seated in an upright position (Fig. 1) without the use of the headrest, with the eyes forward, and the occlusal surfaces of the upper posterior teeth parallel to the floor. The measurement is taken under identical conditions of posture and vigor of speech. The head must not tilt forward or backward, and the patient should speak rapidly in a calm and relaxed manner. A particular observation must be made that the patient does not consciously control the movement of the mandible, as any variation from normal might affect the measurements.

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Direct the patient to close into centric occlusion, with the upper and lower teeth together in maximum occlusal contact. Draw the centric occlusion line (Fig. 2) with a sharp pencil on a lower anterior tooth at the horizontal level of the incisal edge of the opposing upper anterior tooth.

Have the patient say "yes," and while the phonetic sound *s* is being pronounced, draw the closest speaking line (Fig. 3) on the same lower anterior tooth

Fig. 1.—Position of patient when measuring vertical dimension with the speaking method.

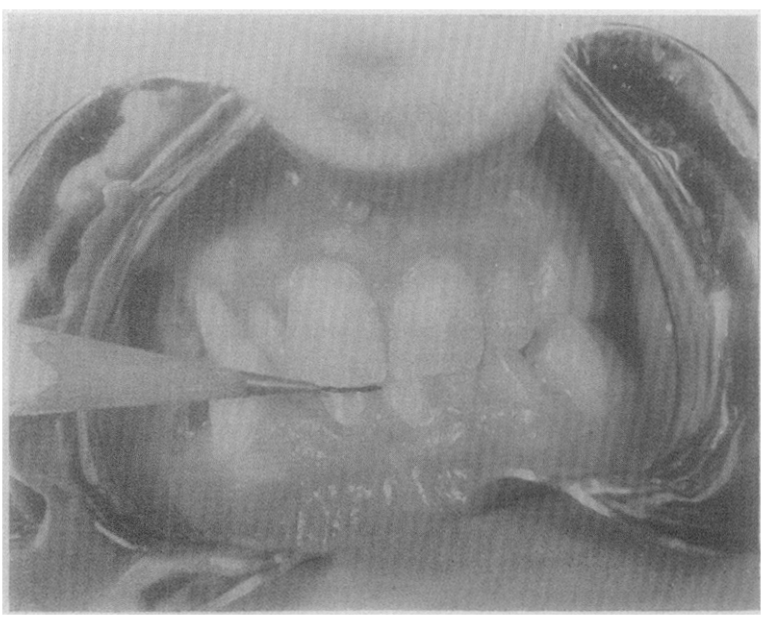

Fig. 2.—Marking the centric occlusion line on a lower anterior tooth while the teeth are closed together in centric occlusion.

at the horizontal level of the upper incisal edge. The distance between the centric occlusion line (lower line) and the closest speaking line (upper line) is called the closest speaking space. This closest speaking space is the measurement for vertical dimension.

In some patients, the mandible will move forward during the pronunciation of some or all speech sounds.[1,3] This forward movement will not affect the accuracy of the measurement because the same movement occurs, and the vertical distance between the lines is always remeasured in the same manner with both natural and artificial teeth.

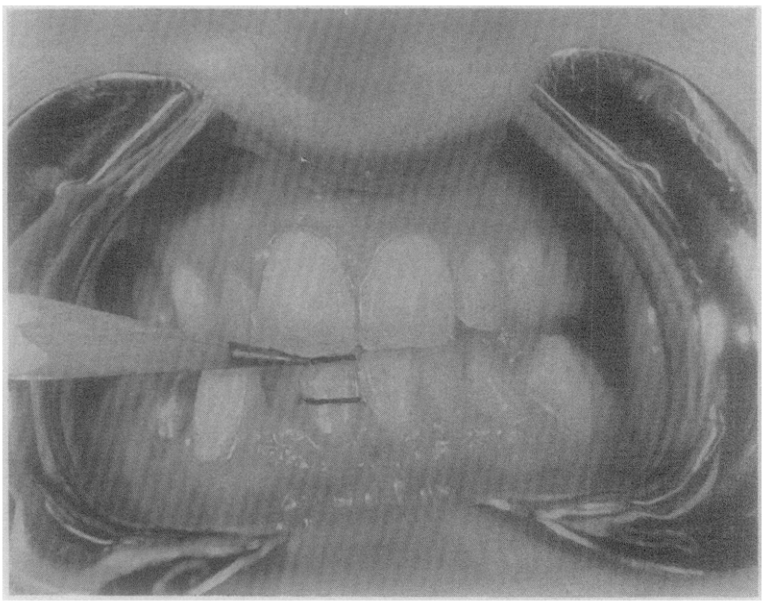

Fig. 3.—Marking the closest speaking line while the patient pronounces a word with one of the sibilants, like *s* in *yes*. The distance between the (lower) centric occlusion line and the (upper) closest speaking line is the closest speaking space. This space is the measurement of vertical dimension.

The closest speaking space may vary in different individuals. In the series of patients examnied,[1] the measurements ranged from 0 to 10 mm., which proves that there is no such thing as "an average" in measuring vertical dimension. Measurement must be made with accuracy as it has been found that increasing the vertical dimension only one millimeter will cause discomfort to the patient.[2] The closest speaking space has been found to be constant in each individual, in patients observed since February, 1950. It is felt that the closest speaking space should be constant throughout life. Records are being kept to determine the accuracy of this supposition. This belief may be accounted for by the "all or none law" of muscle physiology which states that each muscle fiber is in maximum contraction during the stimulus of function. Because this system of measuring vertical dimension is based on physiologic function of muscles while used in speak-

ing under similar conditions, the same levels of the mandible are caused by maximum function of the specific muscle fibers involved.

Out of the 44 phonetic sounds of the English language, one or more of the six sibilants s, z, sh, zh, ch, and j in such words as ye*s*, bu*zz*, fi*sh*, mea*s*ure, *ch*ur*ch*, and *j*ud*g*e are the sounds which cause the closest level of the mandible to the maxilla while speaking, in 90 per cent of the cases surveyed. In the exceptional cases where other sounds caused the closest level, it was found that the sibilants caused a constant and accurate level of the mandible in relation to the maxilla. The remaining of the 44 phonetic sounds caused wider spaces between the mandible and the maxilla, but through experience of making over 10,000 measurements, it was found that these wider levels were not constant nor accurate and

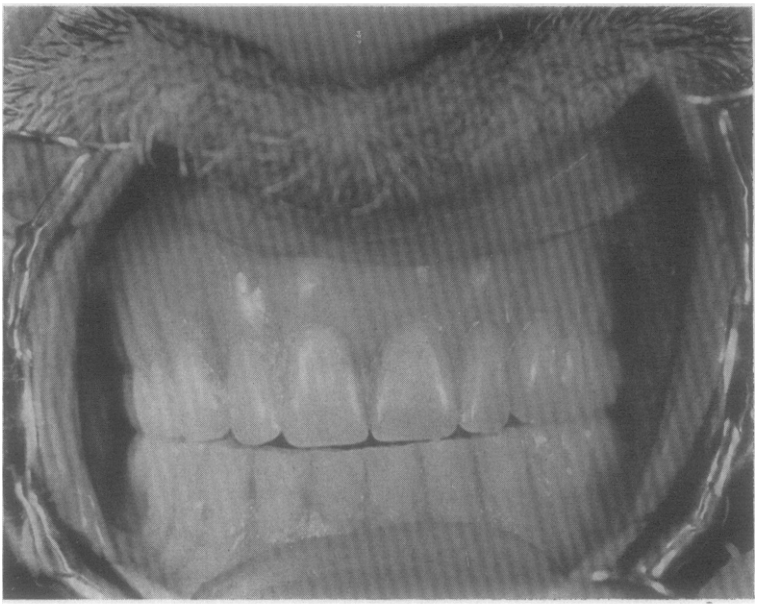

Fig. 4.—Shows the centric occlusion of artificial dentures with no vertical overlap. The centril occlusion line is at the incisal edges of the lower anterior teeth of this edge-to-edge arrangement.

could not be relied upon as a guide to the measurement of vertical dimension. Therefore, to save time and be assured of accuracy, vertical dimension should be measured with only the six sibilants of the 44 phonetic sounds of the English language.

In some patients, it is found that not all six sibilants will cause the closest level of the mandible to the maxilla while speaking. Only one or more sounds of this group will cause the closest level. If such is the case, the sound or sounds with its measurement of the closest speaking space in terms of millimeters should be recorded on the patient's record.

The closest speaking line should first be located and marked by the use of individual words containing the six sibilants as described above. In order to be

certain the patient did not control the movements of the mandible consciously, it is advisable to check further for accuracy. Have the patient say "Mississippi" which contains many sibilants. Then a magazine is given to the patient to read aloud. While the sibilants of the talking or reading matter are pronounced, it should be noted whether the incisal edges of the upper tooth coincide with the closest speaking line drawn on the lower tooth as determined by the use of individual words. If there is variation in the position of the closest speaking line, it is generally due to a voluntary muscular control of the lower jaw. When the patient speaks or reads rapidly, the function of the mandible is unconsciously accurate because all conscious control of the mandible is eliminated.

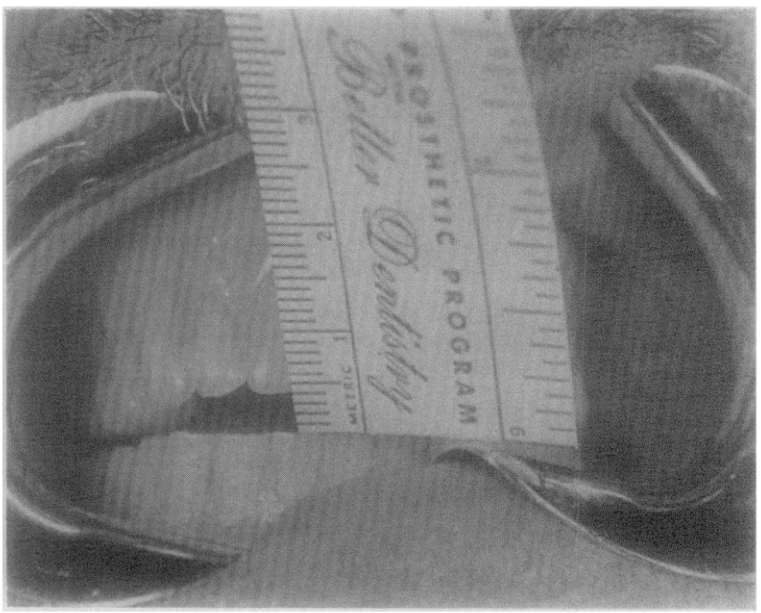

Fig. 5.—Shows the measurement of the closest speaking space when there is a space between the centric occlusion line (lower incisal edge) and the closest speaking line (upper incisal edge).

Whenever lines cannot be drawn on the lower anterior tooth due to space between the upper and lower teeth, Figs. 4 and 5 show how the closest speaking space is measured. In this example, there is no vertical overlap in the dentition which is to be measured for its closest speaking space. The centric occlusion line of this edge-to-edge relationship is at the incisal edges of the lower anterior teeth. The closest speaking line is at the incisal edges of the upper anterior teeth. The closest speaking space is the distance between these two lines as measured.

The closest speaking space as measured in the natural dentition must be reproduced in full dentures after the loss of the remaining natural teeth.

When we build full dentures for patients without pre-extraction records of the closest speaking space, we are back again to guessing at the proper vertical dimension. With an understanding of the speaking method and its closest speaking

space, we can more intelligently approximate the vertical dimension, and eventually record the patient's natural vertical dimension after the shrinkage of the alveolar ridges or wear of the artificial teeth. The accurate closest speaking space is eventually obtained by measuring at intervals until the patient is free of sore spots and is relatively comfortable.

It is always advisable to measure the closest speaking space of all full denture patients at least once a year until it is found that there is an end to discomfort, and perhaps to alveolar shrinkage or wear of the artificial teeth. If the closest speaking space remains constant in the full dentures, it is simple to duplicate this same vertical dimension when registering the maxillo-mandibular relation of new dentures, with the additional help of tattoo dots on the alveolar ridges.[4]

The speaking method for measuring vertical dimension must not be confused with other methods. It is a physiologic phonetic method based on the movement of the mandible while the patient speaks. It is based on the science of phonetics used to teach the deaf and hard of hearing to speak, and is newly applied to dentistry in order to measure the distance between the upper and lower jaws.

The closest speaking space to measure the vertical dimension in this speaking method must not be confused with the free-way space of the centric relation method.[5,6] The free-way space establishes vertical dimension when the muscles involved are at *complete rest,* and the mandible is in its rest position. The closest speaking space measures vertical dimension when the mandible and muscles involved are in the active *full function* of speech. Experience has shown that the measurements for the free-way space and the closest speaking space of the same patients are generally *not* the same.

I have found it difficult to measure the free-way space accurately. It can, at times, consume hours of checking and rechecking and may require cephalographic roentgenograms. The measurements are not only difficult, but lead to inaccuracy and its measurement and reproduction in full dentures is in terms of "an average." The measurement of vertical dimension with the closest speaking space is simple and consumes only minutes instead of hours in checking and rechecking. It is practical because the measurement can be made by the dentist in his own office in less than one minute. It is scientific, and the measurement is made with accuracy for each patient. It is recorded on that patient's record to give us the most practical, scientific, and accurate method of measuring vertical dimension of all our patients for present and future use.

SUMMARY

The speaking method of measuring vertical dimension is a physiologic phonetic method which measures vertical dimension by means of the closest speaking space. This space is measured *before* the loss of the remaining natural teeth to give us the patient's natural vertical dimension which can be recorded and used at later dates.

The same closest speaking space should be reproduced in full dentures as is found in the natural dentition. This space is also the means of proving that vertical dimension must not be increased.

It is advisable to measure and record the closest speaking space of all patients after they are past 20 years of age, for possible use in later years. For example, if we should feel that a certain patient might need occlusal reconstruction the measurement of the closest speaking space can be made which can be compared to the space existing in earlier years. If this space should be larger during later years in life, it could be assumed that the vertical dimension was decreased, and treatment needed to increase the vertical dimension with occlusal reconstruction. This is an assumption based on the hope and feeling that the speaking method with its closest speaking space will prove constant throughout life, as records seem to indicate at the present time.

The measurement of vertical dimension by use of the speaking method with its closest speaking space has been found in my experience to be the missing link in successful full denture construction. It will prove most valuable to dentists doing occlusal reconstruction and to periodontists in the treatment of their patients.

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