

Raščlamba pojavnosti lomova mobilnih proteza u odrasloj populaciji

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Epidemiološka studija rađena temeljem ankete poslužila je za detekciju međusobnih odnosa lomova četiriju osnovnih tipova proteza: GTP, DTP, GPP i DPP. U analizi su upotrijebljeni različiti parametri: materijal izradbe, starost proteza, spol, vrsta štete, uzrok loma i antagonisti.

Kod razvrstavanja oštećenih proteza u sva se četiri tipa proteza najviše pojavljuju lomovi baze proteze, 328 incidenta. Najviše GTP, 151 slučaj od čega su 137 bili lomovi u središnjoj zoni, a kod 14 slučajeva bili su na ostalim mjestima baze proteze. Kod DTP 53 slučaja su lomovi u središnjoj zoni, a 7 je ostalih. Kod GPP od 74 slučaja loma baze 5 je bilo u središnjoj zoni, a 69 su nastali popravcima spojki i rubova. Kod DPP bilo je 48 slučajeva loma baze. Lom zuba ustanovljen je se u 133 slučaja.

Rezultati ankete pokazuju da znatno više lomova imaju gornje proteze, $X^1-X^2=41,56\%$, i totalne $X^1-X^2 = 19,36\%$. Izrazita je pojava lomova akrilatnih proteza u usporedbi s metalnim protezama $X^1-X^2=85,6\%$. Starost proteza i frekvencija žvakanja također pridonose lomovima. Najčešće su štete pucanje baze i lom zuba.

Lomovi proteza su statističkim metodama 2x2 tablice i Hi kvadrat testom uspoređivani s rezultatima sličnog istraživanja u Engleskoj. Rezultati pokazuju da razmjeri lomova GTP i DTP u objema zemljama nisu statistički značajni, a pojava pucanja GPP i DPP u Engleskoj je znatno veća.

Može se zaključiti da je, s obzirom na trajnost, konstrukcija s metalnom bazom bolje rješenje gdje god to omogućuju uvjeti ventilnoga ruba i retencije GTP.

Ključne riječi: mobilne proteze, lomovi proteza

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Uvod

Protetska terapija mobilnim protezama nastoji prevladati nesposobnost funkcije. Osim obnove sposobnosti žvakanja, prirodnog izgleda i pravilnoga govora, tkiva stomatognatoga sustava nastoje se što dulje sačuvati. Ujedno se nastoji stvoriti biokemijske i psihičke preduvjete kako bi se proteza što bolje prihvatila.

Mobilne su proteze, kao tehnička struktura postavljene u biološku sredinu stomatognatoga sustava. One djelatno utječu na funkciju te sredine, ali i sredina izravno utječe na njihov vijek, te na funkcijsku i estetsku vrijednost.

Lomovi proteza jesu najizraženija posljedica tih utjecaja. Literatura o lomovima proteza je po mišljenju mnogih autora, slabo zastupljena. Prema ispitivanju Hargreavesa (1), broj popravaka proteza vrlo je velik i gotovo je jednak broju novih proteza.

Darbar i sur. (2), istražujući epidemiološki lomove proteza u Engleskoj, daju pregled lomova proteza, prevalenciju tipova lomova i distribuciju s posebnim osvrtom na lomove po medijalnoj liniji (midline fracture). Kelly (3), Johnston i sur. (4), te Stafford i Smith (5) uzroke lomova traže u osnovnom materijalu - akrilatu, i prikazuju usporedbu sposobnosti podnošenja naprezanja nekoliko materijala. Vallittu i sur. (6):(7) ispituju uzorke lomova proteza u dva finska grada i utvrđuju kliničke čimbenike lomova proteza. To su: pogrješno određena protetska ploha, visok pripoj frenuluma, okluzijska shema, odluzijske sile, protezno ležište i protezna baza. Nalaze znatnu razliku u lomovima između akrilatnih i metalnih proteza. Također tvrde da je središnja uzdužna fraktura (midline fracture) nastala naprezanjem u svezi s lošim ležanjem na ležištu i s resorpcijom grebena. Hargreaves (1) tvrdi da većina proteza puca nakon 2-3 godine, što bi mogao biti rok trajanja metilmetakrilata.

Svrha ovog rada bila je višestruko raščlaniti pojavnost lomova mobilnih proteza, a anketom i statističkom raščlambom utvrditi međuzavisnost lomova proteza i različitih parametara u pacijenata. Prema dobivenim rezultatima utvrditi moguće razloge i zakonitosti lomova proteza te naputiti na moguće načine kojima bi se proteze poboljšale.

Materijal i postupak istraživanja

U radu su se ispitivale proteze koje su pacijenti donijeli na popravak zbog raznih oštećenja. Proteze su se popravljale u Zavodu za mobilnu protetiku Stomatološkog fakulteta u Zagrebu i u Domu zdravlja Osijek.

Ispitivali smo četiri osnovna tipa proteza: gornja i donja potpuna proteza te gornja i donja djelomična proteza, a prema građi uzradbe, starosti proteze, spolu pacijenta, uzroku i vrsti štete te odnosima prema situaciji u nasuprotnoj čeljusti. Prema tim parametrima napravljen je anketni list u koji su se unosili podatci temeljem očevida i pitanja postavljenih pacijentima:

ANKETNI LIST

1. TIP PROTEZE
 - a) GTP
 - b) DTP
 - c) GPP
 - d) DPP
2. MATERIJAL PROTEZE
 - a) akrilat
 - b) wironit
3. STAROST PROTEZE
 - a) < 1 godine
 - b) 1 - 2
 - c) 2 - 4
 - d) 4 >
4. SPOL
 - a) muško
 - b) žensko
5. UZROK NASTAJANJA
 - a) žvakanje
 - b) trauma
 - c) pad
6. VRSTA ŠTETE
 - a) izgubljen zub
 - b) puknuta baza - lokacija
 - c) puknut skelet
 - d) odvojen akrilat od metala

7. ANTAGONISTI

- a) prirodni zubi
- b) potpuna proteza
- c) djelomična proteza
- d) mostovi

8. IME I PREZIME PACIJENTA

9. BROJ ZDRAVSTVENOGA KARTONA

Podaci iz anketnoga lista obrađivali su se i vrjednovali statističkim metodama deskriptivne statistike (aritmetičke sredine, standardne devijacije, postotci itd.) i metodama Hi kvadrat testa.

Rezultati

Odgovori dobiveni anketom 486 pacijenata s lomom proteza razvrstani su po tipu proteze i zadanim parametrima te pregledno prikazani u Tablici 1. Prikazani su zajedno radi lakše ocjene i procjene međusobne povezanosti.

Raščlambe aritmetičkih sredina tih rezultata pokazuju da je čestota lomova gornjih proteza u usporedbi s donjima znatno veća $X^1-X^2=41,55\%$. Čestota lomova potpunih proteza u odnosu prema djelomičnima je $X^1-X^2=19,34\%$.

Usporedba materijalne izradbe pokazuju da je čestota lomova akrilatnih proteza u usporedbi s protezama s metalnim skeletom vrlo veća $X^1-X^2=85,60\%$.

Kod razvrstavanja oštećenih proteza najčešći su lomovi baze proteze, koji zbrojeno za sva četiri tipa proteza čine 328 incidenta. Od njih je najviše

GTP, 151 slučaj, od čega su 137 bili lomovi u središnjoj zoni, a kod 14 slučajeva bili su na ostalim mjestima baze proteze. Kod DTP 53 su slučajeva s lomom u središnjoj zoni, a 7 je ostalih.

Kod djelomičnih proteza stanje je drugačije. Kod GPP od 74 slučajeva loma baze 5 je bilo u središnjoj zoni, a 69 su činili popravci spojki i rubova.

DPP je imala 48 slučajeva loma baze.

Lom zuba pojavljuje se u 133 slučaja. Najčešće se radilo o lomu zuba ili se je pak odlijepio od baze.

Razlika aritmetičkih sredina između loma zuba i baze $X^1-X^2=37,02\%$ statistički je značajna. Loma skeleta i odvajanja akrilata od metala bilo je u 20 slučajeva, 15 loma skeleta i 5 odvajanja akrilata od metala. Najviše pacijenata navelo je žvakanje kao uzrok loma 407, što daje razliku prema traumi 36 i padu proteze 43. $X^1-X^2=67,49\%$.

Kao antagonisti potpunim protezama pojavljuju se potpune proteze.

Kod GPP zamjetna je razmjerno velika pojavnost prirodnih zubi kao antagonista. Kod donjih proteza podjednako su zastupljene potpune i djelomične proteze.

S obzirom na spol, nešto je veći broj žena ($X^1-X^2=18,11\%$).

Starost proteza pokazuje pravilnost, tako da množina incidenata raste sa starošću kod svih tipova proteza. Raspon je od 4,5% u prvoj godini do 62,75% kod 4 i više godina starosti proteza.

Lomovi proteza statističkom su metodom 2x2 tablice i Hi kvadrat testom vrednovani i uspoređeni s rezultatima sličnog istraživanja u Engleskoj, Tablica 2, Darbar i sur. (2).

Tablica 1. Sumirani odgovori ankete

Table 1. Summary of the answers in the survey

| | 1 | 2a | 2b | 3a | 3b | 3c | 3d | 4a | 4b | 5a | 5b | 5c | 6a | 6b | 6c | 6d | 7a | 7b | 7c | 7d |
|-----|-----|-----|----|----|----|-----|-----|-----|-----|-----|----|----|-----|-----|----|----|----|-----|-----|----|
| GTP | 221 | 220 | 1 | 13 | 24 | 56 | 128 | 104 | 117 | 196 | 7 | 18 | 70 | 151 | — | — | 23 | 137 | 57 | 4 |
| DTP | 69 | 68 | 1 | 1 | 4 | 13 | 51 | 25 | 44 | 51 | 4 | 14 | 9 | 60 | — | — | 5 | 62 | 2 | — |
| GPP | 123 | 95 | 28 | 6 | 9 | 32 | 76 | 37 | 96 | 106 | 14 | 3 | 34 | 74 | 11 | 4 | 42 | 15 | 63 | 3 |
| DPP | 73 | 68 | 5 | 2 | 5 | 16 | 50 | 31 | 42 | 54 | 11 | 8 | 20 | 48 | 4 | 1 | 2 | 31 | 37 | 3 |
| Σ | 486 | 451 | 35 | 22 | 42 | 117 | 305 | 197 | 299 | 407 | 36 | 43 | 133 | 333 | 15 | 5 | 72 | 245 | 159 | 10 |

Tablica 2. Tablica 2x2 gornje i donje potpune proteze
Table 2. Table 2x2 upper and lower complete dentures

| Obilježje | Engleska England | Hrvatska Croatia | Σ |
|-----------|---------------------|---------------------|-----|
| GTP/CUD | 67 | 221 | 288 |
| DTP/CLD | 26 | 69 | 95 |
| Σ | 93 | 290 | 383 |

Tablična vrijednost χ^2 (Hi kvadrat)=3,841 kod prvoga stupnja slobode uz statističku značajnost od 5% ($p=0,05$). Naš $\chi^2=0,45$ u tablici 2x2 što pokazuje da razmjeri lomova GTP i DTP u objema zemljama nisu statistički značajni i razlika je neznatna. Razmjer lomova djelomičnih proteza u objema zemljama izračunan je također s pomoću tablice 2x2 Hi kvadrat testa, Tablica 3.

Tablica 3. Tablica 2x2 gornje i donje djelomične proteze
Table 3. Table 2x2 upper and lower partial dentures

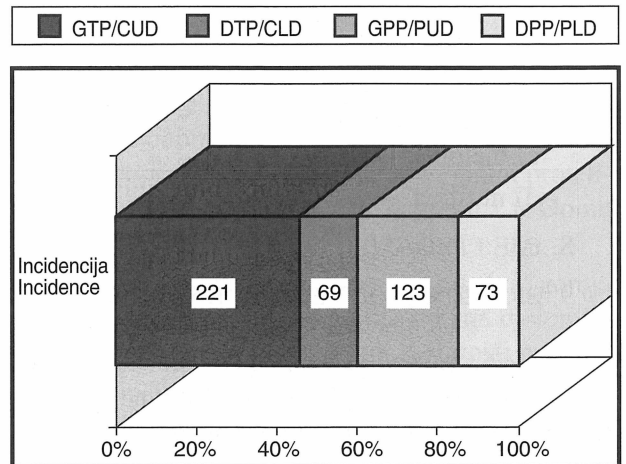
| Obilježje | Engleska England | Hrvatska Croatia | Σ |
|-----------|---------------------|---------------------|-----|
| GPP/PUD | 92 | 123 | 215 |
| DPP/PLD | 10 | 73 | 83 |
| Σ | 102 | 196 | 298 |

Rezultat χ^2 (Hi kvadrat testa)=23,98. Kako je χ^2 za Hrvatsku veći, utvrđena je statistički značajna razlika, te se može zaključiti da u Engleskoj djelomične proteze pucaju znatno češće. Broj lomova proteza u promatranoj studiji najveću incidenciju pokazuje za GTP 45,47%, zatim za GPP 23,30%, dok DTP 14,19% i DPP s 15% imaju znatno manju incidenciju (što je vidljivo u Grafikonu 1).

Rasprava

Premda ovakvih istraživanja ima malo, iskristalizirale su se određene spoznaje. Svi autori smatraju tzv. središnje lomove (midline fracture) najčešćim načinom pucanja GTP, a time i glavnim problemom kod lomova proteza.

Darbar (2) i Vallittu (6) to potvrđuju epidemiološkim studijama. Ova rasprava pridružuje se tome stajalištu temeljem vlastitih istraživanja i statističkih raščlamba navedenih u ovome radu.



Grafikon 1. Incidenција lomova četiriju osnovnih tipova proteza

Graph 1. Fracture incidence of four main types of dentures

Dok kod potpunih proteza ne nalazimo statistički znatne razlike u usporedbi s istraživanjima Darbara (2), kod totalnih su proteza znatne razlike u čestoci lomova.

Rezultati ankete prikazani su u Tablici 1. Najveći rezultati za svaki tip proteze i ispitani parametri uvelike su pomogli da se osvijetli problem lomova proteza. Ti rezultati pokazuju određene pravilnosti koje omogućuju određene zaključke. Gornje proteze pucaju znatno češće od donjih. Čini se da je to posljedica zamora materijala i pojave pukotine u antero-posteriornoj liniji. Uz raspravu o središnjem puknuću gornje potpune proteze želi se reći da je pri opetovanim lomovima već popravljenih proteza mjesto loma gotovo uvijek uz staru pukotinu i približno usporedno s njom, ali odmaknuto i po nekoliko milimetara.

Novi materijal dodan pri popravku u pukotinu gotovo nikad ne pukne pri sljedećem lomu, već se to dogodi na starome akrilatu u zoni usporednoj sa starom pukotinom. Tako se ponekad kod gornjih potpunih proteza s višekratnim lomovima može opaziti i po nekoliko uzdužnih linija spajanja starih lomova. Broj lomova povećava se sa starošću proteze tj. njezinom dužom upotrebom (4 i više godina). Hargreaves (1) to također potvrđuje i misli da je granica češćih lomova 3 godine. Lomovi proteza u prvoj godini statistički su male čestoci i više upućuju na nekvalitetnu izradbu proteza, loš materijal i postupak, loše okluzijske odnose, promjene ležišta proteze, te na nepažljivu uporabu ili rukovanje protezama (8,9).

Uzrok loma s izrazitom pojavnosti kod svih tipova proteza jest žvakanje. Taj podatak potvrđuje da je najčešći i najznačajniji uzrok loma naprezanje i umor materijala zbog naprezanja pri žvakanju (4,7,10,11,12,13).

Trauma i pad proteze mogu ponekad dati sliku središnjeg puknuća, ali uz njih je obično vezano još neko oštećenje proteze, kao npr. lom zuba ili rubova, lomovi na drugačijim pravcima i u više fragmenata. Ta pozitivna korelacija statistički potvrđuje tvrdnju o naprezanju kao glavnom čimbeniku loma.

Izgubljen zub kao vrsta štete pored puknuća baze, pokazuje visoku pojavnost kod svih tipova proteza osim kod DTP. Takva je šteta vrlo česta kao rezultat naprezanja i kod žvakanja (1).

Podatci o antagonistima puknutih proteza posredno govore kakvim su silama izložene proteze u funkciji.

Kod potpunih proteza antagonisti su najčešće potpune proteze, rjeđe prirodni zubi ili djelomične proteze. To pokazuje da se naprezanje kumulira dugotrajnom upotrebom proteza malim silama. Ovakvo prikazan problem osvjetljava na drugačiji način rezultate Vallittua (12) i Bearn (14) o odnosu frekvencije žvakanja i loma proteza.

Djelomična proteza bi kao antagonist puknute proteze, upućivala na nešto veće sile u funkciji ili neravnomjerniji raspored. Ovaj podatak prevladava kod djelomičnih proteza pa je to možda jedan od uzroka inverzije kod vrste štete za djelomične proteze. Drugi bi uzrok mogao biti raspored prirodnih zuba u odnosu spram protezi koji uvjetuje njezin izgled i otpornost na naprezanje (13, 15).

Pojavnost od 85,6% više lomova akrilatnih proteza od metalnih (451:35) govori sama za sebe. Naprezanje u strukturi metala mnogo je manje podložno stresu žvakanja od akrilata.

Zaključci

Čimbenici koji utječu na mobilne proteze opisuju se kao biološki i funkcijski. Nakon višestruke raščlambе četiriju osnovnih tipova mobilnih proteza i parametara ispitanih anketom, te usporedbe dobivenih rezultata s rezultatima iz literature, može se reći da najčešće pucaju gornje potpune proteze, zatim gornje djelomične proteze, a donje djelomične i donje potpune proteze nešto manje. Veća je, dakle, pojavnost lomova gornjih proteza od donjih.

Najčešći uzrok loma proteza jest naprezanje prigodom žvakanja. Stres se kumulira u protezama i uzrokuje njezino naprezanje, umor materijala i na kraju lom. Temeljem rezultata ankete vidi se da na pojavnost lomova neposredno utječu materijal, starost proteze i frekvencija žvakanja. Spol je manje važan čimbenik, s manjom prevalencijom kod žena. Antagonisti su manje važan čimbenik kod korektno izvedenih proteza.

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Analysis of the Incidence of Removable Denture Fractures in an Adult Population

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Summary

An epidemiological study based on a survey was used to investigate the comparison of fractures of four main types of dentures: CUD, CLD, PUD, PLD. Various parameters were used in this analysis: type of material, age of the denture, sex of the patient, type of damage, fracture cause and antagonists.

In the classification of damaged dentures the most frequent fractures are those of the denture base in all four types, with an incidence of 328. The largest incidence of 151 fractures was found on the CUD, out of which 137 were fractures in the central part, while elsewhere on the denture base in 14 other cases. The CLD had an incidence of 53 fractures in the central part and 7 elsewhere. The PUD had 74 fractures of the base, out of which 5 were fractures in the central part, and 69 were repairs of bonding and edges. The incidence of fractures on PLD was 48 cases. Tooth fractures were reported in 133 cases.

The survey results show a significantly higher incidence of fractures on the upper dentures, $X^1-X^2=41.56\%$, and complete ones $X^1-X^2=19.36\%$. The most frequent fractures were observed in the acrylic dentures as opposed to metal dentures $X^1-X^2=85.6\%$. The age of the denture and the frequency of mastication increase the possibility of fracturing. The fracture of the denture base as well as tooth fractures proved to be the most frequent damage.

Denture fractures were compared with the results of similar research in England using statistic methods of 2×2 tables and the Hi square test. Results show that the fractures of CUD and CLD do not have any statistic importance, while the reported incidence of PUD and PLD fractures was much higher in England.

It may be concluded that, taking into the consideration the long-term aspect, metal base constructions are a better choice whenever the conditions of the ventral edge and the CUD retention allow it.

Key words: removable dentures, denture fractures

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Introduction

The object of prosthodontic therapy is to overcome functional ineffectiveness by removable dentures. Apart from restoring normal mastication, natural appearance and correct articulation, the aim is to save the tissues of the stomatological system as long as possible. Simultaneously, the biochemical and psychological conditions for better acceptance of the denture are created.

As a technical structure removable dentures are inserted into the biological medium of the stomatological system. They actively influence the functions of the medium. However, this medium influences their duration as well as their functional and esthetic values.

Denture fractures are the most significant result of this influence. Numerous authors agree that literature on denture fractures is scarce. According to the research of Hargreaves (1) the number of denture repairs is particularly high, and is almost equal to the number of new dentures.

Darbar et al. (2), investigating epidemiologically denture fractures in England, present an overview of denture fractures, the prevailing types of fractures, and the division with special emphasis on midline fractures. Kelly (3), Johnston et al. (4) and Stafford and Smith (5) consider the cause of fracturing to be in acrylic, as the main material, and present a comparison on the stress tolerance capability of several materials. Vallittu et al. (6): (7) investigated the causes of denture fractures in two cities in Finland. They established the clinical factors responsible for denture fractures. These are inappropriately determined prosthodontic surface, high bonding of frenulum, the occlusion pattern, occlusive forces, fundament of the denture and the denture base. They found a significant difference between the fractures of acrylic and metal dentures. They also claim that midline fracture is caused by stress resulting from an inappropriate fundament position and the ridge resorption. Hargreaves (1) claimed that the majority of dentures fractures after 2 - 3 years, which may correspond to the expiry of methylmetacrylate.

The aim of this study was to analyse on several levels the appearance of removable denture fractures, and to determine the relations between the denture fractures and different parameters from each pa-

tient, to establish the possible reasons and denture rules in relation to the results obtained and to indicate the possibilities of improving dentures.

Material and Investigation Procedure

The dentures investigated were those brought by patients for repair. The dentures were repaired in the Department for Removable Dentures of the School of Dental Medicine University of Zagreb and the Medical Center in Osijek.

Four main types of dentures were studied: complete upper and lower dentures and partial upper and lower dentures, classified according to the type of material, age of the denture, sex of the patient, cause and type of damage, and interrelation with the opposite jaw. A survey was composed based on these parameters, where the data was entered, based on actual dentures and patients' answers.

SURVEY QUESTIONS

1. TYPE OF DENTURE
 - a) CUD
 - b) CLD
 - c) PUD
 - d) PLD
2. MATERIAL
 - a) acrylic
 - b) wironite
3. AGE OF THE DENTURE
 - a) less than a year
 - b) 1 - 2 years
 - c) 2 - 4 years
 - d) 4 or more years
4. SEX OF THE PATIENT
 - a) male
 - b) female
5. CAUSE OF DAMAGE
 - a) mastication
 - b) trauma
 - c) fall
6. TYPE OF DAMAGE
 - a) lost tooth
 - b) fracture of the base - location

- c) partial denture fracture of the metal part
 - d) separation of acrylic from the metal
7. ANTAGONISTS
- a) natural teeth
 - b) complete denture
 - c) partial denture
 - d) bridges
8. FIRST AND LAST NAME OF THE PATIENT
9. NUMBER OF THE MEDICAL RECORD CARD

The data obtained from the survey was processed and evaluated by the statistic least square method $X^1 - X^2$ with different standard deviations and methods 2×2 Hi square test χ^2 .

Results

The results obtained by the survey of 486 patients with fractured dentures were classified according to the type of denture and the set parameters, and shown distinctly in Table 1. They are shown together to facilitate easier evaluating and determination of their interrelation.

The analysis of these results by the least square method shows that the frequency of fractures of upper dentures compared to lower dentures is significantly higher, $X^1 - X^2 = 41.55\%$. The frequency of complete denture fractures compared to partial denture fractures is $X^1 - X^2 = 19.34\%$.

When comparing the type of material there is an absolutely higher incidence of acrylic denture fractures as opposed to metal dentures $X^1 - X^2 = 85.60\%$.

When classifying damaged dentures fractures of the denture base are the most frequent damage, which amount to 328 incidents in all four types of dentures. The CUD comes first with 151 fractures, out of which 137 were fractures in the central zone, while 14 fractures were reported on other areas of the denture base.

The CLD had 53 fractures with a fracture in the central zone and 7 others.

Results were different for partial dentures. The PUD had 5 fractures out of 74 with a fracture of the base in the central zone, while 69 were repairs of bondings and edges.

The PLD had 48 fractures of the base.

Tooth fracture was reported in 133 cases, usually either a tooth fracture or its detachment from the base.

The difference obtained by the least square method between the tooth fracture and the base $X^1 - X^2 = 37.02\%$ is statistically important. The partial denture fracture of the metal part and detachment of acrylic from metal occurred in 20 cases, out of which 15 were partial denture fractures of the metal part and 5 detachment of acrylic from metal.

Most patients indicated mastication as the cause of fracture, 407 cases, with the distinction of 36 traumas and 43 falls of the denture $X^1 - X^2 = 67.49\%$.

Complete dentures appear as antagonists to complete dentures.

A relatively high incidence of natural teeth as antagonists was observed with PUD.

Complete and partial dentures were equally represented at PLD.

Regarding the patients sex there was a relatively higher incidence in women, $X^1 - X^2 = 18.11\%$.

The age of the denture showed a regular pattern, and the number of incidents grew with age on all types of dentures. The results were from 4.5% in the first year to 62.75% when the denture was 4 or more years old.

Denture fractures were evaluated and compared to the results of similar research in England by the statistic method 2×2 tables and Hi square test χ^2 , Table 2, Darbar et al. (2).

The table value was χ^2 (Hi square) = 3.841 at the first degree of freedom with a statistic importance of 5% ($p=0.05$). The result obtained was $\chi^2 = 0.45$ in the table 2×2 which shows that the results of CUD and CLD fractures in both countries were not statistically significant and the difference was negligible.

The results of partial denture fractures in both countries were calculated by the table 2×2 Hi square test, Table 3.

The result was χ^2 (Hi square test) = 23.98. Since χ^2 was higher in Croatia, a statistically signifi-

cant difference was established, and it may be concluded that the incidence of partial denture fractures in England is significantly higher.

The number of denture fractures in the research showed the highest incidence for CUD 45.47%, and for PUD 23.30%, while CLD with 14.19% and CLD with 15% have a significantly smaller incidence as is visible Graph 1.

Discussion

Although more research of this problem is necessary, some findings have been confirmed. All authors consider that the so-called midline fractures are the most frequent cause of CUD fractures, and consequently are the main problem in denture fractures.

Darbar (2) and Vallittu (6) confirmed this by epidemiological studies. This discussion is in accordance with opinion based on this research and the statistic analysis reported in this study.

While no statistically significant differences were determined with regard to complete dentures in comparison to the research by Darbar, significant differences in the frequency of fractures were observed for partial dentures.

The survey results are shown in Table 1. The highest results for each type of denture and the parameters tested were a significant help in the identification of the denture fracture problem. These results show a pattern of regularity enabling certain conclusions. Upper denture fractures were much more frequent than lower denture fractures. Which seems to be a result of the stress of material and occurrence of a gap in the anterior-posterior line. Beside the discussion about the central fracture of the complete upper denture, it should be emphasised that when repeated fractures occur on already repaired dentures, the position of the fracture is almost always beside the old fracture and usually parallel to it, but removed sometimes even several millimeters.

The new material added to the gap during the repair hardly ever breaks when the next fracture occurs, and the fracture is caused by the acrylic in the zone parallel to the old gap. Therefore several lines in length of the junction of old fractures may sometimes be observed on complete upper dentures with repeated fractures.

The number of fractures increases with the age of the denture, i.e. with long usage (4 or more years). Hargreaves (1) also confirmed this and is of the opinion that the limit for increased fractures is 3 years. Denture fractures in the first year are statistically scarce and are usually a result of a low quality denture, bad material and construction, bad occlusive conditions, changes in the fundament of the denture or careless and inadequate denture use.

One of the most frequent causes of denture fractures reported is mastication. This information confirms that the most frequent and most significant fracture causes are stress and fatigue of the material caused by mastication stress (4, 7, 10, 11, 12, 13).

Denture trauma and fall may sometimes result in a midline fracture, but they are usually connected to other denture damages such as, for example, tooth or edge fractures, fractures as differently positioned lines or as fragments. This positive correlation statistically confirms the fact of stress being the main cause of fracture.

Tooth loss as a type of damage, apart from the base fracture, shows a high incidence in all denture types apart from CLD. Such of damage is very frequent as a result of stress and mastication (1).

Data on the antagonists of fractured dentures indirectly shows the kind of forces that functional dentures are exposed to.

Complete dentures usually have complete dentures as antagonists, and less frequently natural teeth or partial dentures. This shows that stress accumulates by long-term denture usage with small forces. The problem presented in this way throws a different light on the results of Vallittu (12) and Bern (14) on the interrelation between mastication frequency and denture fractures.

Partial dentures as antagonists to fractured dentures would indicate that somewhat stronger forces were in function or that the position was uneven. This fact prevails when it comes to partial dentures, and may be one of the inversion causes regarding the type of damage of partial dentures. Another cause may be the position of natural teeth in relation to the denture, influencing its appearance and the resistance to stress (13, 15).

The incidence of 85.6% more acrylic denture fractures than metal denture fractures (451:35) is self-explanatory. The metal structure is significant