Dental Inclusion of Canine and Wisdom Tooth in Orthodontics

Chemical Necroses

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Canine plays an important role in the dento-maxillary system. From a functional point of view, it provides the canine guidance, by positioning it in the frontal area, has a role in facial aesthetics. It plays an important prosthetic role by having the longest root and one of the longest arcade teeth. Three molars represent the last teeth that erupt in the arches both in the jaw and in the mandible, which is why they remain the most frequently included.Canine incidence is quite common following the wisdom tooth. It can be unilateral or bilateral and is more common in the upper jaw. The canine may remain included at the vestibular, palatal or between the two bones. A separate entity is the incision of the canine in the edentulous mandible or jaw. The study included 213 cases with dento-alveolar pathology, of which 128 patients were selected with dental inclusion. Our study reports that the first three molars are frequent, followed by the canine as opposed to other studies conducted by Guzduz K in 2011 and Fardi A of the same year bringing the canines first (Fardi, Guzduz). Some studies attribute the first place to the superior canine in terms of frequency, but they are abstracted from the molar three inclusion that they consider as most frequently (Compoy). The most common tooth in inclusion is the third molar (lower and upper) followed by the upper canine; the most commonly affected are women for both canine and molar.

Keywords: wisdom tooth, canine, complications of dental eruption, dental incision, mandible, maxillary

Dental incision is the remain of a fully formed tooth inside the bone far beyond its normal age of eruption. V. Popescu considers as included the tooth that remains with the submucosal follicular sac beyond its normal period of eruption, having completed the morphological evolution with the complete formation of the root[1-15].

Dechaume considers the teeth to be included, whose pericoronous cavity has no communication with the oral environment after the usual eruption (Ecaterina Ionescu). Some authors use the term dental anclavia for partial teeth that are under the gingival fibroma (Timosca).

Canine plays an important role in the dento-maxillary assembly. From a functional point of view, it provides the canine guidance, by positioning in the front area, has a part in facial aesthetics.

The third molars represent the last teeth that erupt in the arches both in the jaw and in the mandible, that is why they remain the most frequently included[15-20].

The inclusion of canine is quite frequent following the wisdom tooth's. It may be unilateral or bilateral and is more common in the upper jaw. The canine may remain included at the vestibular, palatal or between the two bones. A separate entity is the incision of the canine in the edentulous mandible or jaw[20-25].

For the important role they play in the dento-maxillary apparatus during the dentation period, the treatment of canine inclusion should be conservative, that is, its recovery on the arch. This requires the creation of space followed by a expectation and possibly a spontaneous eruption. Another therapeutic decision would be to create space, followed by surgical discovery and surgical-orthodontic recovery[26,27,28]. The treatment of canine involvement may be radical or odontectomy, when the surgical-orthodontic recovery can not be achieved. The third molar in the dental inclusion can be associate with various cysts or cystic tumors. The inclusion of the wisdom tooth can be the cause of a jaw fracture during a trauma, too. As the most common method of surgical treatment is odontectomy, surgical discovery is extremely rare[29-31].

Experimental part

Material and method

The study included 213 cases of dento-alveolar pathology, of which 128 were selected for patients with dental incidence, ages 10 to 30 years old, from rural and urban areas, presented at the Clinic of Orthodontics and Oral and Maxillofacial Surgery in Tg. Mures in 2014-2016.

We used patients' observation sheets and surgical protocols. Patients were divided into 3 subgroups by age: 10-19 years, 20-29 years and 30-39 years, each subgroup being evaluated by sex and background area.

The criteria for inclusion in the study were: lack of canine and molar three on the dental arcade, the existence of the clinical observation sheet with all the completed fields, the existence of radiological paraclinical investigations (panoramic radiographs, bite film, retroalveolar).

Exclusion criteria from the study: lack of documentation from the observation sheets, patients hospitalized for the oral cavity for radiotherapy, the first, two, central incisor and lateral incision inclusions.

Based on the radiographic examination, relationships with neighboring teeth, maxillary sinus, mandibular canal, ratio with the two vestibular and palatal (or lingual) bone masses, obstacles as a local factor of remaining in the

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inclusion (the presence of cysts associated with the included tooth , supernumerary teeth), association with infectious complications.

The association between the labio-maxilo-palatine clefts and the canine incision was also observed.

The study of the observation sheets allowed us to evaluate the cause of the presentation to the oro-maxillofacial surgeon, namely the indication of the orthodontist, the dentist or the doctor of the family, as well as cases that occurred spontaneously, the type of surgical treatment followed (surgical-orthodontic recovery or odontectomy). The molars were associated with mandibular fractures and tumors. The data were introduced into the Microsoft Excel system and processed with the Epi Info system. The results obtained were compared with other literature data.

Results and discussions

In the 128 patients with dental incision, 75 (65.96%) were female, the remaining 53 (34.03%) male (table 1, fig. 1). The age groups at which most cases of dental incisions were diagnosed are 10-19 years and 20-29 years. Most patients diagnosed with dental inclusion come from urban areas (72.4%) as shown in table 3.

Of the total study patients 17 (10.60%) had canine incidence and 91 (89.39%) the third molar inclusions (table 1 fig. 1).

Table 1

DISTRIBUTION BY SEX OF PATIENTS WITH DENTAL INCLUSION

Sex	Frequency	Percent	Confidence Interval 95%
Female	75	66.0%	62.7%-69.1%
Male	53	34.0%	30.9%-37.3%
Total	128	100,0%	

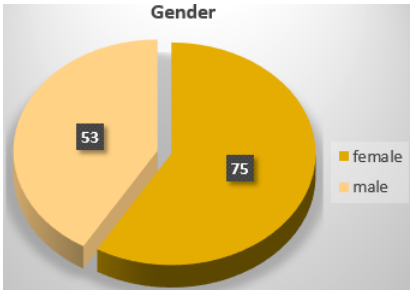

Fig.1. Distribution of patients with dental incidence by gender.

Concerning the dental inclusion distribution by age it is observed a higher percent at the age group 20-29 years.

Table 2

DENTAL INCLUSION DISTRIBUTION BY AGE

Age	Frequency	Percent	Confidence Interval 95%
10-19 years	38	22.5%	19.8%-25.5%
20-29 years	63	48.0%	44.6%-51.4%
30-39 years	27	17.0%	14.6%-19.7%

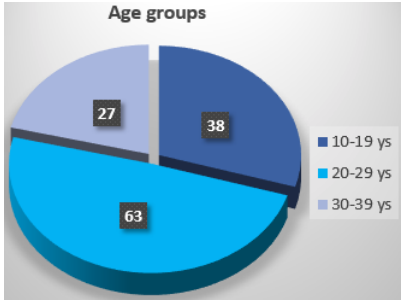

Fig.2 Dental Inclusion Distribution by Age

Analyzing the distribution of dental inclusion on the background, we found a higher frequency in urban patients due to increased addressability to the doctor (table 3, fig. 3)

Table 3

DISTRIBUTION OF DENTAL INCLUSION ON THE BACKGROUND ENVIRONMENT

Medium of origin	Frequency	Percent	Confidence interval 95%
Rural	237	27.6%	24.7%-30.8%
Urban	621	72.4%	69.2%-75.3%
Total	858	100,0%	

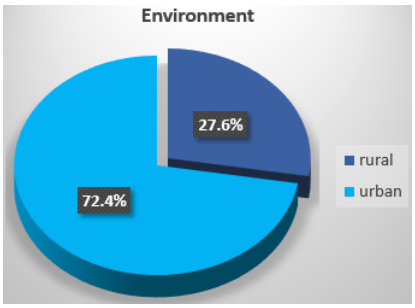

Fig.3 Distributed inclusion according to the environment of origin

In terms of inclusion in the upper jaw, in the first quadrant we obtained the following results: tooth 13 in 12 cases (6.1%); teeth 14 in 2 cases (0.2%); tooth 15 in 2 cases (0.2%); the tooth 18 in 47 cases (15.5%).

At the level of the second dial we obtained the results: tooth 23- in 8 cases (4.1%); teeth 24-in 2 cases (0.2%); tooth 25-1 case (0.1%); tooth 28- 54 cases (12.5%).

For the mandible, we obtained the following results : in the third dial, tooth 33-3 cases (0.3%); tooth 34-1 case (0.1%) tooth 35-0 cases (0.0%); tooth 38-47 cases (24%) .

For quadrant four the results obtained are: tooth 43-1 case (0.1%); tooth 44-2 cases (0.2%); tooth 45-0 cases (0.0%). The canine incidence is more common in females, where we found 58 cases (63.73%) compared to the males, where the number of cases was only 33 (36.26%). For the 3 rd molar, the majority of cases were also 67 in female cases (59.20%) compared to 57 males (30.18%).

As for the incision of canine it occurs more frequently in the upper jaw (95.6%) and on right and tooth 13 respectively (57.14%).

We found only one case of canine incision in the mandible, which was why it was not taken into the subsequent calculations.

For the molar inclusion, the most numerous cases were in the mandible, in relatively equal proportions for the tooth 38 (39.27%) and 48 (39.04%)

Distribution of dental inclusion to the jaw, tooth groups, is shown in figure 4.

Table 4

DENTAL INCLUSION FREQUENCY AT MAXILLARY LEVEL

Dental Inclusion at maxillary level	Frequency	Percent	Confidence Interval **95%**
t_13	12	6.1%	4.6%-7.9%
t_14	2	0.2%	0.0%-0.9%
t_15	2	0.2%	0.0%-0.9%
t_18	47	35.5%	13.2%-18.1%
t_23	8	4.1%	2.9%-5.7%
t_24	2	0.2%	0.0%-0.9%
t_25	1	0.1%	0.0%-0.8%
t_28	54	42.5%	10.4%-14.9%

Table 5

FREQUENCY OF DENTAL INCLUSION BY TEETH GROUPS AT THE MANDIBLE LEVEL

Dental Inclusion at the mandible level	Frequency	Percent	Confidence Interval 95%
t_33	3	0.3%	0.1%-1.1%
t_34	1	0.1%	0.0%-0.8%
t_35	0	0.0%	
t_38	47	24.0%	36.0%-42.6%
t_43	1	0.1%	0.0%-0.8%
t_44	2	0.2%	0.0%-0.9%
t_45	0	0.0%	
t_48	74	55.29%	35.8%-42.4%

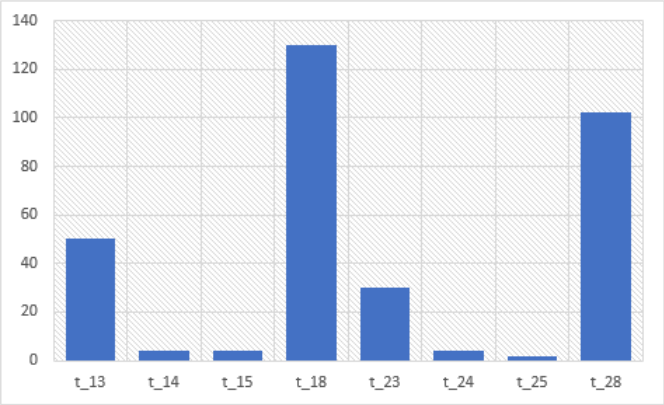

Fig. 4. Distribution of inclusion on tooth groups

The distribution of tooth jaw dental inclusion is different from the jaw and is shown in figure 5.

Analyzing the frequency of dental incision in the mandible by gender and tooth groups, we obtained an approximately equal distribution of sexes in both molar and canine inclusions (fig. 5).

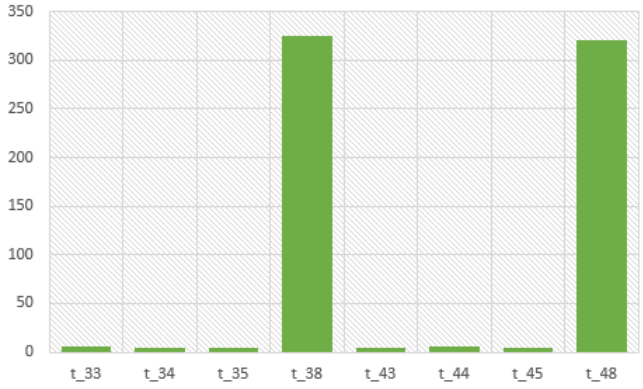

Fig. 5 Frequence of dental incisions at the mandibular level

Most often, the patient with canine and third molar inclusion is diagnosed by the orthodontist specialist, this occurs at childhood and in the adolescent / young adult. With aging, the patient's guidance with the oro-maxillofacial surgeon is done by the family doctor or dentist.

Table 6

GROUPING OF DENTAL CANAL INCLUSION BY SEX AND TYPE OF TOOTH

Tooth	13	23	33	43
Female	34	21	2	1
Male	18	14	1	0

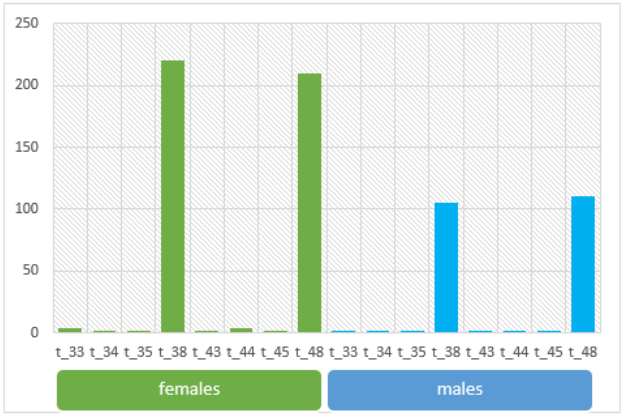

Fig . 6. Frequency of jaw insertion by sex and tooth groups

In our study, we found that patients aged less than 30 years contacted the surgeon at the advice of the orthodontist. Patients aged over 30 years contacted the surgeon, 78.78% at the indications of the dentist who diagnosed the dental incision due to the treatment of another dental condition, 15.7% at the indication of the family doctor and 5.52% spontaneously .

The surgical treatment performed, the odontectomy of the surgical discovery varies according to the tooth included for the canine as shown in table 7. For the third molars, the majority of the incidence cases were treated by odontectomy, respectively 74 cases (89.36%) , as opposed to 27 cases (10.63%) that were treated by decapping (discovery).

Most cases of molars treated by discovery were those on the mandible.

As particularities of canine inclusion, we reported a single incidence (1.09%) of inclusion in relation to the maxillary sinus, a patient who experienced neuralgial pain on the right maxillary nerve and for which it was chosen as a method of odontectomy.

The most common cases of canine incidence were those at the palatinal level (82.41%). The only case of inclusion of the tooth 43 was in intimate contact with the mandible and for which odontectomy was practiced. The association between canine inclusion and infectious complications (abscesses) brings the vestibular inclusion (13.18%) - 12 cases, followed by palatine inclusion (5.49%) - 5 cases.

The temporary canine persisted in a number of 23 cases (25.27%)(fig.7).

Table 7

TYPE OF TREATMENT PERFORMED FOR EACH INCLUDED CANINE

t_13	Frequency	Percent	Confidence interval 95%
No odontectomy	28	53.8%	39.5%-67.8%
Odontectomy	24	46.2%	32.2%-60.5%
Total	52	100,0%	
t_23	Frequency	Percent	Confidence interval 95%
No odontectomy	17	48.6%	31.4%-66.0%
Odontectomy	18	51.4%	34.0%-68.6%
Total	35	100,0%	
t_33	Frequency	Percent	Confidence interval 95%
No odontectomy	2	66.7%	9.4%-99.2%
Odontectomy	1	33.3%	0.8%-90.6%
Total	3	100.0%	

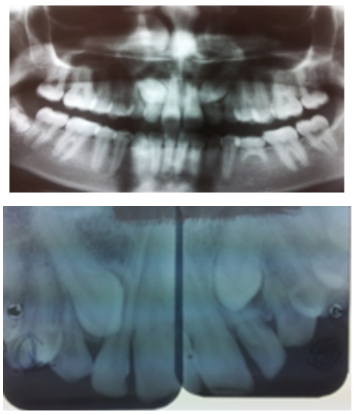

Fig.7 Panoramic Radiography / Retrovalveal Rx-Temporal Canine

Five cases presented supernumerary teeth on canine eruption (fig.8), and supernumerary tooth extraction was performed at the same session with the surgical discovery of the included tooth.

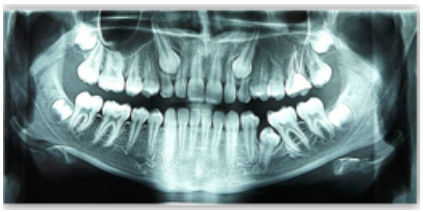

Fig. 8 Inclusion of superior canine with temporary tooth persistence; inclusion of second premolar, dental inclusion of third inferior molar

The association of dental inclusion with the presence of a odontoma was rare (1%) of cases, but the therapeutic method is complicated, requiring the patient's hospitalization with the histopathological evaluation of the taken part (fig.9).

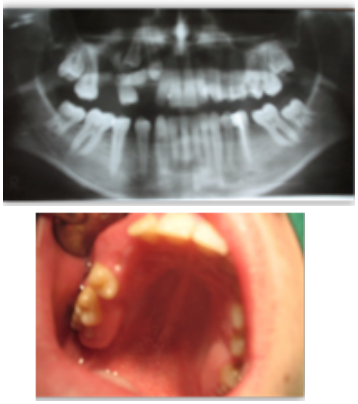

Fig.9. Panoramic radiography; Endo-buccal aspect Inclusion of premolar/ canine with the presence of a odontom

For the third molars we found associations with ameloblastomas (1.43%), follicular cysts (5%), keratochists (0.65%).

Most patients with molar inclusion came due to associated infectious complications, namely submandibular abscesses, mazeterins (50.47%). A significant number of cases were asymptomatic (42.37%) presented for odontectomy for orthodontic purposes.

The presence of third mandibular molar was associated with traumatic mandibular fractures in a number of 57 patients whose presence in inclusion could be considered as a factor of low bone resistance to trauma (13.47%). A rare association of inclusion is with follicular cyst (fig.10, 11), when odontectomy is required due to the proliferative capacity of the follicular sac (Cosarca, Pacurar, 2015).

Dental inclusion is one of the most frequent dental anomalies among the population, 2 , 9% by some authors (Uslu O). The most common are the third molars and canines, and most affected are females.

Our study reports on the first place the third molars, followed by canines as opposed to other studies conducted by Guzduz K in 2011 and Fardi A of the same year bringing the canines first (Fardi, Guzduz).

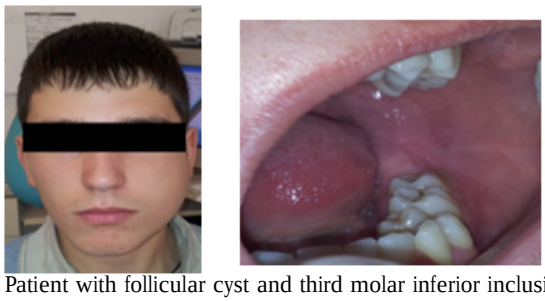

Fig.10 Patient with follicular cyst and third molar inferior inclusion: facial appearance / endobucal aspect

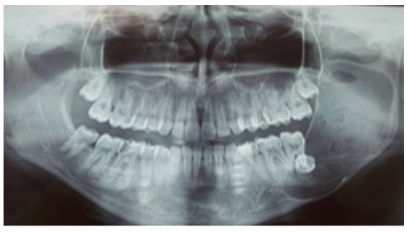

Fig.11 Rx panoramic patient with cyst and inclusion (caseus of OMF Clinic Targu Mures)

Some studies attribute the first place to the upper canine in terms of frequency, but they are abstracted from the inclusion of the third molars that they consider most frequently (Campoy).

In our study, females are in the first place in canine inclusion (63.73%), similar to a study conducted in Sibiu (Smarandache) in 2012.

For the molars, the female sex ranks first (59.20%) similar to the results obtained by other southern countries (64.9%). (Hashemipour).

In comparison with a similar study conducted at the Pediatric and Orthodontic Clinic in Tirgu Mures during the period 2005-2013, which brings to the foreground the canines included in the frequency, and the female gender, the incidence of mandibular canine in 21 cases, our study does not highlight the incidence of mandibular canine. It is possible that the results obtained are influenced by the fact that doctors here face very young patients who are not yet visible on the radiograph of the bud (Nagy Bota, Pacurar Mariana 2013).

With regard to the diagnostic age for canine inclusion, our study brings the age range of 10-19 years into the forefront, as opposed to other studies where diagnosis is mainly done in the age range of 13-15 years (Smarandache).

Our study also brings information on diagnosis and adulthood, i.e. over 40 years, as opposed to the above-mentioned study where the maximum age was 37.

As for the distribution on the four quadrants our study highlights the frequency of inclusion in the jaw, in the first dial, in contradiction with the literature that supports the opposite, i.e. the second dial on the maxillary level (Bucur, Ionescu, Fardi, Smarandache).

For molars most cases were at a mandibular level, consistent with literature (Hashemipour MA).

With regard to patient distribution, the study demonstrates that most of the patients with inclusion come from urban areas similar to those in the literature, although there is some controversy on this issue (Bucur, Timosca, Burlibasa).

One possible explanation for this is the fact that these patients are more likely to address the doctor than those in the rural environment (Study on addressability of patients to a doctor). Usually, patients with canine and molar inclusion are diagnosed in childhood and in the young adult by the orthodontist, with aging diagnosis and guidance to

the oro-maxillofacial surgeon is done by the family doctor or dentist and that as a result of associated complications occurring along the way.

This can be explained by the fact that, at younger ages, the patient is more concerned with the aesthetic aspect, given that in the frontal area the canine plays an important role in facial aesthetics.

The association between the inclusion of the third molar inclusions and odontogenic cystic tumors was signaled in other studies, too (Lin HP, Wang YP). The most common are ameloblastomas, follicular cysts and odontogenic keratocysts. Unlike other studies (Ruhin-Poncet B), our study brings follicular cysts first. All other authors (Adaki SR, Yashodadevi BK) have found greater frequency with follicular cysts. Odontoamins in relation to canine inclusion appear quite rarely in our study, unlike other junctions (Chang JY), where they were in a higher percentage both in relation to canines inclusion, maxillary and mandibular.

The association of third molar inclusion with the abscesses of the various fascicular spaces can be explained by its relationship with the neighboring teeth and the molars two, the contamination of the follicular bag and its sowing with neighboring germs, the size of the pericoronarian sac, but also the association with various diseases that lower the immune threshold (insulin dependent diabetes) (Burlibasa).

Cases of third molar asymptomatic inclusion may be explained by the association between the inclusion of these teeth and the skeletal class III abnormality, where there is anatomic space deficiency, as other studies (Abu Alhaija ES) have reported.

Chemical necroses

Maxillas can undergo necrosis processes under the action of chemical or physical agents that cause circulatory disturbances leading to nutritional deficiencies bone, followed by mortification of more or less stretched bone segments. The toxic necrosis process is usually complicated by over-addition of the infection. Chemical necrosis occurs through direct contact with caustic substances or by the elimination of toxic substances in the oral mucosa. Among the chemicals, arsenic, phosphorus, bismuth, mercury, phenols, etc. usually give jaw necrosis. Curative, general and local anti-inflammatory treatment is recommended to limit the extension of the process and prevent complications: antibiotics, corticosteroids, proteolytic enzymes, oral antiseptics.

Conclusions

The most frequent inclusion is the third molars (lower and upper) followed by the upper canine. The female sex is most commonly affected for both the canine and the molar.

The canine infusion is most commonly diagnosed by the orthodontist, the patient being more interested in the aesthetic appearance of the canine due to its absence from the arch.

Patients diagnosed with inclusion are mainly from the urban environment, due to their greater addressability to the physician.

The age group with the highest incidence of inclusion was 19-29 years old. Cystic and molar cancers and tumor associated with canine and molar inclusion are more frequent follicular cysts and ameloblastomas.

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