



RESEARCH ARTICLE

CLASSIFICATION OF TOOTH MOBILITY: CONCEPT REVISITED

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ABSTRACT

Tooth mobility is not an uncommon finding in day to day dental practice. Periodontitis, trauma from occlusion, endo-perio lesion, any pathology e.g., cyst, tumour, osteomyelitis etc, menstruation, use of contraceptives, pregnancy, and even diurnal variation may be cause of tooth mobility. Proper treatment plan warrants proper diagnosis. In this article, we will review the etiology of mobility, its diagnosis and how the treatment plan varies accordingly along with the prognosis.

INTRODUCTION

In periodontics the inflammation starts from soft tissue of the periodontium, and is extended into the hard tissues including bone. The height and density of bone around teeth is affected by inflammatory invasion that reach alveolar bone along collagen fibre bundle and blood vessels (Di Benedetto et al., 2013). Bone loss seen in periodontitis is not because of bone necrosis, rather via resorption of viable bone cells (Intini et al., 2014). Now one of the consequences of bone resorption in periodontitis patient is increased tooth mobility. Slight degree of mobility is seen in healthy teeth which is known as physiologic tooth mobility. But mobility beyond physiologic limit is not only considered as an indicator of periodontal disease severity, but also helps in determining prognosis of the disease (Armitage 1965). Often patients correlate the changes in mobility before and after the periodontal therapy as the only criterion for success of the therapy. Most of the time they come with the demand of getting rid of the teeth mobility, which may be often unrealistic demand from patients' side. From this point of view, mobility is an important parameter for disease severity and success or failure of periodontal treatment.

For this reason, accurate measurement of tooth mobility is important. The quality or visco-elastic properties of the periodontal tissues and anatomical characteristics, e.g, amount of supporting alveolar bone, width of periodontal ligament are critical factors associated with tooth mobility. Clinical and experimental observations have showed hyper-mobility as a cumulative outcome of both alveolar bone loss and qualitative and quantitative alterations in PDL and supra-alveolar soft tissue (Persson and Svensson, 1980). The main objective of periodontal treatment is to re-establish the balance of periodontal health, restoring the health and function of periodontal teeth (Ramfjord, 1993).

ETIOLOGY OF MOBILITY

- Trauma from occlusion (TFO) could be a major reason for tooth mobility. Occlusal trauma may occur in an intact periodontium (primary TFO) or on a periodontium which has been reduced by inflammatory diseases (secondary TFO). So during detecting the presence and degree of mobility, careful functional evaluation of the occlusion should be performed (American academy of periodontology, 2000), which is unfortunately ignored by the clinicians many a times.
- Periodontitis leads to loss of alveolar bone, which is the support for the teeth. So the degree of mobility is associated more with the remaining alveolar bone support than the pattern of alveolar bone loss. Moreover, root shape (curved root→less mobility), root site (longer root→lesser mobility), number of roots

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(multirooted tooth shows less mobility than single rooted tooth), crown root ratio (increased crown root ratio → increases mobility), etc. play significant role. In fact, the surface area of root surface giving attachment to bone compounds to stability of tooth (Muhlemann, 1997).

- Endo-perio lesion i.e., extension of inflammation in PDL space from root apex due to endodontic involvement may lead to mobility. Endodontic treatment is necessary to manage such mobility (in Primary endodontic-secondary periodontic lesion)
- Pathologies, e.g., cyst, tumor, osteomyelitis, fracture due to trauma etc. may lead to mobility of teeth.
- After periodontal surgery, teeth mobility is increased immediately, which diminishes beyond pre-treatment levels by 4th week (Burch, 1960; Persson, 1981)
- Mobility is increased in female patient during menstruation, use of contraceptives, pregnancy (Rateitschak, 1967; Perlitsch, 1980)
- Mobility also shows a diurnal variation. In the morning, it is found to be more due to lack of chewing or deglutition during sleeping; which gradually decreases as chewing is started (Kurashima, 1965).

STAGES OF TOOTH MOBILITY

Tooth mobility occurs in two stages

Initial/intra-socket stage: this occurs within confines of the PDL. It occurs due to viscoelastic distortion of periodontal fluid, periodontal fibres and interbundle content (Muhlemann, 1960). The movement ranges from 50-100µm, under a load of 100lb (Muhlemann et al., 1965).

Secondary stage: this occurs due to elastic deformation of alveolar bone in response to increased horizontal forces (Everett et al., 1969).

MEASUREMENT OF TOOTH MOBILITY

Miller's classification

In 1950, Miller developed the most commonly used clinical methods for determining tooth mobility. In his method the tooth is firmly held between 2 instruments to move back and forth and mobility is scored on a scale of 0-3

0: no detectable movement apart from physiologic tooth movement.

1: It indicates mobility greater than normal {physiologic}

2: Mobility up to 1mm in bucco-lingual direction

3: Mobility >1mm in bucco-lingual in combination with vertical deformability is present.

Limitation

This measurement linearly quantifies the amount of movement using an ordinary scale. But it fails to address the cause of mobility which is most important to know from therapeutic point of view. No evaluation is made to assess whether mobility results from an adaptive process or due to any pathologic process, the measured mobility should be treated or simply observed?

In 1969, Everett and Stern raised a question: in a root with little bone support and exhibiting class 2 mobility, diseased? (Everett and Stern 1969)

Infact, mobility related to a loss of alveolar support generally shows a more unfavourable prognosis.

TYPES OF TOOTH MOBILITY

Muhleman in 1967 proposed that forces causing mobility may be categorized into 2 broad groups:

- Physiologic
- Pathologic

He determined that pathological mobility was caused by quantitative and or qualitative alterations of tooth supporting structures. This is supported by work of O'Leary and Rudd K.D. (1963). So his division of mobility by etiology had merit. Other have divided mobility as "passive" and "dynamic" (Grant et al. 1988). Passive mobility defines how loose the teeth are on palpation, while dynamic mobility defines how loose the teeth are during functional (as well as parafunctional) movements.

Identification and assessment of occlusal forces has gained immense importance in evaluating mobility. If the cause of the mobility can be properly addressed and thereby can be controlled or reduced, the prognosis definitely improves (Everett et al. 1969). Trauma from occlusion or injury due to excessive occlusal forces due to para-functional habits may initially result in resorption of the cortical plate of alveolar bone and later an adaptive response occurs with widening of periodontal ligament. Again extension of gingival inflammation into periodontal ligament (periodontitis) results in degenerative changes with bone loss that ultimately causes mobility. But both are not the same from therapeutic point of view. Here lies the importance of addressing the etiology of mobility rather than addressing simply linear displacement of teeth. The problem remains that unless the cause of mobility is understood (normal or abnormal; passive or dynamic; physiologic or pathologic), mobility cannot be properly evaluated and treated.

Simply because a tooth exhibits mobility, does not necessarily denote that it is diseased or it requires stabilization. Now coming to the Cogent 1969 question: "is a tooth with little root support in its bony housing with a class 2 mobility diseased?" the answer is probably- NO, provided-

- Crown-root ratio is unfavorable and beyond the scope of correction
- Periodontal probing depth < 3mm
- There is absence of any sign of periodontal inflammation.

Conclusion

Hence adding the designation (A) for adaptive and (P) for pathologic mobility to the current grading system may add advantage to critically evaluate whether any additional occlusal/periodontal therapy is necessary or not. Adaptive mobility is often associated with short root, poor crown-root ratio, bone loss resulting due to surgery with absence of any inflammation and poor root morphology (e.g straight single root). Hence additional treatment could not improve the mobility.

The only therapeutic treatment available is splinting of these tooth to the adjacent teeth to reduce the mobility. But prolonged splinting is again detrimental to the adjacent tooth with which these mobile teeth are splinted. On the other hand pathologic mobility, certainly requires some intervention to treat the cause or etiology (e.g., trauma from occlusion, any endo-perio lesion, bone destruction due to any pathology like cyst tumor, osteomyelitis etc.) A tooth classified as class II(A) will be having definitely better prognosis than a tooth classified as class II(P). So adding the designation (i.e., A/P) to the current method of measuring tooth mobility make it complete and more acceptable from the therapeutic point of view rather than knowing only the linear displacement of tooth.

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