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FREQUENCY OF TOOTH RETENTION IN AZERBAIJANI RESIDENTS

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7172 patients who applied for orthodontic care were examined, of which 2669 (37.21 %) were male and 4503 (62.79 %) were female. 899 impacted teeth were identified, which was 12.53±0.39 % of cases. Depending on the ratio of the first permanent molars according to Angle's classification: out of 3545 patients with class I, impaction of permanent teeth was observed in 494 patients (13.94±0.58 %); from 2710 patients with class II impacted permanent teeth were observed in 304 patients (11.22±0.4 %); from 917 patients with class III impacted permanent teeth were observed in 101 patients (of 11.01±1.03 %). In patients with vertical malocclusions identified 81 impacted tooth 891 patients with open bite (9.09 ±0.96 %), and 181 of the impacted tooth (11.11±0.78 %) in 1629 patients with a deep bite. Timely detection of tooth impaction helps to prevent the development of complications and secondary deformities of the dentition.

Keywords: central incisors of the upper jaw, impaction, eruption delay, Angle's classification

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ЧАСТОТА РЕТЕНЦІЇ ЗУБІВ У НАСЕЛЕННЯ АЗЕРБАЙДЖАНУ

Обстежено 7172 пацієнтів, які звернулися за ортодонтичною допомогою, з них 2669 осіб (37.21 %) чоловічої і 4503 особи (62.79 %) жіночої статі. Виявлено 899 ретенованих зубів, що склало 12.53±0.39 % випадків. Залежно від співвідношення перших постійних молярів по Енгл: з 3545 пацієнтів з класом I ретенція постійних зубів відзначалася у 494 пацієнтів (13.94±0.58 %); з 2710 пацієнтів з класом II ретенція постійних зубів відзначалася у 304 пацієнтів (11.22±0.4 %); з 917 пацієнтів з класом III ретенція постійних зубів відзначалася у 101 пацієнта (11.01±1.03 %). У пацієнтів з вертикальними аномаліями прикусу виявлено 81 ретенованией зуб у 891 пацієнтів з відкритим прикусом (9.09±0.96 %) і 181 ретенований зуб (11.11±0.78 %) у 1 629 пацієнтів з глибоким прикусом. Своєчасне виявлення ретенції зубів сприяє запобіганню розвитку ускладнень і вторинних деформацій зубних рядів.

Ключові слова: центральні різці верхньої щелепи, ретенція, затримка прорізування, класифікація Енгля

This work is a fragment of the doctoral dissertation: "Modern principles of optimization of methods of diagnosis, treatment and prevention of vertical dentoalveolar anomalies".

Violation of the eruption of permanent teeth – retention, a common dental anomaly. Many studies in the field of interdisciplinary dentistry are devoted to the diagnosis and treatment of dental retention. However, despite this, there is no single protocol for the treatment and prevention of such an anomaly.

Under physiological conditions, a tooth erupts when half or three quarters of the final root's length is formed. If the teeth remain in the jaws after a period of physiological eruption, they are considered retentive [1, 5, 6, 8]. According to the literature, the most common among the retinated teeth are the third molars, canines, premolars, and then incisors. Statistical data on the prevalence of retentive teeth are not identical, and their frequency varies depending on race [2, 10, 14].

The causes of tooth retention can be supercomplete teeth (SCT), adentia, various injuries, ameloblastomas, odontomas, cysts, caries damage to neighboring teeth, early removal of temporary teeth, incorrect position of the rudiments of the teeth, the presence of a dense mucous membrane on the path of teething [3, 8, 11]. Tooth retention is also found in patients with various hereditary diseases and Scheithauer-Marie-Sainton, Down, Gorlin–Goltz syndromes, and is often combined with the presence of SCT [12].

To correctly diagnose tooth retention and determine the optimal treatment plan for patients with malocclusion, it is important to determine the degree of root formation and the features of the location of teeth in the jawbones: the levels of occurrence, the angles of inclination, and the presence of obstacles to their eruption. For this purpose, X-ray diagnostic methods are widely used in orthodontic practice, mainly panoramic rentgenography of the jaws, and in recent years, the method of computed tomography is often used [3, 7, 15].

Since teeth play an important role in the formation of a beautiful smile, speech mechanisms and the act of chewing, their absence of some of them in the dentition causes anatomical, aesthetic and functional disorders and social maladaptation of a person in society. Therefore, timely detection of retentive teeth is important for the prevention and treatment of dental anomalies, which makes this problem relevant.

The purpose of the study was to access the frequency of retentive teeth in patients requesting orthodontic care in the Republic of Azerbaijan.

Material and methods. The study included retrospective data of 7172 patients who applied for orthodontic care in the clinic of the Department of Dentistry of the Azerbaijan Medical University and in the dental clinic "Ortho-1" for 25 years.

Of the total number of examined 7172 patients who applied for orthodontic care 2669 (37.21 %) were male and 4503 (62.79 %) were female. Depending on the age, the patients were divided into 5 groups:

Group 1 – 181 children with a temporary bite (2–5 years), of which 74 (40.88 %) boys and 107 (59.12 %) girls.

Group 2 – 1,807 children with early replacement bite (6–9 years old), who had their first permanent molars and incisors – 807 (44.66 %) boys and 1000 (55.34 %) girls.

Group 3 – 2,241 children with late replacement bite (10–13 years), who had the first premolars and canines – 884 (39.45 %) boys and 1357 (60.55 %) girls.

Group 4 – 1,790 adolescents with early permanent bite (14–18 years old), who had a second permanent molar – 662 (34.75 %) boys and 1,168 (65.25 %) girls.

Group 5 – 1,153 adults with a permanent bite (19 years or more), who had a third permanent molar: 282 (24.46 %) men and 871 (75.34 %) women.

Taking into account the varieties of sagittal closure of the first permanent molars according to the Angle's classification, the patients were divided into 3 groups:

Group 1 – neutral molar closure – 3,545 (49.43±0.59 %) patients;

Group 2 – distal molar closure – 2,710 (37.79±0.57 %) patients;

Group 3 – mesial closure of molars – 917 (12.79±0.39 %) patients

Table 1

Distribution of patients into groups, depending on the ratio of the first permanent molars in the sagittal plane according to Angel's classes

Age	Class I	Class II	Class III
1–5 years (n=181)	69 38.12±3.61 %	64 35.36±3.55 %	48 26.52±3.28 %
6–9 years (n=1807)	919 50.86±1.18 %	640 35.42±1.13 %	248 13.72±0.81 %
10–13 years (n=2241)	1104 49.26±1.06 %	931 41.54±1.04 %	206 9.19±0.61 %
14–18 years (n=1790)	893 49.48±1.18 %	657 36.70±1.14 %	240 13.41±0.81 %
Older than 19 years (n=1153)	560 48.57±1.47 %	418 36.25±1.42 %	175 15.18±1.06 %
Total (n=7172)	3545 49.43±0.59 %	2710 37.79±0.57 %	917 12.79±0.39 %

In the vertical plane, the presence of vertical incisor disocclusion (open bite) was revealed in 891 patients (12.42±0.39 %), and vertical incisor occlusion (deep bite) in 1629 patients (22.71±0.49 %). To determine the frequency of retention of permanent teeth during the clinical examination, the following indicators were determined: the size, shape, location of individual teeth, anomalies in the shape and size of the dentition, occlusion disorders in three mutually perpendicular directions, and lack of space in the dentition in mm.

The diagnosis of retention of an individual tooth or a group of teeth was established by the analysis of orthopantomogram (OTPG) and computer tomography (CT) according to the following indicators:

– The presence of rudiments of teeth with fully formed roots;

– The level of the location of the teeth in the alveolar process;

– Angles of inclination of the longitudinal axes of the teeth in relation to adjacent teeth;
– Features of the location of teeth in the jaws;
– The presence of obstacles that contribute to the delay of teething.

The location of the retented teeth, the degree of their formation, and the relationship with other teeth were determined on orthopantomograms, by performing geometric measurements, specifying the levels of location and the angles of their inclination to the occlusal plane.

In cases where the retented teeth were located behind the odontoma or cyst and it was not possible to determine their exact location on the orthopantomogram, computed tomography was used (85 patients).

The data was collected and analyzed using the IBM SPSS Statistics 22 statistical package. The differences between the groups ' indicators were checked using $\chi 2$ – square, Mann-Whitney, and univariate analysis of variance (ANOVA). The significance level was set at 5 % ($p<0.05$).

Results of the study and their discussion. Of the total number of examined 7172 patients, 899 retentive teeth were revealed, which was 12.53±0.39 % of cases. At the same time, retention in women was much more frequent and amounted to 64.5 % of cases, in men – 35.5 % of cases.

Impacted teeth depending on the ratio of the first permanent molars on Angle were as follows (fig.1).

Impacted permanent teeth were observed in 494 patients of the 3545 patients with class I, which amounted to 13.94±0.58 % of cases; in these patients, a total of 727 discovered teeth, an average of 0.21±0.01 tooth per patient.

Retention of permanent teeth was observed in 304 patients of the 2710 patients with class II, which was 13.94±0.58 % Odds ratio (OR) =1.28; 95 % confidence interval (CI): 1.10–1.49; $p2<0.05$; these patients had 501 retained permanent teeth, i.e., an average of 0.18±0.01 teeth per patient;

Retention of permanent teeth was observed in 101 of the 917 patients with Class III, which was 11.01±1.03 %; cases, OR=1.31; 95 % CI: 1.04–1.64; ($p3<0.05$); these patients had a total of 177 retained teeth, i.e., an average of 0.19±0.01 teeth per patient.

In patients of the 1st and 2nd age groups, the retention of SCT between the central incisors was mainly observed. In the 3rd age group, patients with retentive teeth often had canines and second premolars. In patients of the 4th and 5th age groups, retention of the third molars was more common.

The frequency of tooth retention in patients was also revealed, depending on the vertical ratios of their tooth rows (fig.2).

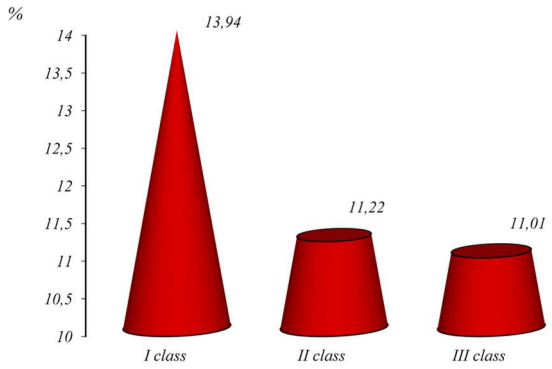

Fig. 1. The number of retented teeth in patients, depending on the ratio of the first permanent molars according to Angle

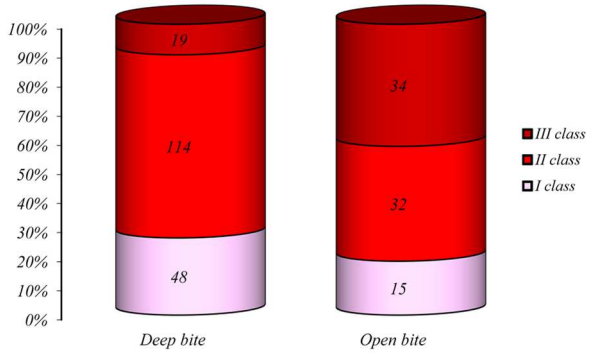

Fig. 2. The frequency of retentive teeth in vertical dentoalveolar anomalies ($x^2=34.4$; $p<0,001$).

Thus, out of 891 patients with an open bite, 81 retentive teeth were detected, which is 9.09±0.96 %; and in 1629 patients with a deep bite, 181 retentive teeth were detected, which is 11.11±0.78 % of cases (OR=0.80; 95 % CI: 0.61–1.05; $p>0.05$).

On the upper jaw (UJ), the most frequently retented teeth are the canines (right – 2.29±0.18 %, left – 2.44±0.18 %,), and on the lower jaw (LJ) – the second premolars (right – 2.2±0.17 %, left – 1.85±0.16 %), and the wisdom teeth (left – 2.50±0.18 %, right – 2.27±0.18 %) (fig. 3, 4).

Retention of permanent teeth (RPT) is one of the most complex forms of dentoalveolar anomalies (DAA) and is one of the serious problems of modern orthodontics. RPT is mainly caused by a violation of the physiological process of teething and their delay in the jaws.

This pathology leads to both morphological and functional disorders of the dentofacial system, and to aesthetic deviations, which worsens the quality of life of patients. With retention of the front teeth (incisors and canines), patients complain of an aesthetic factor – an ugly smile and psychological experiences, while retention of the side teeth negatively affects the function of chewing [3, 11].

According to our studies, it was found that the UJ mainly had supercomplete central incisors: in the area of 11 teeth – 56 (32.32±3.65 %) cases, in the area of 21 teeth – 55 (33.54±3.69 %) cases, then lateral: in the area of 12 teeth – 21 (0.29±0.06 %) cases, in the area of 22 teeth – 13 (0.18±0.05 %) cases. On the LJ, the most SCT was observed in the area of the first premolars – on the right – 15 teeth (9.15±2.25 %), on the left – 14 teeth (8.54±2.18 %).

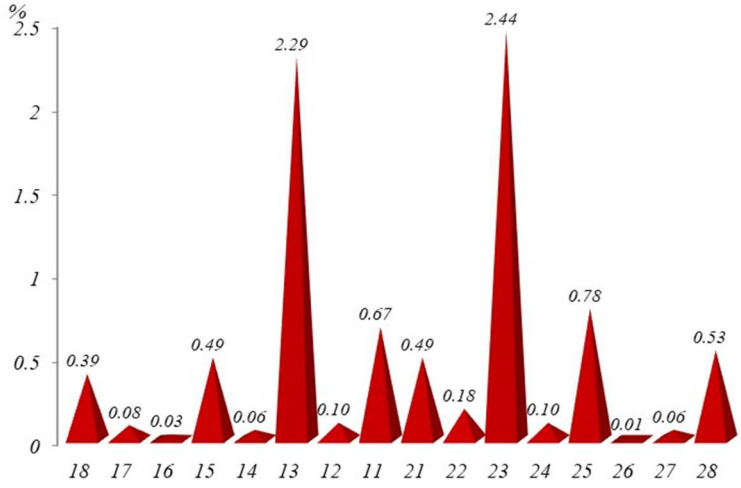

Fig. 3. Frequency of retentive teeth in the upper jaw.

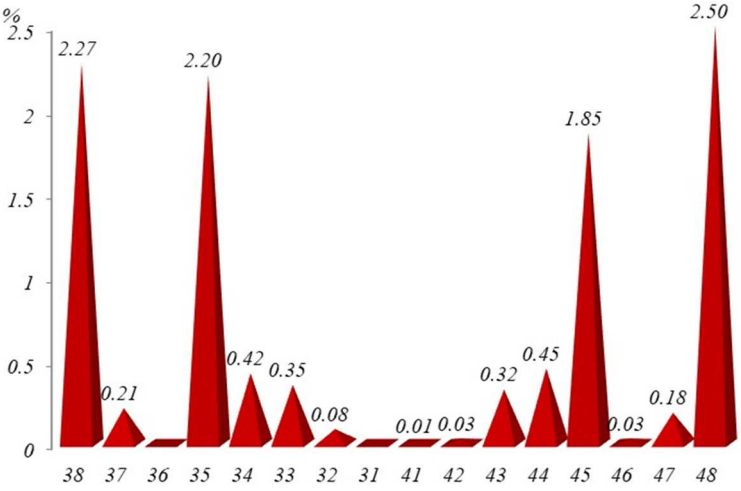

Fig. 4. Frequency of retentive teeth in the lower jaw.

Supercomplete incisors and canines were rarely seen, mainly in patients with multiple SCT and various syndromes.

The SCT identified by us often had an atypical shape of crowns (cone – shaped, spiny, etc.) and roots (unformed, curved, etc.). In some cases, they had the form of complete teeth with normal formed roots. SCT were often located in the jaw bones at an angle to the occlusal plane, and sometimes were directed towards the nasal cavity and maxillary sinuses. SCT in 33 patients were located on the path of complete teeth eruption, causing their retention.

The reason for the retention of permanent teeth can be various injuries, as well as odontoamelo-blastomas, odontomas, cysts or fibroids, as well as the incorrect location of the tooth rudiment with a vertical, horizontal slope or at an angle to the occlusal plane [8, 9].

Most authors believe that the main reason for the retention of permanent teeth is the early removal of temporary teeth, which leads to the displacement of adjacent teeth and a decrease in the size of the dental arch [3, 8, 11].

Our research has confirmed this fact. The main cause of tooth retention, in addition to supercomplete teeth, were odontomas and displacement of adjacent teeth due to early removal of temporary teeth.

Thus, the etiopathogenesis of dentoalveolar anomalies caused by the retention of permanent teeth indicates the polyetiology of this pathology, which was confirmed in our study.

According to the literature [4, 9, 13], the occurrence of RPT ranges from 4 % or more, and most often there is retention of the upper canines and lower premolars, then the lower third molars, less often – retention of the central and lateral incisors.

According to the data of Ukrainian authors [3] who examined 149 patients with retention, divided into groups according to the number of retained teeth – partial, multiple and complete retention, it was noted that the retention of canines accounts for 48 % of cases, central and lateral incisors – 24 % and 15 %, respectively, premolars and molars – 13 %.

During the examination of 26039 Chinese children and adolescents, retention of the upper canines was detected in 533 patients (327 women and 206 men), which was 2.1 %. At the same time, unilateral canine retention was observed in 82.9 %, and bilateral – in 17.1 % of patients. In general, out of 442 cases with unilateral retention of canines, 220 (49.8 %) were located vestibularly, 194 (43.9 %) palatine, and 28 (6.3 %) canines were located within the dental arch [13].

The analysis of 1,527 OTPG in Turkish patients (947 female, 580 male) revealed retention in 9.10 % of them, without significant differences between the sexes (p=0.897). At the same time, it was noted that the most frequently retented canines were the UJ canines (5.24 %), the second LJ premolars (2.23 %), then the second UJ premolars (1.11 %) and the mandibular canines (0.92 %) [14].

The frequency of tooth retention in patients with neutral, distal, and mesial dentition ratios was determined [4], according to which, among patients with a neutral bite, the prevalence of retention is 24.48 %, with a distal ratio – 30.18 %, with a mesial ratio – 42.11 %. In conclusion, the author notes that the most common retention of teeth was found in patients with a mesial ratio of dentition, while according to our data, retentive teeth were more common in patients with a neutral ratio. The author also, without taking into account the retention of the third molars and without distinguishing groups of patients with different ratios of dentition in the sagittal direction, revealed tooth retention in 7.88 % of the examined patients, and the thirds molars, and then the canines, were the most often retained.

In our work, we used a large contingent of patients – 7,172 people, divided into 5 age groups, which allows us to assert that there is sufficient material for conducting statistical studies. The data obtained indicate the peculiarities of the occurrence of retentive teeth among the residents of Azerbaijan, which indicates the need for such diagnostic procedures as orthopantomography and computed tomography for the timely detection of retentive teeth and their subsequent treatment.

Conclusion

When examining 7,172 patients with various anomalies of the maxillofacial system seeking orthodontic care, retention of permanent teeth was detected in 12.53±0.39 % of cases.

The combination of retention of teeth with malocclusion in the vertical direction was also determined – with an open bite in 9.09±0.96 %; with a deep bite – 11.11±0.78 %.

Thus, tooth retention, being one of the most common dental pathologies in Azerbaijan, is of great medical and social importance.

To develop an algorithm for treating patients with this pathology, an orthodontist should take into account sagittal and vertical malocclusion. Timely detection and treatment of tooth retention helps to prevent the development of complications and secondary deformities of the dentition. The observation of this category of patients should become one of the most important areas of dispensary control over the state of dental status.

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