When to Extract a Compromised Tooth

SUMMARY

There are often questions and doubts concerning the decision-making process in regard to the prognosis of an individual tooth. Unfortunately in dentistry, as in all biologic sciences, there are no straightforward answers to questions. Decisions concerning the survival of the tooth are often made by specialists without any uniform criteria, usually only on the base of their previous experience.

This article will look at the literature in this area to help the practitioner in the decision-making process what to do with the compromised tooth. In order to help clinicians to make better choice, factors and variables that can influence the final decision are discussed as factors influencing initial assessment, periodontal disease severity, furcation involvement, etiologic factors, restorative and other factors.

Although there are many literature data concerning this subject, no simplified and precise criteria are offered; so further work should be done in attempt to make some more uniform criteria concerning this subject.

Keywords: Tooth Extraction, criteria; Treatment Planning

Introduction

Advanced technology of new materials, possibilities that prosthetic dentistry offers combined with implants, declines the decision whether to extract or maintain a tooth in favour of its extraction. But one should keep in mind that maintaining the natural dentition in adequate function and aesthetics is still the primary goal in dentistry. Prosthetics restorations can not be compared with the physical, biomechanical and sensitive receptions of the natural tooth. One of the main advantages of the natural teeth, compared to implant restoration, is the presence of bio-receptors and their possibility for adaptation under mechanical force provided from the periodontal ligament.

On the other hand, keeping teeth at any cost could represent a set of pathological conditions that cannot be predicted and can cause unwanted consequences, as lack of function or extension of the dental infection into the surrounding spaces.

Treating a compromised tooth, contrary to extraction, represents one of the most difficult decisions the practitioner has to make. He has to make this kind of decision based on certain criteria from the literature, but still personal experience is one of the most used, if not the only criteria, to do so.

In Moreira’s researches made in Brazil, 152 dentists with average of 15 years of experience, replied to the question how do they make the decision of extracting or maintaining a tooth. 55% of them answered that they refer their patients to a specialist. Although this kind of research is not conducted among our doctors, according to our experience, these kinds of decisions are usually made by specialist based on their own criteria and experience.

Unfortunately in dentistry, as in any other biological science, there is no concrete answer to problems of this kind - that’s why this article will consult the literature, but also will sum the authors experience, all with one cause: to help the clinician in the decision making process concerning the compromised tooth.

Material and Methods

In order to meet the goal of the planned work, we looked into the available textbooks of Periodontology, Oral Surgery and Prosthetic Dentistry. Unfortunately,
we couldn’t find precise answer to the question, or any criteria set for this matter. Certain data were mentioned in different chapters but with other purpose, and it was not possible to extract a worthy conclusion.

Afterwards, we searched all the available literature regarding this problem. The search was conducted by 3 key words: tooth extraction, therapy plan and criteria. After this was done, combined with authors’ experience selection and systematization of the data was made.

Discussion

Most frequently mentioned factors that influence the decision making factor for prognosis or tooth extraction are: type of bone loss, pocket depth, attachment loss, furcation involvement, crown-root relation, mobility, root anatomy, occlusion and tooth replacement, condition of the pulp, type of rehabilitation that follows, strategic value of the tooth and personal factors, such as: patient’s age, general health, oral hygiene, other risk factors and the possibility of their change, finances and parafunctional habits.

According to the clinicians, concerning of criteria they mostly use, they are ranged as follows: (1) mobility 41%; (2) bone loss 24.5%; (3) bone evaluation on the roentgenogram 22.1%; (4) prosthetic needs 19%; (5) furcation involvement 5%; (6) socio-economical possibilities 4.7%; (7) presence of extensive caries 2.3%; (8) systemic disease 2.1%; and (9) the existence of perio-endo lesions 1.8%. Furthermore, Avila3 separates the factors and variables in the decision, making 6 categories of the process, such as initial assessment, severity of the periodontal disease, furcation involvement, etiologic factors, restorative and other factors.

There are some factors that can’t be measured objectively, but they are crucial in the decision making plan of the treatment and rarely considered by dentists such as: patient’s desire to keep the tooth must be considered if there are minimal chances for fulfilling that wish; if not so, it is hopeless to expect from the patient to meet our treatments and recommendations.

Treatment expectations are an issue that should also be considered. Strategic value of some teeth is important segment in the decision making process of treatment. If we decide to keep a compromised tooth, we should have in mind that a long-term maintenance will be necessary under optimal conditions, which in certain cases is not realistic. Some authors suggest certain criteria to facilitate the decision in the maintaining certain teeth in the dental arch; Moreira13 suggests criteria that separates teeth in 3 groups depending on their expected life time in the mouth.

Natural teeth get more than 10 years prognosis if the treatment has a complete success, and function and aesthetics are completely accomplished. These teeth can be considered even for a prosthetics restoration when the other abutment is an implant. When probing, if the pocket depth is bigger than 7-8 mm, with bleeding, those teeth have less than a 5-year prognosis. Maxillary molars with poor oral hygiene and second or third degree of furcation involvement have the biggest risk for complication, and their loss is supposed in less than 5 years. The situation is even more complicated when a tooth is in the same region or quadrant of bad prognosis. Recurrent periodontal abscess often results in fast attachment loss and active bone destruction. In those cases, prognosis of survival of the tooth is minimal.

When a tooth gets a survival prognosis less than 5 years, according to the suggested criteria, even when a proper periodontal treatment is applied, the clinician should not hesitate to extract the tooth and suggest an alternative treatment plan. Generally, when a tooth has a pocket depth on probing of 7-8 mm, in long-term studies, such teeth have a pore prognosis, and should be considered for 5-10 years survival. To this group belong molars with first degree of furcation involvement. When a tooth, regardless the treatment, has a 5-10 years prognosis for survival, the further outcome is uncertain.

In cases when the clinician has a doubt in which category a tooth should be placed (0-5, 5-10) then a category with weaker prognosis is suggested.

It is very difficult even for an experienced periodontologist to predict the progress of the disease, and even more difficult to maintain teeth between the limit checkups. According to Matthews9, the percentage of lost teeth from periodontal reasons, after conducting the treatment, is 36.0% - 88.5%. In this study, component of the patient (age and smoking) and components of the tooth (type of tooth, location, position, initial prognoses of the tooth) were included. After analyzing these variables, it was concluded that age of the patient, smoking and initial prognosis should be the most frequent factors for tooth loss, even after appropriate periodontal treatment.

Aesthetics is also an important, if not the most important issue in today’s dental practice. Patients ask for a treatment that besides a proper function, health and stability will provide aesthetics of high-quality. Appropriate gingival symmetry, papillary symmetry, appearance of the tooth and absence of a discoloration are the most important parameters for adequate esthetics. Therefore, if aesthetic is not involved, the decision whether to extract or keep a tooth is less critical, but if the tooth does not fulfill aesthetic criteria, then there is a possibility to compromise the prosthetic restoration in the future, so we should consider whether to preserve it.

The financial status of the patient plays an important role in the decision making process for treatment. The traditional restoration procedures or implants are often more expensive than a conservative periodontal maintenance of the tooth.
Cooperation of the patient is also an important factor in the decision making process. Cooperative patients have a smaller degree of caries, progression of the periodontal disease and tooth loss compared to uncooperative patients. One should have in mind that patients with bad oral hygiene will have the same habit with their prosthetic appliances. This could be a problem especially if the prosthetic is combined with implants. With these kinds of patients no matter how the problem is solved, it would not be a long-term solution.

One of the crucial things in decision making for or against tooth extraction is periodontal pocket depth. Deep periodontal pockets and bleeding upon probing are indicators for presence of the disease and further attachment loss. Some criteria had been proposed according to the depth of periodontal pockets: if the depth is smaller than 5 mm, extraction is not recommended; if it is 5-7 mm, the tooth should be followed with precautions; if it is bigger than 7 mm, extraction is indicated. if it is bigger than 7 mm, extraction is indicated.

In this context, the mobility of the tooth is the most used criteria for prognosis; yet, there is possibility this not to be a reliable factor. Mobility is divided in 3 classes: the first class refers to the physiological movement of the tooth; the second class refers to movement up to 1 mm in any direction (it is recommended for teeth of that class to be evaluated along with other factors, and then to decide the future treatment); the third class includes teeth with mobility grater than 1 mm in any direction, including vertical dimension too.

Bone loss can be seen on X-ray images, and mostly it has been used as a supplement factor, not as a main factor, in examining. Based on the amount of bone loss, 3 categories have been recommended: the first category refers to bone loss not grater than 30% (these teeth can be properly maintained and kept); the second category refers to the bone loss between 30%-65% (these teeth suffer a big attachment loss, but they can also be treated and maintained for a long period of time); the third category refers to bone loss grater then 65% and loss of the periodontal supportive tissue more then two-thirds (these teeth are difficult to be maintained).

Recently, more studies of root relations have been made, especially analyzing the proximity in multiple rooted teeth. Heinz and Weider analyzed 116 posterior, inter-proximal regions and they came to conclusions that if the inter-radicular proximity is smaller than 0.5 mm, then the spongy bone and lamina dura are histologically absent, while in the regions where the proximity is smaller then 0.3 mm, there is no bone support at all. Therefore, the smallest distance between the roots should be bigger than 0.8 mm, so we can have stability of the attachment loss, and bone resorption.

In assessment of furcation involvement, X-ray can be very useful. Furcation involvement can be divided in 3 classes: the first class refers to teeth which have less than 3 mm in horizontal penetration on probing. In these teeth the destruction is minimal and periodontal maintenance is easily accomplished. The second class refers to teeth which have horizontal penetration bigger than 3 mm on probing. Treatment of these teeth is less sure, yet personal experience stands in favour that a long-term maintenance can be accomplished with proper treatment. The third class refers to teeth with complete horizontal penetration, where extraction is advised. In furcation involvement assessment one should have in mind the inter-proximal length of bone at the furcation entrance. This part of bone has a crucial meaning in the treatment outcome, especially when teeth from the second and third classes are involved. When the roof of bone is above or at the same level with the furcation, the periodontal treatment is possible, but if it is below the furcation then the prognosis is not good.

Presence of risk factors for periodontal disease should also be seriously considered, although they are often underestimated or simply forgotten. McGuire and Nunn, working on this problem, came to the conclusion that the presence of IL-1 genotype and severe smoking play a big role in tooth loss. The presence of IL-1 increases the possibility of tooth loss up to 2.7 times, and smoking increases possibility of tooth loss up to 2.9 times. If both factors are present in same patient, then the possibility of tooth loss may increase up to 7.7 times. Patient with IL-1 genotype presence and bad habits, like smoking, have a bigger chance of losing their teeth, than a patients with IL-1 genotype presence who are not smokers.

Root canal therapy is also a factor that should be considered. In general, teeth which root canal therapy is performed only once have better prognoses than the teeth which treatment had been repeated. Survival of the teeth with root canal treatment is bigger if the treatment is performed by a specialist (98.1%) compared to the treatment performed by general practice dentist (89.7%) in a 5-year period. The most important factor in this case is the data on the root canal treatment, presence of periapical changes, and the general health of the patient.

Systemic disorders, especially diabetes type 1 or 2, hypertension and osteoporosis, have an important role in the decision making process if the compromised tooth should be kept or removed. If the disease is not controlled, than favourable procedure is extraction, but if the disease is controlled, then the attempt to keep the tooth might be more successful. However, there are conditions where the extraction cannot be performed or even can worsen the
situation. In those cases we should make an effort to keep the tooth. The clinician experience is also an important factor in the treatment outcome.

Zitmann\(^1\)\(^4\) summarizes all these factors and offers a pragmatic conclusion for this issue, of course, considering all the mentioned factors. Maintenance of the teeth, as he suggests, and acceptance of the risk factors, is suitable when: the tooth is not extensively affected and has a big strategic value, when we have contraindications for implants or the patient can’t afford it, when the tooth is placed in a complete dental arch and the preservation of the gingival structures is very important. When complete restoration of the teeth is planned, especially if implants are included, then it is recommendable to minimize the risk of failure of the whole restoration.

Avila\(^3\) offers a chart, labelling different factors with colours which seem rather complicated and, most of all, time consuming.

Conclusion

Although there are many literature data concerning this subject, no simplified and precise criteria are offered; so, further work should be done in attempt to make some charts or more uniform criteria.

References