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TOOTH AGENESIS - THE PROBLEM AND ITS SOLVING IN OUR PRACTICE, PREVALENCE AND RELATION WITH OTHER DEFORMITIES.

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ABSTRACT

Tooth agenesis is an orthodontic abnormality affecting the number of teeth. This leads to various types of malocclusion, disturbance in the masticatory function and poor esthetics.

This survey includes 1510 orthodontic patients treated by us. Two hundred and seven (13.71%) of all of the patients have been diagnosed with tooth agenesis. One hundred thirty-seven (8.87%) of the treated patients have tooth agenesis, while 31 (2.05% of all of the patients and 23.13% of the patients with tooth agenesis) have tooth agenesis also in the third molars. In general 207 of the patients have tooth agenesis of 637 teeth. In 104 patients there are 348 absent germs of third molars. Chiefly the tooth agenesis affects one or two teeth. Fifty three patients 39.55% are with one missing tooth and 50 of them - 37.31% are with two missing teeth. It affects most often lower second premolars, followed up by the upper lateral incisors, the next group is the group of the upper second premolars. In 5 of our patients we diagnosed and treated tooth agenesis of the canines, in two of those patients the tooth agenesis of the canines was bilateral. This is a very rare problem that creates to serious occlusal dysfunctions. We found out that the ratio of distribution among the genders is at higher level for the female patients (9.70%) compared to the male patients (7.51%).

Knowing the rate of the problem among a certain nation is very important for its early diagnosis and considering the optimal treatment plan.

Key words: Tooth agenesis, lateral incisor, premolar, genetic disorders,

INTRODUCTION:

Tooth agenesis is an orthodontic abnormality affecting the number of teeth. This leads to various types of malocclusion, disturbance in the masticatory function and poor esthetics. If tooth agenesis affects the number of teeth in the frontal area, appearance of the smile is unaesthetic and patients have psychological problems. It is considered that tooth agenesis is a normal stage of the human race development, because of the way of life and consumption of processed food.

LITERATURE SURVEY:

Tooth agenesis (hypodontia) is a term used to describe absence of tooth germs [1, 2]. The hypodontia is mild if the absent tooth germs are 1-2, moderate if they are 3-5 and severe if they are more than 6.The last one is also known as oligodontia in the literature this. When all of the tooth germs are absent, it is called anodontia. It is very rear and related with genetic disorders [3].

The absence of few permanent tooth germs causes impaired masticatory function and long-term period deformations of the other teeth. Also it can appear speech disorders associated with poor aesthetics and psychological problems.

The problem affects more often the germs of the permanent teeth and rarely the primary tooth germs. The diagnosis is based on X-ray, clinical examinations and history of the disease. It is possible during the clinical examination to notice other abnormalities including different shape and size of the teeth underdeveloped alveolar crests, delayed tooth eruption, persistent primary teeth, taurodontism, fake diastema and deep-bite [4, 5, 6].

Tooth agenesis has a multifactor etiology. It includes genetic and environmental factors. According to last researches in the field of genetics, they are focused about transcription of factors, especially in families with inherited tooth agenesis [7]. Specific genes being object of research are: MSX1, PAX9 and AXIN2 mutations.

There are few hypotheses that suggest the etiology of tooth agenesis. The first one is about traumatic injure (environmental factor) during the germ development. Other hypothesis suggests that hormonal disorders, infections, radiation or chemotherapy during growth period are responsible for tooth agenesis [5].

Tooth agenesis can appear as an accompanying syndrome's symptom. In this case it can be combined with other congenital disorders. Tooth agenesis can appear in persons in good health without manifesting a symptom of a syndrome.

Ratio: Most of the authors found out that tooth agenesis affect very rarely primary dentition. They found out ratio of 0.1 - 0.9% contributed equally among the two genders [3].

A deep research about distribution of tooth agenesis among the different races and ethnic groups has never been done. According to the published surveys we can say that tooth agenesis is most often observed among the female gender in Europe and Australia than America [8].

We will quote the distribution of tooth agenesis among the different races: Europeans (4.6 - 6.3%), Americans (3.2-

4.6%), Afro-Americans (3.2 - 4.6%), Australians (5.5 - 7.6%), Arabians (2.2 - 2.7%) and Chinese (6.1 - 7.7%) [9]. Other surveys show that the distribution among Scandinavians is (4.5 - 6.3%) and Japanese (7.5 - 9.3%) [10, 11]. According to the aforementioned surveys tooth agenesis affects more often lower second premolar 41%, followed up by upper lateral incisor 22.9%, upper second premolar 21.2%, lower central incisor 3.5%, upper first premolar 2.8% and lower lateral incisor 2.5%. Celikoglu expect and find to be 4.6 percent for the Turkish orthodontic patient

population (hypodontia 4.3% and oligodontia 0.3%) [12].

Chiefly this disorder is associated with impaction and infra position of the second primary molars and clinical manifestation such as atrophic alveolar ridge, supraposition of the antagonist teeth, tipping of the adjacent teeth to the absent tooth, even their impaction.

In our own orthodontic practice all of these clinical problems were a leading motive to make a research about this disorder-tooth agenesis. Hypodontia and oligodontia require a multidisciplinary approach to their treatment [13, 14, 15]. Treatment is long and depends on the best individual treatment plan.

AIM:

Aim of this research is to assess the prevalence and gravity of tooth agenesis and its correlation with other disorders in the orthodontic patients treated by us.

MATERIALS AND METHOD:

This survey includes 1510 orthodontic patients treated by us. They have been treated in the period from 2004 to 2015. We reduce the age limit from 5 to 20 years old patients - patients in growth period. The average age of the patients is 13.25±33.48 years old. Patients from male gender are 572 (37.9%) and from female gender 938 (62.1%).

The age group with the highest level of patients among the male gender is between 11-16 years old 326 - clinical cases, followed up between 5-10 years old with 124 clinical cases. The age group with the highest level of patients among the female gender is between 11-16 years old - 580 clinical cases, followed up between 17-21 years old with 215 clinical cases.

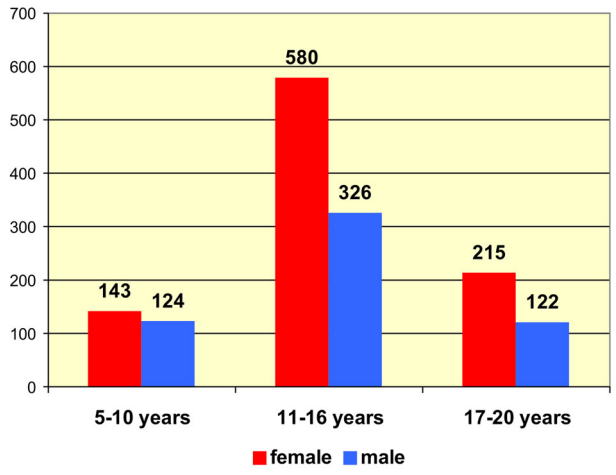

Fig. 1. Distribution of the patients by gender and age

The Distribution of patients according to the dentition is as follows:

Permanent Dentition – 1066 (70.6%);

Mixed dentition – 439 (29.1%);

Primary dentition - 5 (0.3%)

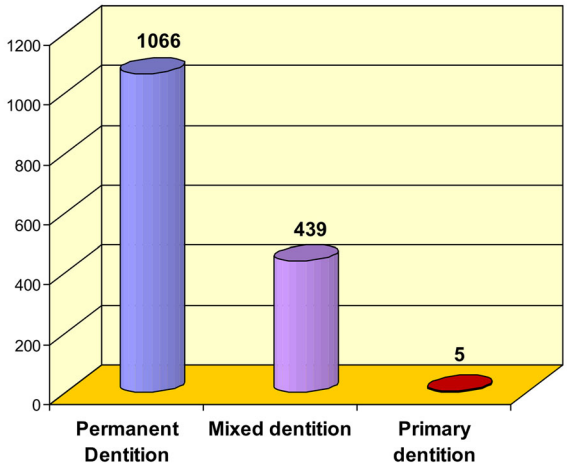

Fig. 2. Distribution of the patients by dentition

The data was processed with the statistical package of IBM SPSS Statistics 22.0. For a level of importance, in which the zero hypothesis is rejected, to be considered $p<0.05$.We have used the following statistical methods: Descriptive analysis, Graphical analysis, Fisher test, Kolmogorov-Smirnoff test.

RESULTS:

Two hundred and seven (13.71%) of all of the patients have been diagnosed with tooth agenesis. Seventy-three (4.83%) of all of the patients have been diagnosed with tooth agenesis of the third molars. One hundred thirty-seven (8.87%) of the treated patients have tooth agenesis, while 31 (2.05% of all of the patients and 23.13% of the patients with tooth agenesis) have tooth agenesis also in the third molars.

Five hundred seventy-two of all of the patients are from male gender and in particular seventy five of them have tooth agenesis (13.11%). Forty-three (7.51%) of the male patients are diagnosed with tooth agenesis excluding the third molars. Male patients with absent third molars are 32 (5.59%).

938 of all of the patients are from female gender. One hundred thirty two of them have tooth agenesis (14.07%). Ninety one (9.70%) of the female patients are diagnosed with tooth agenesis excluding the third molars. Female patients with tooth agenesis of the third molars are 41 (4.37%).

In general 207 of the patients have tooth agenesis of 637 teeth. In 104 patients there are 348 absent germs of third molars. In this group 31 of them have tooth agenesis of other teeth except the third molars. The disorder tooth agenesis of the third molar is not important for the orthodontic plan and treatment, so it will not be considered in the following research.

Tabl. 1. Distribution of patients by gender and diagnosed type of tooth agenesis.

Index	Male(n=572)		Female (n=938)		p
	Number	%	Number	%	
Patients with tooth agenesis in general	75	13,11	132	14,07	n s
Patients with tooth agenesis only of third molars	32	5,59	41	4,37	<0,01
Patients with tooth agenesis excluding the third molars	43	7,51	91	9,70	<0,01
Patients with tooth agenesis of third molars and other teeth	13	2,27	18	1,92	n s

In general patients with tooth agenesis are 134 and they have a total of 295 absent teeth. We can say that this is 2,2 teeth average missing on a patient.

Tabl. 2. Ratio of the teeth affected by tooth agenesis

Index	Male(n=572)		Female (n=938)		p
	Number	%	Number	%	
Patients with tooth agenesis	43	7,51	91	9,70	<0,01
Absent teeth (excluding third molars)	85	0,50	210	0,81	<0,01

It is clear from Tabl. 2 that the prevalence of tooth agenesis differs between the two genders. It is considerably higher among the female gender. The ratio of absent teeth between females/males is 2.12/1. This is a mark of gender dimorphism.

It is clear from Tabl.3 that the upper and lower jaws are affected almost equally, with a little prevalence of the problem in the upper jaw. We can make a conclusion that there is a difference in the prevalence between right and left segment as in upper jaw and in lower jaw. Tooth agenesis is most often observed in the right segment in upper jaw and in the left segment in the lower jaw.

Tabl. 3. Comparative analysis between tooth agenesis in upper and lower jaw

Index	Upper jaw		Lower jaw		p
	Number	%	Number	%	
Tooth agenesis in right segment	84	28,47	59	20,00	<0,01
Tooth agenesis in left segment	72	24,40	80	27,11	n.s.
Tooth agenesis of 295 teeth	156	54,33	139	47,12	<0,01

Table 4. shows the prevalence of tooth agenesis according to the number of the absent teeth. It becomes clear that:

Chiefly the tooth agenesis affects one or two teeth. Fifty three patients 39.55% are with one missing tooth and 50 of them – 37.31% are with two missing teeth.

Followed up by patients with missing three or four teeth – 12, which is 8.95%. In single cases of tooth agenesis the number of missing teeth is between 6 and 11.

Tabl. 4. Prevalence of patients according to the number of teeth affected by tooth agenesis

Number of tooth agenesis	Clinical cases	Prevalence	Sp	Male cases	Female cases
1	53	39,55	4,12	18	35
2	50	37,31	3,89	18	32
3	12	8,95	0,93	3	9
4	12	8,95	0,93	3	9
5	1	0,75	0,08	-	1
6	3	2,24	0,23	1	2
8	2	1,49	0,15	-	2
11	1	0,75	0,08	-	1

In table 5.wedisplay the number of teeth affected of tooth agenesis depending on the type of the teeth it affects. As we can see:

1. It affects most often lower second premolars 35 and 45 (54+42=96 teeth – 33.22%)
2. Followed up by the upper lateral incisors 12 and 22 (38+36=74 teeth – 25.60%)
3. The next group is the group of the upper second premolars 15 and 25 (32 + 26=58 teeth – 20.07%)
4. In 5 of our patients we diagnosed and treated tooth agenesis of the canines, in two of those patients the tooth agenesis of the canines was bilateral.
5. It is rarely to observe tooth agenesis to affect molars and lower first premolars.
6. The lower lateral incisors are not often affected unlikely the upper lateral incisors.

Tabl. 5. Distribution of tooth agenesis among genders according to the type of teeth.

Number of tooth agenesis	**2**	**-**	**32**	**4**	**3**	**38**	**5**	**1**	**36**	**4**	**3**	**26**	**-**	**2**
Male	-	-	8	1	-	9	4	1	11	2	1	6	-	-
Female	2	-	24	3	3	29	1	-	25	2	2	20	-	2
Teeth in upper jaw	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
Teeth in lower jaw	**47**	**46**	**45**	**44**	**43**	**42**	**41**	**31**	**32**	**33**	**34**	**35**	**36**	**37**
Male	2	-	13	1	-	-	4	2	-	-	1	13	-	2
Female	1	1	29	-	-	1	7	6	2	-	2	41	-	-
Number of tooth agenesis	**3**	**1**	**42**	**1**	**-**	**1**	**11**	**8**	**2**	**-**	**3**	**54**	**-**	**2**

We analyzed the related orthodontic disorders combined with tooth agenesis in the dentition Tabl. 6 and we found out the following correlation:

Tooth agenesis has a significant relation with impacted teeth, extraction treatment and microdent.

When tooth agenesis is affected the lower and upper second premolars, most often there is a presence of persistent primary second molars.

Patients with diagnosed tooth agenesis are unlikely to be treated with extractions. In cases with extractions combined with tooth agenesis it is considered to be compensatory in asymmetric tooth agenesis cases.

Tabl. 6. Analysis of the relation between tooth agenesis and other orthodontic disorders

Index	**Tooth agenesis**		**p**
	Number	%	
Hyperodontia	2	1,50	1,000
Transposition	2	1,50	1,000
Impacted teeth	36	15,30	0,015
Cysts	7	3,00	0,196
Persistant primary teeth	68	23,53	0,023
Extraction treatment	18	7,70	0,022
Microdent	17	7,20	<0,001

DISCUSSION:

Our survey is based on patients with true orthodontic disorders, unlike other literature researches. We found out that the lower second premolars are affected most often by tooth agenesis 33.22%, followed up by upper lateral incisors – 25.60%, followed up by upper second premolars 20.07%. Hobkirk et al. found out similar to our results. According to them chiefly the tooth agenesis affects the lower second premolar 41% and upper lateral incisor – 22.9%, upper second premolar 21.2%

We found out that the ratio of distribution among the genders is at higher level for the female patients (9.70%) compared to the male patients (7.51%). This is most likely caused by the genetic part of its etiology and the fact that patients from female gender seek for orthodontic help more often than male. We found out that there is difference between the prevalence of tooth agenesis according to the right and left segment of the dental arch. Also there is a difference between the prevalence in lower and upper jaw. There is a higher level of prevalence in the right segment of the upper dental arch and in the left segment in lower dental arch.

Tooth agenesis of upper lateral incisors is one of the main reasons for impaction of canines. For its long way of eruption the canine germ needs a traction guide. The distal surface of the lateral incisor is the needed traction guide, when it is absent the canine germs tends to impact.

Frequently tooth agenesis of lower and upper second

premolars is combined with presence of persistent primary molars.

There are two main approaches for treating a patient with tooth agenesis – closing the spaces using the present teeth or opening space for prosthetic treatment. The need of maintaining the required space until the end of the growth period is unsecured and frequently undesirable. Treatment with closing the gaps with the present teeth is more desirable way of treatment in adolescent age, because of the long-term stability result. We consider the length of the dental arch, the face profile, type of occlusion, dimensions and aesthetics of the canines, presence of third molars, duration of treatment and its gravity, expectations of patients.

CONCLUSION:

The early diagnosis and treatment are important for improvement of the masticatory function, speech and appearances. The optimal treatment includes multidiscipline approach between the following specialist: general dental practitioners, orthodontists, oral and maxillofacial surgeon and prosthesis. The treatment goals are targeted to keep the present teeth, improvement of the masticatory function, speech disorders, esthetic appearances and psychological condition of the patients.

FUTURE SCOPE:

Knowing the rate of the problem among a certain nation is very important for its early diagnosis and considering the optimal treatment plan. The treatment with closing gaps leads to shortening of the dental arch. This leads to the treatments with prosthetic restoration require long-term maintenance or their replacement. Decisions for most appropriate treatment plan should be considered with the genetic predisposition of the patient and their requirements. Also the soft tissues and bone structure esthetics of the face and smile should be taken in mind in the treatment plan.

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