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IZVORNI ZNANSTVENI RAD
ORIGINAL SCIENTIFIC PAPER

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Komunikacija između doktora dentalne medicine i zubnih tehničara tijekom izrade mobilne djelomične proteze u pokrajini Khartoumu, Sudan

Communication Between Dentists and Dental Technicians During the Fabrication of Removable Partial Dentures in Khartoum State, Sudan

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Sažetak

Svrha rada: Željela se istražiti kvaliteta komunikacije između doktora dentalne medicine i zubnih tehničara u privatnim dentalnim laboratorijima u sudanskoj pokrajini Khartoumu kad je riječ o izradi mobilnih djelomičnih proteza. **Metode:** Obavljena je deskriptivna analiza poprečnog presjeka te se razgovaralo sa zubnim tehničarima o kvaliteti uputa koje su dobili od doktora dentalne medicine u vezi s izradom mobilnih djelomičnih proteza (*removable partial denture* – RPD). Bilo je uključeno 69 akrilatnih proteza (A-RPD) i 11 od kobalt-kroma (CC-RPD). **Rezultati:** Doktori dentalne medicine nisu dali upute u 21,7 % slučajeva za izradu A-RPD-a, no dali su ih u svim slučajevima za CC-RPD-e. Upute su uglavnom bile usmene (55,1 % za A-RPD, 54,5 % za CC-RPD), a rjeđe napisane (23,3 % za A-RPD, 45,5 % za CC-RPD). Većina konstrukcijskih komponenti za A-RPD i CC-RPD nisu bile jasno opisane, a izričite su bile samo u 8,7 % slučajeva za A-RPD-e i 36,4 % slučajeva za CC-RPD-e. Značajno je da je liječnik modele kontrolirao u samo u 18,2 % slučajeva kad je riječ o CC-RPD-u. Većina tehničara (84,2 %) vjeruje da je oblikovanje proteze odgovornost doktora. Tehničari su u vezi s CC-RPD-om trebali znatno češće ($p = 0,004$) razgovarati s doktorima te ih tražiti objašnjenje za njihovo oblikovanje. **Zaključak:** Kvaliteta komunikacije između doktora dentalne medicine i privatnih laboratorijskih zubnih tehničara u pokrajini Khartoumu o izradi mobilne parcijalne proteze bila je uglavnom nedovoljna.

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Ključne riječi
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Uvod

Svrha mobilnih djelomičnih proteza jest ponovno uspostavljanje estetike i funkcije te očuvanje preostalih oralnih struktura (1 – 4). Kako bi se to postiglo, proteze trebaju biti odgovarajuće oblikovane, a upute za njihovu konstrukciju treba precizno prenijeti zubnom tehničaru u laboratoriju (5). Važan dio protetičke terapije je određivanje oblika proteze pri kojem treba voditi računa o biološkim i mehaničkim čimbenicima (6). Te informacije treba napisati zubnom tehničaru u radnom nalogu (7). Pisani radni nalog ima težinu pravnog dokumenta i za doktora dentalne medicine i za zubnog tehničara te zato treba biti razumljiv, jasan i kratak. Nedovoljno detaljne upute mogu rezultirati protezom neadekvatnog oblika, pa se pacijentu mogu oštetiti preostale oralne strukture (6, 8).

Introduction

The goals of removable partial denture treatment are to restore esthetics and function, and preserve the remaining oral structures (1-4). To help achieve these goals, the prostheses should be appropriately designed and instructions regarding their construction should be accurately communicated to the dental laboratory technician (5). The important constituents of prosthodontic treatment are the design and prescription of prostheses, which should be implemented with regard to biological and mechanical factors (6). This information should then reach the dental technician in the form of a written work authorization (7). A written work authorization acts as a legal document for both dentists and dental laboratory technicians, and should therefore be decipherable, clear, brief, and easily understood by technicians. Inadequately de-

Rezultati dosadašnjih istraživanja u nekoliko zemalja u proteklih 30 godina upućuju na nedostatke u postupcima oblikovanja i pri izradi različitih vrsta proteza u ordinacijama dentalne medicine, posebno onih mobilnih parcijalnih od slitine kobalt-kroma (8 – 15). Zbog toga neke zemlje propisuju etičke i zakonske smjernice u kojima se zahtijeva od kliničara adekvatno oblikovanje proteza i komuniciranje sa zubnim tehničarom o njihovim značajkama (8). Pretpostavljalo se da će te etičke i pravne smjernice poboljšati stanje. No neka istraživanja provedena u Velikoj Britaniji i Irskoj pokazuju da problem i dalje nije riješen (16, 17).

Svrha ovog istraživanja bila je analizirati kvalitetu komunikacije između doktora dentalne medicine i zubnih tehničara u vezi s mobilnim djelomičnim protezama u Sudanu jer nema jasne odredbe koja upućuje na odgovornost terapeuta u odobravanju izrade bilo kojeg stomatološkog rada. Istraživanje koje ocjenjuje kvalitetu komunikacije između doktora dentalne medicine i zubnih tehničara može upozoriti na potrebna poboljšanja i može pridonijeti kakvoći protetičkih radova u Sudanu.

Materijali i metode

Obavljena je deskriptivna analiza poprečnog presjeka slučajeva s mobilnim parcijalnim protezama izrađenima u registriranim privatnim zubnim laboratorijima u pokrajini Khartoumu koji su opremljeni uređajima za izradu djelomičnih proteza od kobalt-kroma. Privatni laboratoriji izvan te pokrajine nisu mogli biti uključeni jer o njima nije bilo nikakvih relevantnih zapisa u Ministarstvu zdravstva.

Uključeni su svi slučajevi koji su poslani u odabrane dentalne laboratorije kako bi se izradio RPD, a isključeni su oni za koje je izrađen bilo koji nadomjestak, osim RPD-a.

Veličina uzorka određena je sljedećom formulom:

$$n = \frac{z^2 pq}{(d^2)}$$

pri čemu je n veličina uzorka, **z** interval pouzdanosti od 1,96, a p je 5,5 % na osnovi rezultata prethodnog istraživanja [12], q je 1-p, a d granica pogreške od 5 %. Time je dobivena veličina uzorka od 80. Zatim je izračunata veličina uzorka za svaku vrstu RPD-a, tj. za protezu od kobalt-kroma (CC) i za akrilatnu (A) djelomičnu protezu, prema ukupnom prosjeku broja slučajeva u mjesecu:

$$n = \frac{\textit{prosjek broja slučajeva (CC)/mjesec} \times \textit{ukupna veličina uzorka}}{\textit{ukupan prosječni broj slučajeva (A\&CC)/mjesec}}$$

$$\text{RPD od } \textit{kobalt-kroma} = \frac{26 \times 80}{190} = 11 \text{ slučajeva}$$

$$\text{Akrilatni RPD} = \frac{163 \times 80}{190} = 69 \text{ slučajeva}$$

Iz toga je dobivena konačna veličina uzorka od 11 CC-RPD-a i 69 A-RPD-a. Veličina uzorka iz svakoga zubnog laboratorija određena je proporcionalno.

tailed work authorizations can lead to prostheses that are inappropriately designed and may harm the patients' remaining oral structures (6,8).

Findings of previous studies in several countries over the past 30 years indicate shortcomings in the design and fabrication procedures of different types of prostheses in general dental practice, especially cobalt-chromium removable partial dentures (8-15). This has led some countries to stipulate ethical and legal guidelines that require the clinician to adequately design prostheses and communicate these design features to the technician (8). It was hoped that these ethical and legal guidelines would have led to an improvement. However, some studies carried out in the UK and Ireland indicated that the problem still persists (16,17).

The aim of this study was to investigate the quality of communication between dentists and laboratory technicians regarding removable partial denture construction in Sudan, as there is no clear stipulation that outlines the dentist's responsibility in authorizing the fabrication of any dental appliance. A study evaluating the quality of communication between dentists and dental laboratory technicians may give indication of improvements that are needed, and might contribute toward better-constructed removable prosthodontic appliances in Sudan.

Materials and methods

This was a descriptive cross-sectional study of cases involving removable partial dentures constructed by registered private dental laboratories that have the facilities to fabricate cobalt chromium RPDs in Khartoum State. Private dental laboratories outside Khartoum State could not be included as no relevant records could be found with the Ministry of Health.

All cases or prescriptions sent to the selected dental laboratories for RPD construction were included in the study while any case or prescription for a prosthetic restoration other than RPD was excluded.

The sample size was determined through the following formula:

$$n = \frac{z^2 pq}{(d^2)}$$

where n was the sample size, z the confidence interval 1.96, and p was 5.5% on the basis of results from a previous study (12), q was 1-p, and d, the desired margin of error, was 5%. This led to a total sample size of 80. The required sample size of each type of RPD was then calculated, i.e., for cobalt chromium (CC) partial dentures and acrylic (A) partial dentures, according to the total average of cases per month;

$$n = \frac{\textit{average of cases (CC)/ month} \times \textit{total sample size}}{\textit{total average of cases (A \& CC) / month}}$$

$$\text{Cobalt Chromium RPDs} = \frac{26 \times 80}{190} = 11 \text{ cases}$$

$$\text{Acrylic RPDs} = \frac{163 \times 80}{190} = 69 \text{ cases.}$$

boratorija uzeta je ovisno o broju slučajeva u određenom laboratoriju tijekom prikupljanja podataka. Popis privatnih stomatoloških laboratorija u pokrajini Khartoumu dobiven je od Ministarstva zdravstva. Sedam je bilo opremljeno uređajima za izradu CC-RPD-a. Voditelj istraživanja anketirao je tehničare tih sedam laboratorija s pomoću upitnika kojim su se prikupljale informacije o svakom zaprimljenom slučaju RPD-a, a podatci su uneseni u proračunsku tablicu. Upitnik je bio prilagođena inačica onoga kojim se Al-Alsheikh koristio u Saudijskoj Arabiji (13), a sastojao se od triju glavnih dijelova – odjeljak A bavio se podatcima o laboratoriju i vrsti proteze, odjeljak B sadržavao je informacije o A-RPD-u i CC-RPD-u, a C se odnosio samo na podatke o CC-RPD-u.

Upitnik je sadržavao pitanja o četirima komponentama dizajna za A-RPD i osam za CC-RPD. Komponente oblikovanja za A-RPD bile su zubi na koje su se pričvršćivale kvačice, boja umjetnih zuba, oblik stražnjih zuba i stražnji palatinalni ventil. Komponente dizajna za CC-RPD bile su jednake onima za A-RPD, no dodana je vrsta velikih i malih spojki, položaj upirača i položaj indirektnog retencijskog elementa.

Kako bi se procijenile upute dobivene uz slučajeve RPD-a, one su klasificirane kao jasne, potrebno objašnjenje, loše i nikakve (bez uputa) prema broju spomenutih komponenti dizajna: jasno [4 (A-RPD)\7 – 8 (CC-RPD) komponente opisane], potrebno objašnjenje [2 – 3 (A-RPD)\4 – 6 (CC-RPD) komponente opisane], loše [1 (A-RPD)\1 – 3 (CC-RPD) komponente opisane] i nikakve (nije opisana nijedna komponenta). Ta klasifikacija je modificirana prema onoj kojom su se koristili Lynch i suradnici u Irskoj i Velikoj Britaniji (8). Upotrijebljena je deskriptivna statistika, uključujući tablice distribucije frekvencija i grafikoni. Fisherov test odabran je za testiranje razlike između dviju skupina (A-RPD i CC-RPD). SPSS verzijom 17.0 analizirani su unos i podatci. Svrha istraživanja objašnjena je sudionicima prije njegova početka. Prije početka istraživanja dobiveno je i odobrenje Etičkog povjerenstva Stomatološkog fakulteta Sveučilišta u Khartoumu. Svi laboratoriji koji su sudjelovali u istraživanju potpisali su informativni pristanak te je osigurana zaštita podataka.

Rezultati

U istraživanju je sudjelovalo 19 zubnih tehničara. Oni su izradili 80 mobilnih parcijalnih proteza koje su naručili stomatolozi – od toga je 69 (86,25 %) bio A-RPD i 11 (13,75 %) CC-RPD. Tehničari su dobili upute od liječnika usmeno ili su bile napisane u 78,3 % (54) slučajeva za A-RPD-e i u svim slučajevima za CC-RPD-e (11). Usmene upute dobivene su u 55,1 % (38) slučajeva i pisane u 23,2 % (16) slučajeva za A-RPD-e, a usmene upute dobivene u 54,5 % (6) slučajeva i pisane upute u 45,5 % (5) slučajeva za CC-RPD-e. Važno je napomenuti da je većina tehničara – 84,2 % (16) vjerovala da je oblikovanje proteze odgovornost liječnika, a samo 15,8 % (3 slučaja) smatralo je da je to odgovornost teh-

This yielded a final sample size of 11 CC-RPD and 69 A-RPD cases. The sample size from each dental laboratory was taken according to the availability of the cases within the laboratory during the time of data collection. A list of private dental laboratories in Khartoum State was obtained from the Ministry of Health. Seven of them had the facilities to fabricate CC-RPDs. The technicians of these 7 dental laboratories were interviewed by the main investigator using a questionnaire enquiring about each of the RPD cases received, and the data were entered into a spreadsheet. The questionnaire was a modified version of the one used by Al-Alsheikh in Saudi Arabia [13], and consisted of three main sections: section A dealt with data about laboratory & type of prosthesis, section B included information about A- and CC-RPDs, while section C only pertained to data regarding CC-RPDs.

The questionnaire contained questions about 4 design components for A-RPD and 8 design components for CC-RPD. The design components for A-RPD were the teeth to be clasped, the shade of artificial teeth, the form of posterior teeth, and the posterior palatal seal. The design components for CC-RPD were the same as those for A-RPD in addition to the type of major and minor connectors, the position of the rests, and the position of the indirect retainer.

In order to evaluate the instructions accompanying RPD cases, the instructions were classified as clear, guided, poor, and none (no instruction) according to the number of design components mentioned: clear {4 (A-RPD) \7-8 (CC-RPD) design components mentioned}, guided {2-3 (A-RPD)\4-6 (CC-RPD) design components mentioned}, poor {1 (A-RPD)\1-3 (CC-RPD) design components mentioned}, and none {no design variable mentioned}. This classification was modified from that used by Lynch et al in Ireland and the UK (8). Descriptive statistics including frequency distribution tables as well as graphs were used. The Fisher exact test was used to test the difference between two groups (A-RPD and CC-RPD). SPSS version 17.0 was used for entering and analyzing the data. The aim of the study was explained to the participants before commencing the study. Approval letters from the Ethical Committee of the Faculty of Dentistry, University of Khartoum were obtained before conducting the study. Written informed consent was obtained from all laboratories that participated in the study and data protection was assured.

Results

Nineteen technicians participated in the study. They constructed 80 RPDs prescribed by dentists, of which 69 cases (86.25%) were A-RPDs and 11 cases (13.75%) were CC-RPDs. Technicians received instructions, either verbal or written, from dentists in 78.3% (54 cases) of the A-RPD cases and in all of the CC-RPD cases (11 cases). Verbal instructions were obtained in 55.1% (38 cases) and written instructions in 23.2% (16 cases) of A-RPD cases, while verbal instructions were obtained in 54.5% (6 cases) and written instructions in 45.5% (5 cases) of CC-RPD cases. It is important to note that most of the technicians, 84.2% (16 cases), believed that the design of prosthesis is the responsibility of

Tablica 1. Izradite komponente za akrilatne i djelomične proteze od kobalt-kroma
Table 1 Design components for acrylic and cobalt chromium partial dentures

Komponente proteze • Design components		Akrilatna RPD • Acrylic RPD N (%)		Kobalt-krom RPD • Cobalt chromium RPD N (%)	
1. Je li stomatolog označio zube na koje se stavljaju kvačice? • Has the dentist indicated the teeth to be clasped?	Ne • No	47(68.1)		Ne • No	2 (18.2)
	Nepotrebno • Not needed	3(4.3)		Nepotrebno • Not needed	0 (0.0)
	Da • Yes	19(27.5)		Da • Yes	9 (81.8)
2. Je li stomatolog odredio boju umjetnih zuba? • Has the dentist indicated the shade of artificial teeth?	Ne • No	30(43.5)		Ne • No	0 (0.0)
	Da • Yes	39(56.5)		Da • Yes	11 (100)
3. Je li stomatolog predložio oblik stražnjih zuba? • Has the dentist indicated the form of posterior teeth?	Ne • No	56(81.2)		Ne • No	9 (18.8)
	Nepotrebno • Not needed	10(14.5)		Nepotrebno • Not needed	0 (0.0)
	Da • Yes	3(4.3)		Da • Yes	2 (18.2)
4. Je li stomatolog ucrtao tijek stražnjeg palatinalnog ventila (ako je potrebno)? • Has the dentist drawn/ carved the posterior palatal seal (if needed)?	Ne • No	24(34.8)		Ne • No	1 (9.1)
	Nepotrebno • Not needed	43(62.3)		Nepotrebno • Not needed	10 (90.9)
	Da • Yes	2(2.9)		Da • Yes	0 (0.0)
5. Je li stomatolog odredio vrstu velike spojke? • Has the dentist determined the type of major connector?				Ne • No	4 (36.4)
				Da • Yes	7 (63.6)
6. Je li stomatolog odredio vrstu male spojke? • Has the dentist determined the type of minor connector?				Ne • No	8 (72.7)
				Da • Yes	3 (27.3)
7. Je li stomatolog odredio položaj upirača? • Has the dentist located the position of the rests?				Ne • No	2 (18.2)
				Da • Yes	9 (81.8)
8. Je li stomatolog odredio položaj indirektnog retencijskog elementa? • Has the dentist located the position of the indirect retainer?				Ne • No	4 (36.4)
				Nepotrebno • Not needed	2 (18.2)
				Da • Yes	5 (45.5)

Tablica 2. Upute za izradu A-RPD-a nasuprot CC-RPD-u
Table 2 A-RPD versus CC-RPD instructions

Varijable • Variables		Vrsta proteze • Type of prosthesis				P-vrijednost • P-value
		A-RPD		CC-RPD		
		N	%	N	%	
Jesu li uz radni model bile priložene upute? • Were there instructions accompanying the master cast?	Ne • No	15	21.7%	0	0%	0.113
	Da • Yes	54	78.3%	11	100%	
Je li se od vas tražilo da oblikujete protezu? • Have you been asked to design the prosthesis?	Da • Yes	14	20.3%	0	0%	0.103
	Ne • No	55	79.7%	11	100%	
Vrsta uputa • Type of instructions	Usmeno • Verbal	38	55.1%	6	54.5%	0.123
	Pismeno • Written	16	23.2%	5	45.5%	
	Bez uputa • No instruction	15	21.7%	0	0%	
Hoćete li morati kontaktirati sa stomatologom radi objašnjenja o obliku prije izrade proteze? • Will you need to contact the dentist for clarification of the design prior to making the prosthesis?	Ne • No	44	63.8%	5	45.5%	0.004
	Da • Yes	10	14.5%	6	54.5%	
	Bez uputa • No instruction	15	21.7%	0	0.0%	
Je li stomatolog s vama kontaktirao kako biste razjasnili slučaj? • Does the dentist approach you to discuss the design of the case?	Ne • No	52	75.4%	6	54.5%	0.269
	Da • Yes	17	24.6%	5	45.5%	
Je li navedena dob pacijenta? • Was the age of the patient mentioned?	Ne • No	56	81.2%	5	45.5%	0.018
	Da • Yes	13	18.8%	6	54.5%	
Je li naveden spol pacijenta? • Was the gender of the patient mentioned?	Ne • No	43	62.3%	3	27.3%	0.084
	Da • Yes	26	37.7%	8	72.7%	
Je li naveden datum povratka? • Was the return date mentioned?	Ne • No	24	34.8%	2	18.2%	0.482
	Da • Yes	45	65.2%	9	81.8%	
Je li priložen dijagram dizajna? • Was there a design diagram?	Ne • No	62	89.9%	6	54.5%	0.009
	Da • Yes	7	10.1%	5	45.5%	

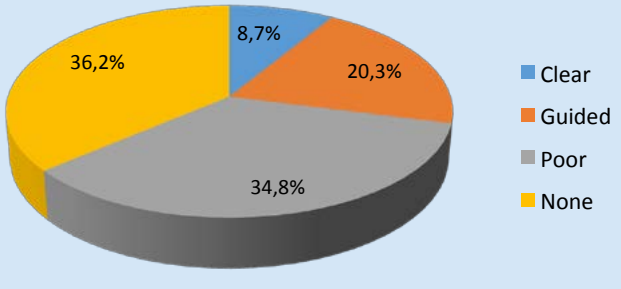
Razina značajnosti (0,05) prilagođena je za 7 testova (0,05/7 = 0,007), pa se p-vrijednost manja od 0,007 smatra značajnom • The level of significance (0.05) was adjusted for the 7 tests (0.05/7 = 0.007), which has led to the p-value of less than 0.007 being considered as significant.

ničara. U ovom istraživanju tehničari su zamoljeni da oblikuju protezu u 20,3 % (14) slučajeva za A-RPD-e, ali ni jednu za CC-RPD-e. Liječnici su raspravljali o nacrtu proteze s tehničarima u 24,6 % (17) slučajeva za A-RPD-e i 45,5 % (5) slučajeva za CC-RPD-e. Tehničari su morali kontaktirati s terapeutom radi objašnjenja dizajna u 14,5 % (10) slučajeva za A-RPD-e i 54,5 % (6) slučajeva za CC-RPD-e. U 69 slučajeva koji su uključivali akrilatne parcijalne proteze, stomatolozi nisu naznačili na koje su se zube trebale staviti kvačice u 47 slučajeva (68,1 %), zatim nisu naznačili boju zuba u 30 (43,5 %) slučajeva ili oblik stražnjih zuba u 56 (81,2 %) slučajeva i nisu označili tijek palatinalnog ventila u 24 (34,8 %) slučaja (tablica 1.).

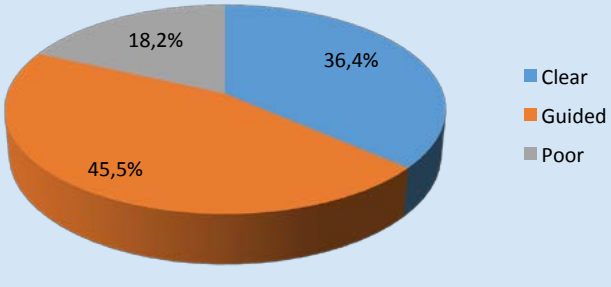
Za 11 parcijalnih proteza od kobalt-kroma, liječnici nisu naznačili zube na koje su se trebale pričvrstiti kvačice u dva (18,2 %) slučaja, no za svaku je odabrana boja zuba, ali oblik stražnjih zuba naveden je u samo 2 (18,2 %) slučaja, a tijek palatinalnog ventila nije označen u samo jednom slučaju. Nadalje, tipovi glavnih spojki određeni su u sedam (63,6 %) slučajeva, tipovi malih spojki u tri slučaja (27,3 %), položaj upirača u devet slučajeva (81,8 %), a položaj indirektnih retencijskih elemenata u pet (45,5 %) slučajeva (tablica 1.). I za akrilatne i za proteze od kobalt-kroma tehničari su naveli da je dob pacijenata spomenuta u 18,8 % (13) slučajeva za A-RPD-e i 54,5 % (6) slučajeva za CC-RPD-e; spol pacijenata nije zaboravljena u 37,7 % (26) slučajeva za A-RPD-e i 72,7 % (8) slučajeva za CC-RPD-e; datum povratka u 64,7 % (44) slučajeva za A-RPD-e i 81,8 % (9) slučajeva za CC-RPD-e; dijagram dizajna u 10,1 % (7) slučajeva za A-RPD-e i 45,5 % (5) slučajeva za CC-RPD-e; stomatolozi su analizirali modele u samo 18,2 % (2) slučajeva za CC-RPD-e (tablica 2.). Preparacija zuba obavljena je u svim slučajevima s CC-RPD-om. Upute koje su liječnici dali tehničarima za A-RPD smatrale su se jasnima u 8,7 % (6) slučajeva, objašnjenje je bilo potrebno u 20,3 % (14) slučajeva, lošima su se smatrale u 34,8 % (24) slučajeva i nije bilo nikakvih uputa u 36,2 % slučajeva (25) (slika 1.). Slično tomu, upute koje je dobio tehničar o CC-RPD-u bile su jasne u 36,4 % (4) slučajeva, zahtijevale su objašnjenje u 45,5 % (5) slučajeva, a loše su bile u 18,2 % (2) slučajeva za CC-RPD (slika 2.). Kada se uspoređuju rezultati za A-RPD i CC-RPD koristeći se Fisherovim testom, jedina značajna povezanost (p = 0,004) utvrđena je za tehničara koji je trebao kontaktirati s doktorom radi objašnjenja dizajna (tablica 2.).

the dentist, and only 15.8% (3 cases) thought that the design of prosthesis is the technician's responsibility. In this study, technicians were asked to design the prosthesis in 20.3% (14 cases) of A-RPD cases but in none of the CC-RPD cases. Dentists discussed the design of the case with technicians in 24.6% (17 cases) of A-RPD cases and in 45.5% (5 cases) of CC-RPD cases. It was necessary for technicians to contact dentists for clarification of the design in 14.5% (10 cases) of A-RPD cases and 54.5% (6 cases) of CC-RPD cases. In 69 cases involving acrylic partial dentures, dentists did not indicate which teeth needed to be clasped in 47 (68.1%) cases; did not specify tooth shade in 30 (43.5%) or posterior tooth form in 56 (81.2%) of cases; and did not draw the posterior palatal seal in 24 (34.8%) of necessary cases (Table 1)

Concerning the 11 cases involving cobalt chromium partial dentures, dentists did not indicate the teeth to be clasped in 2 (18.2%) cases; selected the tooth shade in all cases, specified the posterior tooth form in only 2 (18.2%) cases; and did not draw or carve the necessary posterior palatal seal in only one case. Furthermore, the types of major connectors were determined in 7 (63.6%) cases, types of minor connector in 3 (27.3%) cases, the position of rests in 9 (81.8%) cases, and positions of indirect retainers in 5 (45.5%) cases (Table 1). For both acrylic and cobalt chromium partial dentures, technicians stated that patients' age was mentioned in 18.8% (13 cases) of A-RPD and 54.5% (6 cases) of CC-RPD cases; patients' gender in 37.7% (26 cases) of A-RPD and 72.7% (8 cases) of CC-RPD cases; return date in 64.7% (44) of A-RPD and 81.8% (9) of CC-RPD cases; and design diagram in 10.1% (7 cases) of A-RPD and 45.5% (5 cases) of CC-RPD cases; surveying was done by the dentist in only 18.2% (2 cases) of the CC-RPD cases (Table 2). The tooth preparations were performed in all of CC-RPD cases. Instructions given by dentists to technicians for A-RPD were considered to be clear in 8.7% (6 cases); guided in 20.3% (14 cases); poor in 34.8% (24 cases); and absent in 36.2% (25 cases) of cases (Figure 1). Similarly, instructions received by the technician with regards to CC-RPD were clear in 36.4% (4 cases), guided in 45.5% (5 cases), poor in 18.2% (2 cases) of CC-RPD cases (Figure 2). When comparing the results of A-RPD and CC-RPD cases using the Fisher's exact test, the only significant association (p=0.004) was with the technician needing to contact the dentist for clarification of the design (Table 2).



Slika 1. Kvaliteta uputa za A-RPD prema broju komponenti
Figure 1 Quality of instructions for A-RPD according to the number of design components



Slika 2. Kvaliteta uputa za CC-RPD prema broju komponenti
Figure 2 Quality of instructions for CC-RPD according to the number of design components

Rasprava

Rezultati ovog istraživanja pokazali su da su se A-RPD-i češće izrađivali od CC-RPD-a. Ti rezultati u skladu su s onima Radha i suradnika (12). To razočarava, jer CC-RPD-i bolje čuvaju oralno zdravlje od A-RPD-a, a ovi drugi mogu čak oštetiti tkiva usne šupljine (10, 18, 19). Razlozi zašto se ipak češće izrađuju A-RPD-i mogu biti skupoća izrade CC-RPD-a i nedostatak edukacije ili kliničkog iskustva u njihovoj konstrukciji (13). Kad je riječ o broju elemenata, većina uputa o izradi A-RPD-a i CC-RPD-a u ovom istraživanja nije bila jasna. To se može usporediti s opažanjima drugih autora (8, 12 – 14, 16, 17, 20 – 22), a može biti pokazatelj neodgovarajuće komunikacije između terapeuta i zubnog tehničara kao posljedica liječnikova oslanjanja na tehničara pri oblikovanju proteze. S druge strane, to može biti i zbog nedovoljne preddiplomske edukacije o davanju uputa laboratoriju i o izradi RPD-a. Manje od četvrtine slučajeva s A-RPD-om i manje od polovine onih s CC-RPD-om došlo je s pisanim uputama, više negoli u istraživanju Netoa i suradnika (23).

Pisane upute važne su tehničarima jer bi mogli zaboraviti pojedinosti ako im se daju samo usmeno. Još jedna prednost pisanih uputa jest da se one mogu smatrati pravnim dokumentom (24). Verbalna komunikacija može biti korisna kada tehničari trebaju dodatne informacije ili objašnjenja. U takvim okolnostima ne smije se zanemariti važnost osobnog ili telefonskog razgovora (25).

Većina tehničara vjeruje da je oblikovanje proteze odgovornost stomatologa, suprotno nalazima Haj-Alija i suradnika (15). Tehničari su se trebali obratiti liječniku samo u nekoliko slučajeva za A-RPD-e, ali u gotovo pola slučajeva za CC-RPD-e. U ovom istraživanju doktori su razgovarali s tehničarima osobno samo u približno četvrtini slučajeva za A-RPD-e i oko polovini slučajeva za CC-RPD-e, što je slično rezultatima Al-Alsheikha (14). To upućuje na to da je potrebno mnogo više napora da bi se poboljšala komunikacija između stomatologa i tehničara kako bi se popravila kvaliteta protetičke usluge.

Tehničari su zamoljeni da oblikuju protezu u oko petine slučajeva s A-RPD-om, a ni u jednom slučaju s CC-RPD-om, što se može usporediti s opažanjima Lyncha i suradnika (17), no razlikuje se od drugih istraživanja (8, 13, 23). Možda stomatolozi stavljaju veći naglasak na upute pri izradi CC-RPD-a, negoli A-RPD-a zbog velikih troškova CC-RPD-a ili zato što su CC-RPD tražili stomatolozi koji su bili vještiji od onih koji su tražili A-RPD. Rezultati ovog istraživanja pokazali su da većina dijelova za A-RPD i CC-RPD nije bila jasno propisana, što je opet slično dosadašnjim istraživanjima (13, 17, 24, 23). To znači da stomatolozi uglavnom ostavljaju tehničarima oblikovanje proteze, što je neprihvatljivo jer terapeut treba biti odgovoran za dizajn RPD-a s obzirom na to da obavlja pregled, postavlja dijagnozu i planira terapiju.

Dob pacijenta bila je navedena u manje od petine slučajeva za A-RPD-e i u gotovo polovini slučajeva za CC-RPD-e, a spol pacijenata bio spomenut u gotovo trećini slučajeva za A-RPD-e i oko tri četvrtine slučajeva za CC-RPD-e. Takav nalaz ne zadovoljava jer su dob i spol važni u odabiru zu-

Discussion

The results of this study showed that A-RPDs were more commonly prescribed than CC-RPDs. These results are consistent with those of Radhi et al (12). These findings are disappointing as CC-RPDs are more proficient in maintaining oral health than A-RPD, and the latter may even have harmful effects on the oral tissues (10,18,19). Reasons for the frequent prescription of A-RPD may be the high financial cost of CC-RPD and lack of educational or clinical experience in constructing CC-RPD (13). Based on the number of design components, most of the A- and CC-RPD instructions in the current study were not considered clear. This is comparable to observations by other authors (8,12-14,16,17,20-22). This might be a reflection of inadequate communication between dentists and dental technicians, based on dentists relying on the dental technicians to construct the prostheses. Alternatively, it could be due to weak undergraduate training in writing laboratory instructions and designing RPDs. Less than a quarter of A-RPD and less than half of CC-RPD cases came with written instructions, more than those found by Neto et al (23).

Written instructions are important to technicians as they might forget the details of instructions if they were given to them only verbally. Another advantage of written instruction is that they can be considered a legal document (24). Verbal communication may be useful when technicians need additional information or clarification. In such circumstances, the importance of discussing the case face to face or over the telephone cannot be ignored (25).

Most of the technicians believed that the design of the prosthesis is the responsibility of the dentist, contrary to findings by Haj-Ali et al (15). The technicians needed to contact the dentist in only a few of the A-RPD cases but in nearly half of the CC-RPD cases. In the present study, the dentists discussed the design of the case with the technicians face to face only in approximately a quarter of A-RPD cases and about half of CC-RPD cases, similar to the results by Al-Alsheikh (14). This indicates that much more effort is needed to improve communication between dentists and technicians in order to enhance prosthodontic services.

Technicians were asked to design the prosthesis in about a fifth of A-RPD cases and had not been asked to design any CC-RPD case, which is comparable to observations by Lynch et al. Two hundred and ten questionnaires were distributed to 21 laboratories throughout England, Ireland and Wales. Information was collected regarding the quality of written communication and selection of master impression techniques for cobalt chromium partial dentures in general dental practice. One hundred and forty-four questionnaires were returned (response rate = 68%]. It is possible that dentists put a greater emphasis on CC-RPD instructions than A-RPD instructions because of the high cost of CC-RPDs, or because CC-RPDs were prescribed by dentists who possessed greater skills than those who prescribed A-RPDs. The results of this research showed that most of the design components for A- and CC-RPDs were not clearly prescribed, which again is similar to previous studies (13,17,23,24). This again indicates that dentists leave it mainly to technicians to

ba (27, 28). Datum povratka spomenut je u više od polovine slučajeva za A-RPD-e i u većini slučajeva za CC-RPD-e. To je u skladu s rezultatima Al-Alsheikha (14), ali je suprotno rezultatima Carneira (15). Datum povratka važan je za organizaciju i učinkovitost. Stomatolozi su dizajnirali dijagram samo za nekoliko slučajeva s A-RPD-om, te za približno polovinu njih s CC-RPD-om, što je opet bilo slično kao u nekoliko istraživanja (8, 12, 14, 22), ali različito od istraživanja Lyncha i suradnika (16). Dijagrami bi se trebali upotrebljavati češće kako bi se poboljšala kvaliteta komunikacije između terapeuta i zubnog tehničara. Dijagram koji se stvara nakon detaljne procjene pacijenta, uz analizu i artikulaciju studijskih modela, može se koristiti kao prihvatljivo odobrenje za oblikovanje RPD-a (25).

Doktori su analizu modela obavili u manje od petine slučajeva za CC-RPD-e, što se ponovno može usporediti s dosadašnjim istraživanjima (8, 14, 22). Možda je to posljedica slabe preddiplomske edukacije ili neznanja o važnosti tog postupka. Zubi su preparirani u svim slučajevima s CC-RPD-om, što se može smatrati pozitivnim jer je preparacija zuba nužna za uspješno liječenje (26). Tehničari su se trebali obratiti doktoru za objašnjenje dizajna znatno češće za CC-RPD-e ($p = 0,004$), negoli za A-RPD-e. Kao što je naveo Lynch [8], oblikovanje bilo koje proteze temelji se na mehaničkim i biološkim načelima. Stoga su komunikacija između terapeuta i tehničara i/ili potpune informacije dobivene otiskom vrlo važne, jer ako se glavni otisak šalje u dentalni laboratorij s neadekvatnim informacijama o dizajnu, tehničar nema pristup ključnim informacijama vezanima za prirodu i zdravlje (biologija) parodontnih i drugih tkiva. To će negativno utjecati na sljedeće poteze i može rezultirati oštećenjem i ozljedama zubnog i parodontnog tkiva.

Bilo je nekih ograničenja u istraživanju koje treba uzeti u obzir pri tumačenju rezultata. Prvo – istraživanje je obavljeno u obliku ankete koja se oslanjala na sjećanje tehničara o pojedinostima vezanima za upute o svakom slučaju, a anketa je provedena nakon probe proteze. Drugo – točnost procjene ovisila je o nepristranosti tehničara i treće – odabir dentalnih laboratorija u ovom istraživanju ovisio je o tome jesu i opremljeni uređajima za izradu CC-RPD-a. Zato možda odabrani dentalni laboratoriji nisu reprezentativni predstavnici svih dentalnih laboratorija u pokrajini Khartoumu.

design the prosthesis, which is unacceptable as the dentists should be fully responsible for the RPD design, since they perform the examination, diagnosis, and treatment planning.

The age of the patient was stated in less than a fifth of A-RPD cases and in nearly half of CC-RPD cases, while patients' gender was mentioned in almost a third of A-RPD cases and in about three quarters of CC-RPD cases. This revelation is unfortunate, as age and gender are important guides in tooth selection (27,28). The return date was mentioned in more than half of A-RPD cases and in most of CC-RPD cases. This is consistent with the results obtained by Al-Alsheikh [14were part of the questionnaire. Out of two hundred distributed questionnaires, 136 were received (response rate=68%], but conflicts with the results of Carneiro (15). The return date is important to organizational effectiveness of the subsequent appointment for the patient.

The dentists designed a diagram for only a few cases of A-RPD, and for around half of the CC-RPD cases, which is again similar to several studies (8,12,14,22), but different from those by Lynch et al (16). Diagrams should be used more often in order to improve the quality of communication between dentists and dental technicians. A design diagram that is formed after a careful evaluation of the patient, with subsequent surveying and articulation of study casts, can be used as an acceptable work authorization for an RPD design (25).

Surveying of the casts by dentists was implemented in less than a fifth of the CC-RPD cases, which again was comparable to previous studies (8,14,22). It is possible that this is a consequence of poor undergraduate training, unavailability of surveyors, or ignorance of the dentists regarding the importance of surveying. Tooth preparations were performed in all of the CC-RPD cases, which may be considered positive as tooth preparations are essential for obtaining a successful treatment outcome (26). Technicians needed to contact the dentist for clarification of design significantly more for CC-RPD ($p=0.004$), than A –RPD cases. As previously stated by Lynch (8), the design of any prosthesis is based on mechanical and biological principles. Hence, communication between the dentist and dental technician and/or complete information provided with the impression is a very important step because if master impressions are being sent to dental laboratories with inadequate design information, the technician does not have access to crucial information relating to the nature and health (biology) of the periodontal and other tissues. This will reflect negatively on the following steps and may result in damage and injuries to dental and periodontal tissues.

There were some study limitations that should be considered when interpreting the results of this research work. First, the study was based on an interview format that relied on the memory of the technicians for details of the instructions sent with each case, particularly given that the interview was made after the try-in stage of the prosthesis. Likewise, the accuracy of the assessment also depended on the impartiality of the technician. Thirdly, the selection of the dental laboratories in this study was dependent on the existence of facilities for fabrication of CC-RPD. Therefore, the selected dental laboratories might not be representative of all dental laboratories in Khartoum State.

Zaključak

Kvaliteta komunikacije između doktora dentalne medicine i zubnih tehničara o izradi mobilnih parcijalnih proteza nije bila odgovarajuća. Potrebne su jasne smjernice koje ističu odgovornost doktora dentalne medicine u odobravanju izrade mobilnih proteza kako bi se poboljšala trenutačna situacija.

Sukob interesa

Autor ne navodi sukob interesa.

Conclusion

The quality of communication between dentists and laboratory technicians with regard to removable partial prosthodontic appliances was found to be inadequate. Clear guidelines outlining the dentist's responsibility in authorizing the fabrication of removable denture appliances are necessary to help improve the current situation.

Conflict of interest

None declared

Abstract

Objectives: To investigate the quality of communication between dentists and dental laboratory technicians in private dental laboratories in Khartoum State related to fabrication of removable partial dentures. **Methods:** This was a descriptive cross-sectional study, in which dental technicians were interviewed regarding the quality of instructions they received from dentists concerning the construction of removable partial dentures (RPD). Eighty cases were investigated, 69 acrylic (A-RPD) and 11 cobalt chromium (CC-RPD) dentures. **Results:** Although dentists provided no instructions in 21.7% of A-RPD cases, they gave instructions in all CC-RPD cases. Instructions were primarily given verbally (55.1% in A-RPD, 54.5% in CC-RPD cases), as opposed to written (23.3% in A-RPD, 45.5% in CC-RPD cases). Most design components for A-RPD and CC-RPD cases were not clearly prescribed, and instructions were clear in only 8.7% of A-RPD and 36.4% of CC-RPD cases. Notably, surveying of casts by dentists was only done in 18.2% of CC-RPD cases. Most technicians (84.2%) believed that prosthesis design was the dentists' responsibility. Technicians needed to contact dentists for clarification of design significantly more frequently for CC-RPD (p=0.004) cases. **Conclusion:** Quality of communication between dentists and private laboratory technicians in Khartoum State with regard to removable partial denture construction was largely inadequate.

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Key words
Interprofessional Relations; Dentists; Dental Technicians; Dental Prosthesis Design; Removable Partial Denture

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