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Review paper



Multiple dental retentions: literature review

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Abstract

Multiple dental inclusions are a relatively rare pathology. They are often part of complex dysmorphoses which require an interrogatory, clinical and radiological examination. The most frequent etiologies of inclusion are local. However, the presence of multiple inclusions can also be correlated with genetic syndromes or metabolic or hormonal pathologies, as well as idiopathic etiologies. There are as many therapeutic approaches as there are forms of inclusions; therapeutic abstention, extraction followed by prosthetic restoration or surgical-orthodontic treatment. Developing a treatment sequence, determining the appropriate anchorage, and biomechanical planning can be a challenge. The aim of our work is to establish an up-to-date state of knowledge regarding the epidemiology, etiological factors and appropriate treatment strategies for multiple dental inclusions.

Keywords: *Impacted Teeth; Prevalence; Etiology; Syndrome; Treatment; Orthodontic; Surgical Treatment.*

1. Introduction

The dental eruption represents a complex series of local histological events genetically orchestrated to allow the germ to take up a well-defined place on the arch. This several centimeter-long courses requires the dental organ to overcome various obstacles, such as bone strength and the roots of temporary teeth. In addition, this movement, which is carried out simultaneously by several germs, and symmetrically in both jaws, must also be harmoniously combined with growth, a concomitant phenomenon [17]. Therefore, considering this complexity of growth and development, it is not uncommon to encounter eruption problems in the sense of a delay or a stop, and in particular dental inclusion. Defined as a tooth retained in the maxillary or mandibular arch beyond its normal eruption date, surrounded by its pericoronal sac and without communication with the oral cavity, dental inclusion may involve a single tooth as it may involve several permanent teeth, a phenomenon dating from prehistoric times and which currently remains a more frequent clinical situation. [19], [26]. The most frequent etiologies of inclusion are local. However, the presence of multiple inclusions in permanent teeth can also be correlated with genetic syndromes or metabolic or hormonal pathologies. Multiple inclusions may also have etiologies of idiopathic origin [19]. Indeed, the presence of an excessive and unusual number of impacted teeth and their disposition cause a certain problem in the therapeutic process and considerably increase the difficulty and duration of treatment. Communication between the orthodontist and the oral surgeon is essential in order to use the most appropriate surgical and orthodontic technique.

2. The prevalence of dental inclusion

The prevalence of impacted teeth has been the subject of several statistical studies carried out on various samples. The incidence has been established from surveys, at the level of dental faculties, hospitals or dental clinics, dental radiology centers. [2], [6], [9], [14], [12], [22] Inclusions in permanent dentition are the most common ones. An order of frequency of impaction has been established by the literature can be summarized as follows: lower third molars, upper third molars, upper canines, premolars, lower and upper canines, upper incisors, lower canines, lower incisors, upper incisors and lower first molars and upper and lower second molars. [2] Multiple inclusions are very little reported in the literature. Some authors have presented a few cases, but never in sufficient numbers to specify their prevalence. Consequently, given the rarity of the cases encountered and studied, any statistical epidemiological study seems very difficult to carry out. Gisakis et al (2011) determined the prevalence of impacted teeth in an adult Greek population by type, sex and age based on clinical and radiological examination of 425 patients. As a result, 152 patients (35.8%) had a single impacted tooth, 134 patients (31.5%) had two impacted teeth and 139 patients (32.7%) had three or more impacted teeth. The number of impacted teeth in the mandible was greater than in the maxilla, and the number of impacted anterior teeth in the maxilla was greater than in the mandible. [9]

3. Etiologies of multiple dental inclusions

The presence of multiple dental inclusions has been correlated with genetic syndromes such as: cleidocranial dysplasia, Gardner's syndrome, Gorlin Goltz syndrome, Noonan syndrome, cherubism or nephrocalcinosis associated with amelogenesis imperfecta. Sometimes these dental inclusions are correlated with endocrine disorders such as hypothyroidism [19].

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The failure to erupt several permanent teeth may occur in connection with a local cause, namely dental barriers. The presence of supernumerary teeth and odontomas has been described in many clinical cases throughout the literature. They form a real physical barrier in the eruption path of permanent teeth, causing delay or inclusion with an overall prevalence of between 10. According to Hwang and al, the incidence is between 41-87% for odontomas, [10] resulting in a wide range of complications such as diastemas, displacement, rotation, ectopic eruption or resorption of adjacent teeth, following narrowing of the dental arch or even displacement of permanent dental buds or formation of dental cysts. [8,20,29] the association between delayed eruption and the presence of odontoma or supernumerary teeth affects permanent teeth more frequently than temporary teeth. [20]

Local tumor etiology was also cited, namely dental cysts, ameloblastic fibro odontoma, keratokystic odontogenic tumor (KCOT), except that cysts and bilateral or multiple tumors formations are extremely rare, and generally associated with certain syndromes. The non-syndromic presence of a bilateral dental cyst is very rare and not very clear, a survey of the literature identified only 43 cases reported up to 2013. [11], [13], [24], [32]

A permanent tooth eruption can often be disrupted following traumatic injury to temporary teeth, causing hypoplasia, corono-radicular dilacerations, cessation of root formation or even sequestration of the tooth germ. [15], [21], [27]

And finally, idiopathic inclusions, where the failure to erupt several teeth, not ankylosed, occurs without any local, genetic or systemic etiology. [18], [30]

4. Therapeutic strategies for multiple dental inclusions

Dental inclusions are a rarely isolated pathology. They are often part of complex dysmorphoses that require an interrogation, a clinical examination and complementary examinations, particularly radiological examinations, which allow the diagnosis to be refined and the choice of the right therapeutic strategy to be made, with predictable results [19]. There are as many therapeutic approaches as there are forms of inclusions, the choice of the treatment depends on several parameters which are related to the practitioner's experience and multidisciplinary collaboration, others are related to the patient, general heath status, dental condition, degree of motivation and financial means.

Overall, the treatment of dental inclusions is objective under three alternatives: surgical and/or orthodontic repositioning, extraction or abstention. [19]

1) Surgical and/or orthodontic repositioning

Includes interception, surgical exposure without orthodontic traction, surgical-orthodontic treatment, and self-transplantation.

The first therapeutic solution, in this case is “interception”, helps to maintain the space after avulsion of temporary teeth and supernumerary germs, in order to allow spontaneous eruption of permanent teeth. [19]

Surgical exposure without orthodontic traction, an alternative method described by Schmidt and Kokich, consists of the extraction of temporary teeth if they exist, and surgical exposure of impacted teeth without the use of orthodontic traction to facilitate spontaneous eruption. According to the authors, the majority of impacted teeth (75%) would erupt if the soft or hard tissue obstruction is removed from the eruptive path, finding that impacted teeth still retain eruptive potential even after closure of their apex [16]. However, this technique has been rejected by many patients for aesthetic reasons. In addition, inclusions that are too deep indicate exposure without traction. [28]

Surgical exposure combined with orthodontic traction after necessary space planning is the optimal solution to multiple inclusion if it is possible [5], [19]. It is usual to estimate the extent of orthodontic treatment at 2 years on average, so repositioning an impacted tooth requires additional time and treating several impacted teeth involves a longer period of time and requires the cooperation of the patient and his or her parents [1], [15]. The objectives of this therapeutic choice are to proceed with guided orthodontic traction of the impacted teeth in order to bring them to the level of the occlusal plane [28]. In different clinical situations, the therapeutic sequence adopted consists of:

a) Pre-surgical orthodontic preparation, which consists of arranging the future sites of the impacted teeth by creating sufficient spaces and creating anchoring units in the arch to optimize the orthodontic traction of the teeth concerned [16], [35]. In some situations, this preparation requires extractions of adjacent permanent teeth. This procedure should be preceded by a traction test, which is a good means of assessing the risk of ankylosis prior to orthodontic extraction [36]. According to D. Brézulier et al, it would be preferable to begin traction without prior orthodontic treatment in order to avoid failures due to possible ankylosis [3].

b) The surgical exposure of impacted teeth consists of an osteo-mucosal release, in order to facilitate the physiological movement of the impacted tooth, and therefore allow the formation of an adequate band of keratinized gum. Open and closed eruption techniques consist of making sutured flaps, in their original position, or in an apical position, after the anchorage has been placed. Concerning the aesthetic and periodontal result, the choice of the eruption technique is rarely discussed given the lack of studies that would allow a definitive decision on the question. Some authors believe that the closed eruption technique produces better esthetic and periodontal results and that in the presence of multiple inclusions, it is therefore considered a better choice. [1], [15], [23] Vermette et al compared the two techniques of closed and open eruption on retained anterior teeth and showed that the latter has poor esthetic results such as increased clinical crown length and poor gingival healing. [13] However, according to the randomized controlled clinical trial of Parking and Miler (2013), comparing the two techniques, no significant difference was found in periodontal and esthetic outcomes. [31] The closed surgical technique appears to be more strongly associated with ankylosis than the open technique [15% versus 4%] according to the longitudinal prospective clinical study by STYLIANOS I et al. [33] Kyung et al. show that at present there is no scientific evidence that leads to favor the open or closed technique in terms of aesthetics and periodontal health. [15] Therefore, the choice is left to the free appreciation of the oral surgeon and the orthodontist.

c) Orthodontic traction and placement Aiming at the placement of the impacted teeth on the arch, this phase requires that the force transmitting entity and the force generating entity are connected in an ideal position. In order to achieve this goal, an anchorage is necessary to straighten or pull the tooth towards its eruption corridor. This anchorage can be dental or skeletal. Through the literature, a range of eruptive force systems are available to the orthodontist for this purpose. Autotransplantation is rarely adopted as a therapeutic choice for multiple dental inclusions. For some authors, the long-term success rate of transplanted teeth remains low. Because of the complications following autotransplantation [risk of ankylosis and root resorption, deep periodontal pockets, high probability of necrosis] this solution must therefore be considered as a transitional solution to maintain bone and periodontal volume while waiting for a dento or implant-supported prosthetic reconstruction. [3], [4]

Self-transplanted teeth may have deep periodontal pockets, a higher tendency to bleed on probing and a high probability of pulp necrosis. [10].

2) Surgical extraction

In the case of multiple tooth inclusions, careful management must be programmed to guide as many teeth as possible to their eruption sites. However, if this fails, the removal of the impacted teeth may be necessary. [7]
The orthodontist in collaboration with the surgeon consider the extraction of impacted teeth as a solution in case of orthodontic failure, aberrant position of the impacted teeth, or corono-radicular dilaceration, also in the presence of stable occlusion with closed spaces and in order to preserve the periodontal status of the adjacent teeth.
However, the general condition of the patient, the asymptomatic inclusion, the risk of weakening of the jaw bone and the presence of sufficient space for repositioning are all factors against indicating the extraction of the impacted teeth [7] Thus, the position and depth of inclusion, the contact with adjacent teeth, and the relationship to the noble anatomical structures are all factors that determine first the diagnosis and then the decision to abstain, reposition or proceed with surgical avulsion. [21]

3) Abstention and supervision

The practitioner must opt for abstention whenever the intervention [repositioning or avulsion] is likely to lead to a poorer result than the initial situation.
Abstention is justified according to several parameters, which are age, general condition, motivation, type and number of impacted teeth. Abstention is adopted in cases: [7], [34], [25]

- Semiological silence; if the impacted teeth do not interfere with the adjacent teeth,
- Teeth that are too deeply impacted, making the avulsion delicate with the risk of damaging the teeth or the surrounding anatomical structures.
- Refusal of treatment on the part of the patient who is satisfied with his or her aesthetic dental appearance.
- A general contraindication to tooth extraction.
- Abstention is mainly adopted for molars.
- Risk of weakening of the basal bone of the jaws.

Clinical and radiological monitoring approximately every 12 to 18 months is necessary to detect any possible complications.

5. Conclusion

Multiple tooth retention is a relatively rare condition and is hardly reported in the literature. The most frequent etiologies of inclusion are local; however, the presence of multiple inclusions is often part of complex dysmorphoses.
An interrogation, a rigorous clinical examination, as well as complementary examinations, especially radiological, are necessary for an optimal diagnosis.
There are as many therapeutic approaches as there are forms of inclusions, the orthodontist and the surgeon must work in perfect collaboration and the choice of the most adequate therapeutic option depends on several parameters, relative to the terrain as well as the competence of the practitioner. The whole process is part of an approach centered on the patient's well-being

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