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# Analysis of Impacted and Retained Teeth Operated at Department of Oral Surgery, School of Dental Medicine, Zagreb

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## A B S T R A C T

*The purpose of the present study is to see whether we follow global guidelines for operative procedures and diagnoses for impacted and retained teeth, and to compare these results with older results in Croatia. Operative protocols from Department of Oral Surgery, School of Dental Medicine, Zagreb in the period from 1997 till 1999 were used in the present study. 4756 patients were operated (total of 4857 diagnosis were set). Of all diagnoses, 24.89% (N=1209) belongs to dens impactus, 5.13% (N=249) to dens semiimpactus, 6.05% (N=294) to dens retentus and 0.64% (N=31) to dentitio difficilis. These four diagnoses make 36.71% of all 4857 set diagnoses. Most commonly impacted teeth are: 8– (38.64%), –8 (35.88%), 8+ (10.9%) and +8 (9.29%). Most commonly retained teeth are: 3+ (19.1%) and +3 (18.8%), while in the remaining two diagnoses –8 and 8– are most commonly diagnosed and operated teeth. Impacted teeth are in 97.90% of the cases operated by alveolotomy procedure. With semiimpacted teeth alveolotomy was conducted in 94.12% cases, and 5.10% of such teeth were extracted. With retained teeth alveolotomy was conducted in 65.21%, corticotomy in 23.01% and extraction in 8.77% of the cases. With dentitio difficilis alveolotomy was applied in 46.88%, extraction in 37.50%, circumcision in 9.38% and corticotomy in 6.25% of the cases. Intra muscular corticosteroids (Dexamethason) were used in 2.80% of the cases, most commonly with dens impactus and dens retentus diagnosis. PHD was done in 4.21% cases. Although its use is on the increase, Dexamethason is still rarely used in everyday practice, despite global guidelines for the postoperative use of corticosteroids. PHD analysis is used most commonly with retained teeth since they usually come with follicular cysts. Anesthesia without epinephrine was used in only 1.80% of the operating procedures, because the epinephrine solution used at Oral Surgery Department is 1:160000.*

***Key words:*** *impacted teeth, third molar, dexamethason, epidemiological study*

## Introduction

In this research we followed four diagnoses which are associated with impacted and retained teeth: *dens impactus*, *dens retentus*, *dens semiimpactus* and *dentitio difficilis*. Impacted teeth are teeth which are not able to erupt in normal position due to mechanical barrier, such as another tooth, ascending arm of the mandibule or decreased mandibule because of phylogenetic reasons (Figure 1). Retained teeth are teeth which are unable to erupt due to the incorrect direction of the longitudinal axis of dental germ, deep position of dental germ, lack of erupting impulse, hereditary reasons and pathological processes which have damaged tooth or dental germ (Figure 2). Diagnosis *dentitio difficilis* refers to teeth with difficult eruption which is followed by acute inflammation (usually it refers to semiimpacted teeth). Semiimpacted teeth are partially erupted teeth, further eruption of which is interfered by a mechanical barrier, usually ascending arm of the mandibule or a nearby tooth[1]

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*Fig. 1. Impacted tooth.*

(Figure 3). According to literature, most frequently impacted teeth are lower and upper wisdom teeth[2]. These are followed by upper and lower canines, premolars and lastly incisors. Since there are clear definitions for all of these four diagnoses, wrong diagnoses should not occur, although this is often the case in clinical practice. Most frequently used operating techniques for these four diagnoses are: alveolotomy, extraction, circumcision and corticotomy. The purpose of the present study is to see whether we follow global guidelines for operative procedures and diagnoses for impacted and retained teeth, and to compare these results with older results in Croatia. Finally, we want to see if we need to change some of our previous guidelines.

## Material and Methods

Operative protocols from Department of Oral Surgery, School of Dental Medicine, Zagreb in the period from 1997 till 1999 were used in the present study. In order to facilitate later processing, all data were transferred into digital form, coded numerically and entered in the special data entry mask made in Microsoft Office Excel. To ensure protection of privacy, only the main researcher had complete access to both database and decoding key. Data were processed and analyzed in two statistical programs: SPSS 16 (Statistical Package for Social Sciences) and STATISTICA 7. The following information from operating protocols were used: ordinal number in the operating protocol, gender, place and county of residence, operating date, diagnosis type, number of diagnoses, anesthetic type, type and number of operating procedures, patohystological diagnosis (PHD in further text) and use of corticosteroids. In descriptive data processing, we calculated frequencies, percentages and central tendency measures – arithmetic means (M). In addition to arithmetic means, standard deviations (SD) were used as a measure of dispersion. Inferential statistical analysis was comprised of $\chi^2$-tests and analysis of variance accompanied with post-hoc tests. In order to avoid extremely liberal multiple comparison method (e.g. Fisher's LSD, which has high statistical power, but a big probability of committing Type I error) and extremely conservative procedure (such as Scheffé test, which does not tend to commit Type I error, but has poor statistical power), Duncan's test was used as a post-hoc. Main results are presented graphically also.

*Fig. 2. Retained teeth.*

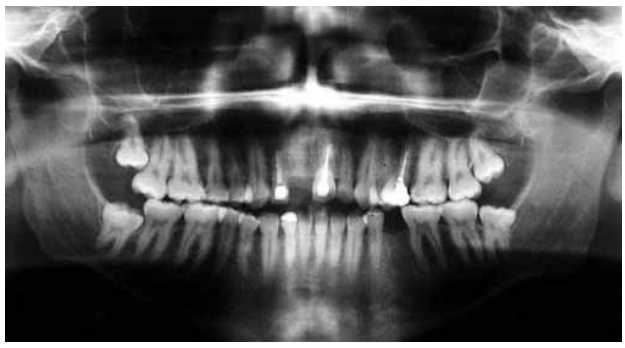

*Fig. 3. Semiimpacted teeth.*

## Results

In the period from 1997 till 1999, 4756 patients were operated (total of 4857 diagnosis were set). Sex ratio was 1:1.67 in favor of women. Number of patients is increasing every year. Frequency of *dens impactus* diagnosis is also growing every year, while frequencies of the other three diagnoses slightly decrease or remain roughly unchanged. Of all diagnoses, 24.89% (N=1209) belongs to *dens impactus*, 5.13% (N=249) to *dens semiimpactus*, 6.05% (N=294) to *dens retentus* and 0.64% (N=31) to *dentitio difficilis*. These four diagnoses make 36.71% of all 4857 set diagnoses. Most patients (84.17%) arrive from Grad Zagreb county, 7.59% from Zagrebačka county, from Karlovačka county 1.6% and Splitsko-dalmatinska county 0.77%. 63.95% of all alveolotomy procedures, and 18.40% of all extraction procedures were done on patients with one of these four diagnoses. Most commonly impacted teeth are: 8– (38.64%), –8 (35.88%), 8+ (10.9%) and +8 (9.29%). Most commonly retained teeth are: 3+ (19.1%) and +3 (18.8%), while in the remaining two diagnoses –8 and 8– are most commonly diagnosed and oper-

ated teeth. Impacted teeth are in 97.90% of the cases operated by alveolotomy procedure. With semiimpacted teeth alveolotomy was conducted in 94.12% cases, and 5.10% of such teeth were extracted. With retained teeth alveolotomy was conducted in 65.21%, corticotomy in 23.01% and extraction in 8.77% of the cases. With *dentitio difficilis* alveolotomy was applied in 46.88%, extraction in 37.50%, circumcision in 9.38% and corticotomy in 6.25% of the cases. Intra muscular corticosteroids (Dexamethason) were used in 2.80% of the cases, most commonly with *dens impactus* and *dens retentus* diagnosis. PHD was done in 4.21% cases. Assuming sex ratio in population 1:1, $\chi^2$-test shows that women were significantly more frequently operated than men ($\chi^2$=302.88, df=1, p=0.000). The average age of all patients was $\overline{X}$=33.50 years, SD=16.87. Men were in average 1.1 year older than women (men: $\overline{X}$=34.18, SD=17.46; women: $\overline{X}$=33.08; SD=16.48). The youngest patient was 4 while the oldest was 94 years old. Patients average age considering diagnosis *dens impactus* was: $\overline{X}$=25.60, SD=9.46 (men: $\overline{X}$=26.57, SD=10.83; women: $\overline{X}$=25.09, SD=8.56). Patients average age considering diagnosis *dens semiimpactus* was: $\overline{X}$=27.06, SD=10.04 (men: $\overline{X}$=29.23, SD=12.66; women: $\overline{X}$=25.98, SD=8.30). Patients average age considering diagnosis *dens retentus* was: $\overline{X}$=21.69, SD=12.34 (men: $\overline{X}$=21.38, SD=14.29; women: $\overline{X}$=21.87, SD=11.08) and for *dentitio difficilis* diagnosis average age was: $\overline{X}$=20.06, SD=6.55 (men: $\overline{X}$=19.92, SD=5.87; women: $\overline{X}$=20.16; SD=7.10) (Figures 4–7). Two-way analysis of variance was applied to explore age differences as a function of gender and diagnosis. Main effect of diagnosis was statistically significant: F (3, 1774) = 13.11; p=0.000. Main effect of gender was not statistically significant: F (1, 1774) = 0.38; p=0.54. There was no significant interaction: F (3, 1774) = 1.19; p=0.31. A post-hoc test was applied to explain the obtained main effect of diagnosis. Duncan's test revealed that patients with diagnosis *dentitio difficilis* are statistically younger than patients diagnosed as *dens impactus* and *dens semiimpactus*. Also, patients diagnosed as *dens semiimpactus* are statistically older than patients diagnosed as *dens retentus*. Other differences were not significant at risk level of 5%. In 1.80% of cases, anesthesia without epinephrine was used. Altogether 6503 operating procedures were done, 40.95% of which were alveolotomies. Alveolotomies with *dens impactus, semiimpactus, retentus* or *dentitio difficillis* represent 26.19 % of all interventions.

## Discussion

The results show interesting changes, especially compared to other research done in Croatia in the past. In 1975, Amšel and Grgurević found that only 10.8% operating procedures were done on impacted teeth at Department of Oral Surgery[4]. Ćabov did a similar research in Rijeka in 2000 and found that 15.4% operating proce-

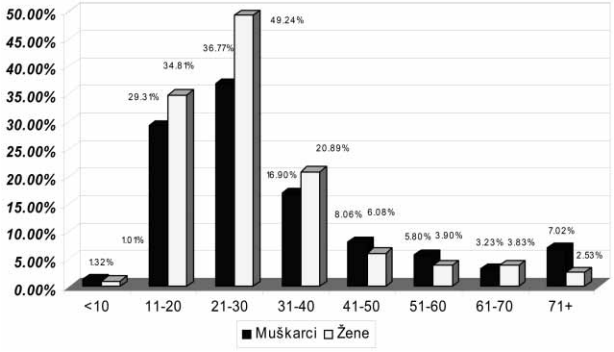


*Fig. 4. Dens impactus ratio considering sex and age.*

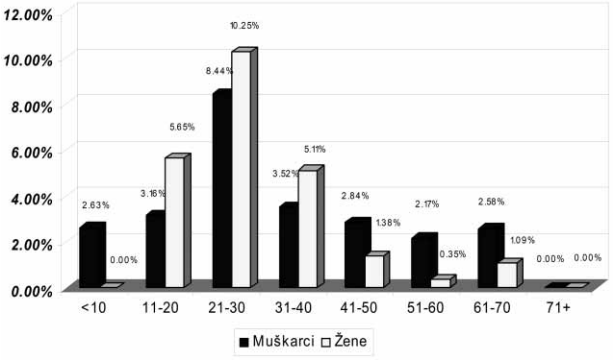


*Fig. 5. Dens semiimpactus considering sex and age.*

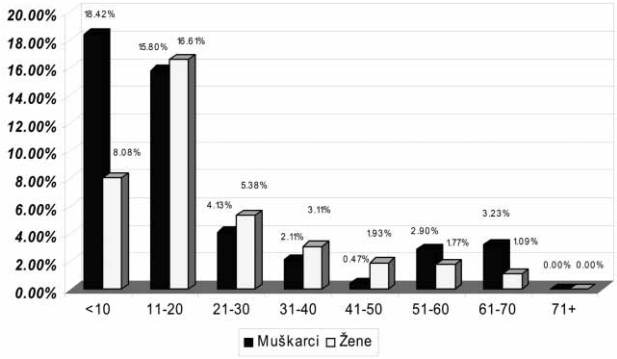


*Fig. 6. Dens retentus considering sex and age.*

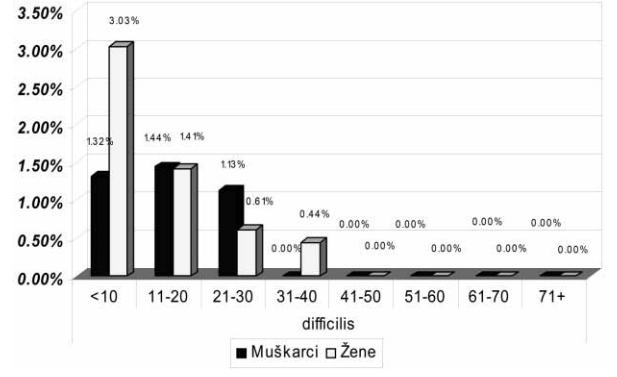


*Fig. 7. Dentitio difficilis considering sex and age.*

dures were done on impacted teeth[5,6]. Kobler et al. (1991) show results according to which alveolotomy makes 33.1% of complete operating program at Department of Oral Surgery, Dental School of Zagreb[7]. Our results show that now 36.71% of operated teeth belong to impacted or semiimpacted teeth. In our opinion, such an increase is expected, because orthodontic therapy has become much more available. The aesthetic dimension is increasingly important in our society and panoramic x-rays are part of standard protocols for patients. Chaparro-Avendano AV et al. (2005) report that in Spain there is 40.5% orthodontic indications for wisdom tooth extraction in adolescents. It is noticeable that the number of alveolotomies is on the increase in oral surgery[8]. Adeyemo WL (2006) shows that in Nigeria, in the period from 2001–2006, 6.3% of third molar teeth were treated at patients older than 40 years[9]. Our results show the similar ratio of 6.84%. It can be expected that this number will rise in the future, because of increased frequency of prosthetic therapy. Most common reason for operating procedures at patients older than 40 is prosthetic indication. Kaminishi et al. (2004) show that the number of operated patients older than 40 has doubled, and it reached 17.9% in USA in the period from 1997–2002[10]. The most common age groups for impacted and semiimpacted teeth are patients from 21–30 years of age, while *dentitio difficilis* and *dens retentus* are more usual in younger population (age groups 1–10 years and 11–20 years). These results are similar to those found in world literature[11]. Concerning sex ratio (1:1.67), it is obvious that more women were operated, although according to the last census men-women ratio is 1:1.07[12]. The only explanation is the assumption that aesthetics is more important to women than men, and because of that they are more often prosthetic and orthodontic patients. Patients ratio in counties is expected, most patients come from Grad Zagreb county, then follows Zagrebačka and Karlovačka county. The three counties mentioned are geographically closest to Dental school in Zagreb and that why most of the patients come from these counties. Interestingly, Ćabov (2000) shows that the ratio between patients from Rijeka and surrounding is 1:1[5]. Most commonly impacted and semiimpacted teeth are lower wisdom teeth, than upper wisdom teeth, while most commonly retained teeth are the upper canines. These results correspond to Ćabov's (2000)[5] and Kovarčik's (1984)[13] results. Corticosteroids (Dexamethason i.m.) were applied in 2.8% of the operating procedures. Zandi M (2008) prooves that postoperative use of corticosteroids has a positive effect on the reduction of postoperative symptoms such as pain, swelling and trizmus[14]. Grossi et al. (2007) show that parenteral use of 4 mg dexamethason has very good postoperative effect and that there is no need to increase the dose to 8 mg[15]. We think that corticosteroids should be used more often in oral surgery procedures, because new studies show their good effects on the postoperative recovery[16–18]. As expected, material for PHD analyses was most commonly taken after retained teeth operating procedures, because these teeth usually come with follicular cysts. Anesthesia without epinephrine was used in 1.80% of the operating procedures, because at Oral Surgery Department we use 1:160000 epinephrine solution. This solution allows enough vasoconstriction and dry operating area, and on the other hand such a low concentration of epinephrine has minimal systemic effect and is suitable for high-risk patients. Besides, the number of high-risk patients (older patients) is extremely small. Conado et al. (2007) show that epinephrine in solution 1:100000 has no statistically significant effect at cardiovascular system[19].

## Conclusion

The number of operated patients is rising every year. One of the reasons is the increased number of surgeons at the Department of Oral Surgery and the frequency of orthodontic therapy which requires alveolotomy. Women are more frequently patients, probably because the aesthetics is more important to them than it is to men. These four diagnoses cover 36.71% of all diagnoses, and this corresponds to other results and we can expect this number to increase in the future (especially concerning older patients, for prosthetic reasons). The ratio according to counties is expected, except a somewhat larger number of patients from Karlovačka county, which can be explained by the proximity of Zagreb and the insufficient number of oral surgeons in Karlovac at the time. The most commonly treated impacted teeth are –8 and 8–, and retained teeth are 3+ and +3. Although its use is on the increase, Dexamethason is still rarely used in everyday practice, despite global guidelines for the postoperative use of corticosteroids[20]. PHD analysis is used most commonly with retained teeth since they usually come with follicular cysts. Anesthesia without epinephrine was used in only 1.80% of the operating procedures, because the epinephrine solution used at Oral Surgery Department is 1:160000.

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## ANALIZA IMPAKTIRANIH I RETINIRANIH ZUBA OPERIRANIH NA ZAVODU ZA ORALNU KIRURGIJU, STOMATOLOŠKOG FAKULTETA U ZAGREBU

### S A Ž E T A K

Svrha rada je vidjeti postoji li razlika u udjelima dijagnoza *dens impactus, dens semiimpactus, dens retentus* i *dentitio difficilli*s s obzirom na svjetske smjernice i prošle rezultate u Hrvatskoj. Analizirali smo 4756 operiranih pacijenata na Zavodu za Oralnu Kirurgiju, Stomatološkog fakulteta u Zagrebu u periodu od 01.01.1997.–31.12.1999. godine. Svi podaci su digitalizirani i statistički obrađeni. Udio pojedinih dijagnoza je:1209 (24,89%) *dens impactus*, 249 (5,13%) *dens semiimpactus*, 294 (6,05%) *dens retentus* i 31 (0,64%) *dentitio difficilis*. Najčešće ukliješteni zubi su: 8– (38,64%), –8 (35,88%), 8+ (10,9%) i +8 (9,92%). Najčešći zadržani zubi su: 3+ (19,1%) i +3 (18,8%), a u ostalim dijagnozama –8 i 8– su najčešće dijagnosticirani i operirani zubi. Kortikosteroidi i.m. su dani u 2,80% slučajeva. Udio patohistoloških analiza (phd) je 4,21%. Odnos operiranih muškaraca i žena je 1:1,67, iako po zadnjem popisu za Republiku Hrvatsku odnos muškaraca i žena je 1:1,07. 36,71% ukupnih dijagnoza čine navedene četiri dijagnoze. Phd je najčešće uziman uz zadržane zube budući da je uz njih najčešći nalazak folikularne ciste. Kortikosteroidi se još uvijek malo primjenjuju u svakodnevnoj praksi unatoč svjetskim smjernicama koje govore u korist njihove postoperativne primjene. Anestezija bez adrenalina je dana samo u 1,80% slučajeva. Na Zavodu se koristi razrjeđenje 1:160 000 adrenalina, tako da je rijetko davana anestezija bez adrenalina. Ovakvi rezultati pokazuju da pratimo svjetske smjernice, te da su se broj i vrsta operativnih zahvata s obzirom na prošlost u Hrvatskoj poprilično promijenili.