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Indices to Assess Tooth Mobility-A Review

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Abstract

There has been an effort by the dental profession working in the field of gingival and periodontal disease to find a method of recording the extent and degree of pathological change in tissues leading from gingivitis to periodontitis and to measure reversible as well as irreversible changes. Indices are an important tool to measure, quantify and treat mobile tooth in both epidemiological and clinical situations. The index required should have the following criteria: (1) Simplicity, (2) Accuracy, (3) Quantitativeness, (4) Reproducibility, (5) Speed, (6) Objectivity, and (7) Amenability to statistical analysis. Indices must also give data that make it possible to verify the nature, severity and etiology of the disease process and to evaluate therapeutic measures. It gives information about the success or failure of control and prevention of disease, affecting the gingivae and the periodontal tissues. However, there is dearth of literature on collective information of tooth mobility indices formulated. This article collectively describes the evolution and the present concept that have been formulated to assess tooth mobility.

Keywords: Tooth mobility, Index.

Introduction

Tooth mobility indicates the beginning of destructive periodontal diseases. It is the most common condition with which the patients report. Mobility can be due to inflammation of the periodontium or underlying pathology. It may also be due to the decreased adaptive capacity of the periodontium due to occlusal forces.[1] The ideal treatment plan for the mobile tooth or teeth would require a thorough knowledge to understand etiology and the prognosis of the tooth. There are different available methods to assess mobility of tooth such as; direct visualization when tooth is held between two rigid instruments, direct observation of movement due to occlusal forces, percussion sound, and electronic device. This review mainly focuses on the indices that can be used to measure or grade the mobility of tooth. According to Russell an index can be defined as a numerical value describing the relative status of a population on a graduated scale with definite upper and lower limits, which is designed to permit and facilitate comparison with

other populations classified by the same criteria and methods.[2]

Objectives of an index[2]

1. To increase understanding of the disease process and lead to a method of control and prevention.
2. Population can be grouped as low or high risk
3. To define the specific problem under investigation.

Ideal requisites of an index [2]

1. Validity: Index should be able to measure accurately so as it should relate to the clinical stage of disease at each point of study.
2. Reliability: Index should be reliable and should be able to measure at different times at different conditions. It should be reproducible and maintain consistency.
3. Clarity, simplicity and objectivity: The criteria should be clear and unambiguous, with mutually exclusive categories. Ideally, it should be readily memorized by an examiner after some practice.
4. Quantifiability: The index must be amenable to statistical analysis so that the status of a group can be expressed by a distribution, mean, median or other statistical measures.
5. Sensitivity: Sensitive enough to measure small shifts.
6. Acceptability: It should not be demanding or painful to the subject.

Criteria for selecting an index [2]

A. It should be simple to use and calculate.
B. Should allow examination of many people in short period of time.
C. Require minimum armamentarium and expenditure.
D. The components should be clear and readily understandable so as to promote maximum intra and inter examiner reproducibility and standardization.
E. Should be as free as possible from subjective interpretation.
F. Should define clinical conditions objectively.
G. Should be reproducible.
H. Should be amenable to statistical analysis; have validity and reliability.
I. Should relate numerically with the clinical disease.
J. It should not cause discomfort to the patient and should be acceptable to the patient.

Types of dental indices[3]

1) Individual assessment: The purpose is to evaluate and monitor the progress and maintenance of oral health. Monitors progress of disease healing, patient education and motivation.
2) Clinical trial: It determines the effect of an agent or procedure on prevention, progression, or control of disease. It also compares an experimental group with control group
3) Epidemiologic survey: The survey is done for characteristics of disease in population. It is not designed for individual patient.

History

Elbrecht in 1939 [4] Measured tooth mobility by fixing a tripod with large dial indicator in front of patients mouth. The dial registered bucco-lingual crown movement which were produced by digital pressure. Movement of head caused inaccuracy. Only values over 0.75mm would be identified by this method. Werner in 1942[5] Used an "oscillometer" which has a rod with scale attached and held in anterior teeth. When the neighboring or proximal tooth is moved labio-lingually with a force of 700 grams, the resultant difference of tooth position could be read on the scale. Differences of tooth position smaller than 0.2 5 mm could not be evaluated. Manly et al in 1951[6] however with still higher and variable frequencies. Their reported preliminary clinical results were inconsistent. Zwirner in 1949[7] studied axial tooth mobility on separated rat jaws with an electronic device. His method is highly sensitive.

The probable cause for the lack of reports on human TM is the technical difficulties which have been encountered. Cross in 1951[8] demonstrated tooth mobility measuring device about which no details have been published to our knowledge. Jung's in experiments were concerned with measurements more of the elastic deformation of the mandible during mastication than of TM of individual teeth. Muhlemann[9] (1951) used intra-orally attached dial indicators to determine the degree of crown excursions that were produced by known static forces which was called periodontometry. Certain indices were developed to evaluate the tooth mobility to overcome the problems with devices. However, a degree of subjectivity could be observed when evaluating tooth mobility.

Measurement using Index

Mobility is simply graded by holding the tooth between the two metallic instruments or one finger and one metallic instrument and effort is made to move the tooth in all directions.

Then mobility is graded according to any one of the indices as follows:

Tooth mobility Index: [10] The most subjective method used to assess tooth mobility was described by Miller SC in 1950.(Table:1)

Table 1:

Code	Criteria
0	No detectable movement when force is applied.
1	Barely distinguishable tooth movement.
2	The crown of the tooth moves up to 1mm in any direction.
3	Movement more than 1mm in any direction or the teeth can be depressed or rotated in their sockets.

Mobility Index by Ramfjord:[11]

Ramfjord in 1967 developed this index. (Table:2)

Code	Criteria
M0	Physiologic mobility; firm tooth
M1	Slightly increase mobility
M2	Definite to considerable increase in mobility but no impairment of function.
M3	Extreme mobility; a loose tooth that cannot be used for normal function.

Mobility Index by Laster:[12]

This index was given in 1975. Mobility is assessed by the application of lateral horizontal forces. (Table:3)

Code	Criteria
0	Normal.
1	Movement greater than normal.
2	Mobility of 1mm in lateral direction.
3	Mobility greater than 1mm laterally plus rotation and/or axial depression.

Mobility Index by Grace and Smales: (Table:4)

This index can be useful to track the amount of mobility in teeth over a period of time.

Grade	Mobility index
0	No apparent mobility
1	Tooth mobility is perceptible, but less than 1mm buccolingually.
2	Mobility is between 1 and 2mm
3	Mobility exceeds 2mm buccolingually

	or vertically

Tooth mobility Index by Lindhe: (Table:5).

Degree	Interpretation of tooth mobility by Lindhe
1	Movability of the crown of the tooth 0.2-1 mm in horizontal direction.
2	Movability of the crown of the tooth exceeding 1 mm in horizontal direction.
3	Movability of the crown of the tooth in vertical direction as well.

Tooth mobility Index by Prichard (1972):[13] (Table:6)

Degree	Interpretation of tooth mobility by Prichard
1	Slight mobility
2	Moderate mobility
3	Extensive movement in a lateral or mesio-distal direction combined with vertical displacement in the alveolus.

Wasserman's Index (1973): [14] (Table:7)

Degree	Interpretation of tooth mobility by wasserman
1	Normal
2	Slight mobility less than approximately ¾ mm of movement bucco-lingually
3	Moderate mobility – up to approximately 2 mm of bucco-lingual movement.
4	Severe mobility – more than 2 mm of movement.

Nyman's Index (1975)[14] (Table:8)

Degree	Interpretation of tooth mobility by Nyman
0	Normal – less than 0.2 mm
1	Horizontal / Mesiodistal mobility of 0.2 – 1mm
2	Horizontal / Mesiodistal mobility of 1-2 mm.
3	Horizontal / Mesiodistal mobility exceeding 2mm and / or vertical mobility.

Flezar's Index (1980): (Table:9)

Grade	Interpretation of tooth mobility by Flezar
M0	Firm Tooth
M1	Slight increased mobility
M2	Definite to considerable increase in mobility but not impairment of function.
M3	Extreme mobility, a loose tooth that would be incomparable in function.

Glickman's Index (1972):[15] (Table:10)

Grade	Interpretation of tooth mobility by Glickman
	Normal mobility
	Pathologic mobility
Grade I	slightly more than normal
Grade II	moderately more than normal
Grade III	Severe mobility faciolingually and or / mesiodistally combined with vertical displacement.

Grant, Stern, and Everett:[16] (Table:11)

Degree	Interpretation
0	No perceptible movement
½	Barely perceptible movement of a healthy lower incisor
1½ to 2½	Are increasing degrees that end at 3
3	Teeth that can be depressed.

Lovdal's Index (1959)[17] (Table:12)

Degree	Lovdal's Index
0	Normal mobility.
1	Teeth somewhat more mobile than normal.
2	Teeth showing conspicuous mobility in a transversal, but not in an axial direction.
3	Teeth mobile in an axial as well as a transversal direction.

Conclusion

During diagnostic examination the dental practitioner not only looks for existing diseases but also for possible areas of future diseases. Measuring oral diseases in a population, however, requires a more standardized and objective approach to the group members. Standard diagnostic criteria are written explicitly for clinical, radiographic, microbiological, or pathological examination. These criteria, i.e. objective standards on which diagnostic judgment can be based, are applied to judge the condition of oral tissues as they might be in the future. Tooth mobility index can be considered as the main tool of epidemiological studies in periodontal diseases, to find out the incidence, prevalence and severity of the diseases.

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