INTRODUCTION

Dental impaction represents the dental eruption anomaly characterized by the fact that a fully formed tooth remains inside the bone a long time after its normal eruption age. Canine impaction comes second in terms of frequency, after its role as a pivot in the determination of the shape of the dental arch, its contribution to the aesthetics of the smile and its participation in the achievement of the functional occlusion.

The evaluation of the impaction for classification purposes is performed with the help of the imaging paraclinical examinations (OPG, profile teleradiographies, X-ray with occlusal film, Clark X-ray, CT scan). After the identification of the impaction, the exact localization of the impacted tooth is made (palatine, vestibular or central), followed by the determination of the intraosseous orientation, as essential characteristics for the establishment of the treatment (only monitoring/extraction of the temporary canine and its role as a pivot in the determination of the shape of the dental arch, its contribution to the aesthetics of the smile and its participation in the achievement of the functional occlusion, the exact localization of the impacted tooth can also be obtained. However, mention should be made of the fact that in cases when it is situated very profoundly or in the middle of the alveolar process, it cases when it is situated in the middle of the alveolar process, it is sufficient to enable the diagnosis of dental impaction, since a chronological age and the dental age, and to find the best conditions for a successful treatment of the impaction.

The suspicion of an impaction must be raised whenever the permanent canine cannot be seen on the superior arch at the ages of 12 and 13, and on the inferior arch at the ages of 10 and 11.

The examination and the palpation of the arch, both at the vestibular level, and at the palatal and lingual levels, are sufficient to enable the diagnosis of dental impaction, since a hard, painless tumefaction can be noticed. Very important clues regarding the localization of the tooth can also be obtained.

However, mention should be made of the fact that in the case when the tooth is situated very profoundly or in the cases when it is situated in the middle of the alveolar process, it is sufficient to enable the diagnosis of dental impaction, since a chronological age and the dental age, and to find the best conditions for a successful treatment of the impaction.

First of all, it is of the utmost importance to make the diagnosis as early as possible, so as to be able to intervene in an easier situation or when there is no discrepancy between the chronological age and the dental age, and to find the best conditions for a successful treatment of the impaction.

The suspicion of an impaction must be raised whenever the permanent canine cannot be seen on the superior arch at the ages of 12 and 13, and on the inferior arch at the ages of 10 and 11.

The examination and the palpation of the arch, both at the vestibular level, and at the palatal and lingual levels, are sufficient to enable the diagnosis of dental impaction, since a hard, painless tumefaction can be noticed. Very important clues regarding the localization of the tooth can also be obtained.

However, mention should be made of the fact that in the case when the tooth is situated very profoundly or in the cases when it is situated in the middle of the alveolar process, it is sufficient to enable the diagnosis of dental impaction, since a chronological age and the dental age, and to find the best conditions for a successful treatment of the impaction.

First of all, it is of the utmost importance to make the diagnosis as early as possible, so as to be able to intervene in an easier situation or when there is no discrepancy between the chronological age and the dental age, and to find the best conditions for a successful treatment of the impaction.

The suspicion of an impaction must be raised whenever the permanent canine cannot be seen on the superior arch at the ages of 12 and 13, and on the inferior arch at the ages of 10 and 11.
CLINICAL ASPECTS

is impossible to make a diagnosis by simply using the clinical data, in such cases a radiographic investigation being necessary. Sometimes, dental impaction is diagnosed by means of an X-ray examination performed for another disease.

The identification of the impacted canine is the first step for the correct diagnosis of such a case. The exact localization and the specification of the orientation of the impacted tooth are essential for the drawing up of a good treatment plan, the choice of the surgical method (extraction of the temporary tooth and uncovering and anchoring of the permanent tooth, extraction of the permanent tooth or transplantation), and the orthodontic treatment which depends on the first two.

PURPOSE

The purpose of this study is to present the possibility of using the radiological evaluation of some of the aspects contributing to a more accurate diagnosis of PIC, besides familial recurrence.

METHODS

This study is based on the data collected from a group of 96 clinical cases comprising patients aged between 12 and 37 years old, with late mixed dentition and permanent dentition. Regarding the skeletal development, the patients belonged to the stages CS4-CS6 (puberty - postpuberty).

In order to establish the parameters, we performed a clinical examination and paraclinical tests (models, X-rays, photos) and we filled in the observation sheets. After the examination of the group, we selected the significant cases necessary to illustrate the purpose of this study. The criteria we had in mind, besides the aesthetic one – representing in most of the cases the reason for requesting an orthodontic examination – were the functionality and stability of the occlusion.

The examination of the X-rays focussed on the following:
1. Skeletal development (cervical stages) and a possible correlation with the biological (chronological) age.
2. Distribution of the canine impaction according to sex and age.
3. Localization of the impaction on the quadrant and the relation to the middle of the alveolar ridge (buccal, middle of the ridge or palatine). This localization is purely theoretical, the surgical approach to discover the canine being B or P, followed by the creation of a tunnel from the uncovered level up to the middle of the alveolar ridge (the place where we wish to position the canine) – the newest, most conservative method from the point of view of the periodontal health.
4. Depth of the impaction.
5. Axis (orientation) of the respective canine - angulation of the canine or angle of the impaction.
7. Preservation or absence of the necessary space for the eruption of the impacted canine, persistence of the temporary canine at the level of the arch.
8. A-P position of the apex of the canine.
9. Height of the location of the crown of the canine as against IL.
10. Degree of overlapping on IL.
11. Ectopic impactions.

REMARK: The possible M3 impactions will not be taken into consideration.

The X-rays were performed at the imaging centre F.M. Medident” in Bucharest.

The intraoral X-rays we used are: the Clark method (the parallax method); the maxillary X-ray with occlusal film (described by Simpson). As extraoral radiographs, in diagnosing canine impaction, panoramic radiography and profile cephalograms are used, the axial one not being used for this purpose. In an attempt to establish some skeletal features of canine patients, some measurements were made in the linear and angular profile cephalograms. These are: SNA, SNB, ANB, facial heigh, previous posterior facial height, facial divergence, condylar growth (in conjunction with OPG), mandibular rotation.

Patient, B.S., female, aged 18, urban environment, came to the orthodontist for aesthetic reasons (absence of 13 from the arch). A.H C. are insignificant. A.P. General clinical examination shows a normotropic constitutional type. The face examination revealed a concave profile, strong labiomental channel, decreased inferior floor, decreased angle of the mandible. The dental occlusion presents a distal relation (class II/2 Angle).

The radiological analysis is made on the orthopantomogram (OPG), the profile teleradiography, the retroalveolar X-ray and the X-ray with occlusal film.

On the OPG, we can notice the site of the impaction – 1st quadrant, corresponding to the middle of the ridge. The angle of the impaction is of 30°. The severity is assessed according to the following parameters:
- angle of the impaction – 2nd degree;
- anteroposterior position of the apex of the canine – 1st degree;
- height of the crown of the canine according to IL – 1st degree;
- degree of overlapping on IL – 2nd degree.

The analysis of the retroalveolar and occlusal X-rays supports the site of the impaction (the middle of the arch) and the possibility of performing a vestibular surgical approach.

On the profile teleradiography, the linear and angular measurements reveal the positioning of the maxilla within normal limits (SNA=80°), 2nd skeletal class (ANB=5°), anterior rotation of the mandible, with HFP=55° and HFA=60°. The stage of skeletal maturity is CS6- postpubescent.

Patient, G.A. M., female, aged 13, urban environment, came to the orthodontist for aesthetic reasons (absence of 13 from the arch). A.H C. indicates a first cousin having the same anomaly. A.P. General clinical examination shows an asthenic, gracile constitutional type. The face examination was within normal limits. The dental occlusion presents a neutral relation (class I Angle).

The radiological analysis is made on the orthopantomogram (OPG), the profile teleradiography, the retroalveolar X-ray and the X-ray with occlusal film.

On the OPG, we can notice the site of the impaction – 1st quadrant, palatal localization, persistence of the temporary canine, anodontia.(1,2)

Figure no. 1. Ortopantomogram of the patient B.S. (1st clinical case)

The angle of the impaction is of 45°. The severity is assessed according to the following parameters:
CLINICAL ASPECTS

- angle of the impaction – 3rd degree;
- anteroposterior position of the apex of the canine - 2nd degree;
- height of the crown of the canine according to IL - 3rd degree;
- degree of overlapping on IL - 4th degree.

The analysis of the retroalveolar and occlusal X-rays supports the (palatine) site of the impaction and the possibility of performing a vestibular surgical approach.

On the profile teleradiography, the linear and angular measurements reveal maxillary prognatism (SNA=84°), 2nd skeletal class (ANB=6°), slight anterior rotation of the mandible, with HFP=47° and HFA=65°, retroinclination of the superior central incisors. The skeletal maturity corresponds to stage CS 5-postpubescent.

Figure no. 2. Ortopantomogram of the patient G.A.M. (2nd clinical case)

RESULTS AND DISCUSSIONS

To summarize the previous observations, we can state that canine impaction can be classified according to the possibility of the surgical approach into: buccal (comprising the proper buccal localization and the central localization, corresponding to the middle of the ridge) and palatine. This classification extends to the etiologic level as well, palatine impaction having a genetic (general) determinism, and vestibular impaction having local causes. By relating the impaction to the middle of the ridge, this can be buccal (13%), central – in the middle of the ridge (36%) – these two localizations benefitting from a vestibular approach and tunnelling - and palatine (50%) - with palatine approach and tunnelling. The temporary canine persists especially in the palatine localizations of the canine impaction (62%, i.e. 30 cases out of the total of 96), but its persistence in the other localizations is not excluded.

CONCLUSIONS

Palatine impaction and vestibular impaction of the canine are two distinct entities, both in terms of etiology and risk factors, and in terms of clinical picture and radiologic aspects. Moreover, the surgical – orthodontic treatment plan is different, particularly in the surgical stage of discovery and anchoring.

Canine palatine impaction has a genetic etiology with familial recurrence, high frequency, distribution according to sex M:F 1:2, and it is frequently bilateral. It is not associated with the absence of the space at the level of the arch, but it is associated with other dental anomalies with a genetic cause (microdontia or anodontia of the superior lateral incisor). Moreover, in the case of the palatine impaction in retarded mixed dentition, the distal inclination of the bud of the 2nd inferior premolar can also be noticed on the orthopantomogram. In most of the cases of palatine impaction of the canine, at the level of the skeleton, maxillary prognatism, skeletal class I, can be noticed, as well as the retroinclination of the central maxillary incisors, facial hypodivergence and the anterior rotation of the mandible, which is in agreement with the specialty studies. From the dental point of view, generally speaking, it falls under class I Angle.

Buccal canine impaction has local causes, more often the absence of the space at the level of the arch, no familial character, a more reduced frequency, equal distribution according to the sexes, and is very rarely bilateral. According to this study, this type of impaction is associated with various skeletal patterns, which is slightly different from the specialty literature which associates vestibular canine impaction with maxillary retrognatism, 3rd skeletal class (characteristics of the 3rd class with maxillary growth deficit) and rare retroinclination of the superior central incisors.

Consequently, we can notice at the level of the facial morphology as well, differences between canine palatine impaction and vestibular impaction, with the specification that, according to the present study, generally speaking, palatine impaction benefits from the inclusion in a certain skeletal pattern. The necessity to recognize the radiological signs announcing canine impaction is essential for the initiation of an interceptive treatment during the early or late mixed dentition stages (more correctly during the CS 1-4 cervical stages). Canine impaction presents predominantly at the palatine level (if the impaction is palatine, central and vestibular and if we consider the surgical approach, the number of palatine and vestibular cases is equal) in the second quadrant as well. The temporary canine tooth persists especially in the case of palatine impaction, but this is not always the case. The degree of severity of the maxillary canine impaction determines the duration of the treatment, which is always longer in the case of palatine impaction. All these data are useful in order to make an early diagnosis of the maxillary canine and to draw up an adequate treatment plan (vestibular or palatine approach, with or without tunnelling), as well as in order to evaluate the approximate duration of the treatment if the tunnelling technique is used (e.g. in the case of the measurements according to Ericson and Kurol; the increase by 5° degrees of angle α entails an additional week of traction; the increase by 1mm of the distance “d” entails an additional week of treatment, and an impaction in the 3rd quadrant entails the extension of the treatment by 6 weeks as against an impaction in the 1st quadrant).

Note: Fragments of this article are part of the PhD thesis entitled “Maxillary canine impaction, radiological, dental and occlusal aspects”. Author: Smarandache Andreia-Maria, being taken with the written consent of the author.

BIBLIOGRAPHY
