International Poster Journal IPJ of Dentistry and Oral Medicine

Int Poster J Dent Oral Med 2011, Vol 13 No 3, Poster 547

Cross-contamination risks in the dental laboratory during denture processing

Language: English

Authors:
Prof. Mihaela Pauna, PhD, PhD student Madalina Malita, PhD student Iuliana Babiuc,
University of Medicine and Pharmacy Carol Davila Bucharest, Faculty of Dentistry, Department of Removable Prosthodontics, Bucharest, Romania
Lucia Ciudin, Daniela Cristea, Maria Condei, Madalina Baltoiu, Vasilica Ungureanu, Anca Petrini, Andi Marian Palade,
National Institute of Research-Development for Microbiology and Immunology Cantacuzino, Bucharest, Romania

Date/Event/Venue:
22-25th April 2010
15th BASS Congress
Thessaloniki, Greece

Introduction

Cross-contamination may arise during different prosthetic stages, such as impression, casts, occlusal rims, articulators, dental prostheses and during repairs, relining or polishing of the dentures.

Objectives

The aim of this study was to investigate the potential for microbial contamination in the dental laboratory during dentures' processing.

Material and Methods

A total of 14 patients from the Department of Removable Prosthodontics of the Faculty of Dental Medicine in Bucharest participated in this study. They were of both sexes, ranging in age from 48 to 84 years, wearing 20 removable dentures. The subjects were divided into 2 groups: partially edentulous (n=8) and completely edentulous (n=6).
The samples were collected from the dentures at the Faculty of Dentistry, using a cotton pad. The cotton pad was placed in coded tubes and sent to INCDMI Cantacuzino. The samples were inseminated and incubated then the isolated aerobic species were biochemically identified using API galleries, rapid ID and/or Vitek ID cards and PCR targeting either species/specific genetic regions or gft genes coding for pathogenicity.

Results

50 bacterial strains have been isolated from 20 collected samples. All the microbial strains were aerobic species.
First group – partially edentulous patients – 11 samples from 8 subjects were analyzed, which led to the identification of 30 bacterial strains. Two subjects displayed signs of stomatitis and 7 were diagnosed with advanced periodontitis.
Group II – totally edentulous patients – 9 samples from 6 patients were collected. Four patients showed signs of denture-induced stomatitis, sometimes in connection with denture defects of construction.

	Pacient sex/age	Sample No./Date	Sample collection area	Isolated aerobic species
1	B.G./M/73 years	2c/06.05.08	Upper partial denture	1. S. plurianimalium 2. Proteus mirabilis 3. Candida spp. (frotiu)
2	C.M./F/73 years	5c/06.05.08	Impression surface of upper partial denture	1. S. intermedius 2. Neisseria spp 3. E. coli
		6c/06.05.08	Impression surface of lower partial denture	1. S. gordonii 2. S. mitis/oralis 3. Enterobacter cloacae
3	P.E./F/55 years	5c/27.05.08	Lower partial denture	1. S. parasanguinis

4	S.C./F/57 years	10c/27.05.08	Lower denture – frontal base	1. S. anginosus 2. S. parasanguinis 3. Candida spp.
5	H.I./F/65 years	7c/17.06.08	Impression surface of lower partial denture	1. Rothia mucilaginosa 2. S. parasanguinis 3. Enterococcus cecorum
6	M.R./F/80 years	8c/17.06.08	Impression surface – upper denture	1. S. mitis/oralis 2. S. plurianimalium
		10c/17.06.08	Impression surface – lower denture	1. S. plurianimalium 2. Klebsiella pneumoniae
7	S.B./F/48 years	8c/24.06.08	Impression surface	1. S. mitis/oralis 2. S. gordonii
8	B.E./F/70 years	10c/24.06.08	Impression surface – upper denture	1. S. gordonii 2. S. parasanguinis 3. Citrobacter braakii 4. Klebsiella oxytoca
		12c/24.06.08	Impression surface – lower denture	1. S. gordonii 2. S. mitis/oralis 3. Citrobacter braakii 4. Klebsiella oxytoca

Tab. 1: Group I

	Pacient sex/age	**Sample No./Date**	**Sample collection area**	**Isolated aerobic species**
1	I.M./F/74 years	10c/06.05.08	Complete upper denture – calculus	1. E. coli
2	P.E./F/84 years	2c/20.05.08	Complete upper denture	1. S. mitis/oralis 2. S. parasanguinis 3. Sphingomonas paucimobilis
		4c/20.05.08	Complete lower denture	1. S. mitis/oralis 2. Rothia mucilaginosa
3	M.A./F/75 years	5c/10.06.08	Complete lower denture – frontal base (relined with resilient material)	1. S. mitis/oralis 2. S. parasanguinis 3. E. coli 4. Candida spp.
		7c/10.06.08	Impression surface – complete upper denture (relined with resilient material)	1.S. parasanguinis 2. Candida spp.
4	R.C./F/53 years	8c/10.06.08	Impression surface – complete upper denture	1. S. gordonii 2. S. mitis/oralis
5	G.S./F/80 years	12c/10.06.08	Complete lower denture	1. Gemella morbillorum 2. S. mitis/oralis
		14c/10.06.08	Impression surface – complete upper denture	1. Gemella morbillorum 2. S. alactolitycus
6	H.I./F/65 years	4c/17.06.08	Impression surface – complete upper denture (relined with resilient material)	1. Aerococcus viridians 2. Candida spp.

Tab. 2: Group II

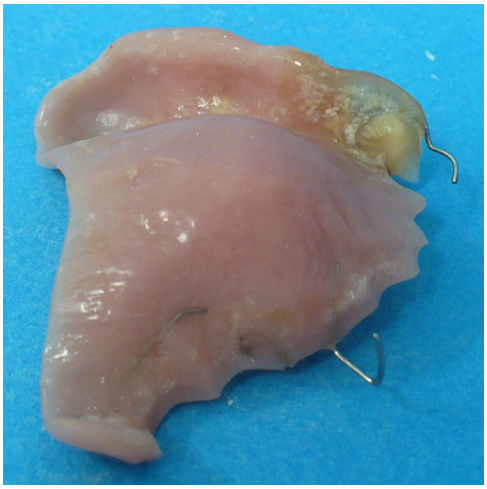

Fig. 1: Puss in the proximity of a root (23). Microbial samples turned positive for E. coli.

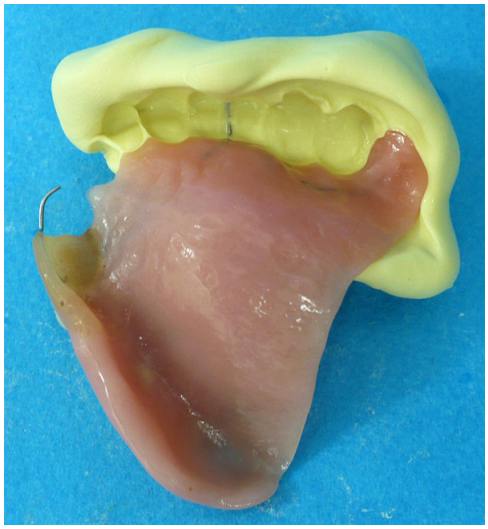

Fig. 2: A silicone impression was taken in order to add a dental clasp. The denture and the silicone material were immersed in Printosept for 10 minutes.

Fig. 3: Microbial analysis of the sample collected from the mucosal surface of this 8 years old denture turned positive for Enterobacter cloacae

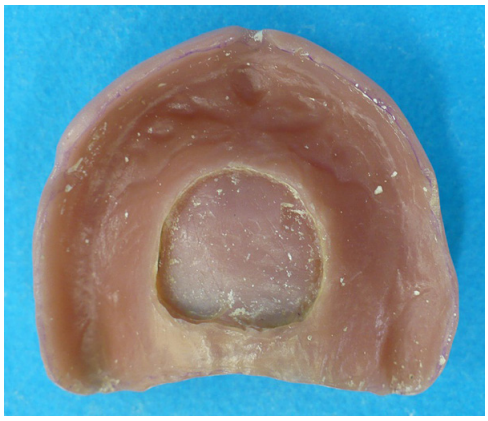

Fig. 4: Complete upper denture with heavy deposits of calculus. The microbial analysis isolated one strain of E. Coli and one strain of Pseudomonas aeruginosa, very sensible to multiple antibiotics.

Fig. 5: Complete upper denture with heavy deposits of calculus. The microbial analysis isolated one strain of E. Coli and one strain of Pseudomonas aeruginosa, very sensible to multiple antibiotics.

Conclusions

The isolated species from the dentures' surface were aerobic bacterias and fungi. They were generally part of the normal oral flora and could cause different pathologies especially in immunocompromised patients.
Enteric rods were present, in small number, signaling poor oral and denture hygiene. The isolated Pseudomonas spp. may play a role in the etiology of the periodontal disease.
3 out of 4 samples collected from dentures relined with resilient material turned positive for Candida spp. They are frequently associated with denture-induced stomatitis.
No anaerobic species was found on the surface of the dentures. However, studies analyzing the colonization of the internal porous system of the acrylic resin indicate the presence of anaerobic species at this level.
In conclusion, dentures tend to accumulate plaque and they become a reservoir for numerous microbial species, some of which may be responsible for a wide range of infections. A faulty manipulation in the dental office and in the laboratory of the removable dentures presents a risk of cross-contamination.

Literature

1. Marya CM, Shukla P, Dahiya V, Rampal N, Disinfection of dental impressions in dental colleges in India: a cause of concern, Int J of Infection Control, 2010, 6:1-2
2. Agostinho AM; Miyoshi PR; Gnoatto N; Paranhos HO; de Figueiredo LC; Salvador SL, Cross-ontamination in the dental laboratory through the polishing procedure of complete dentures, Braz. Dent. J., 2004, 15(2): 138-143
3. Kahn RC, Lancaster MV, Kate W. The microbiologic cross-contamination of dental prostheses. J Prosthet Dent 1982;47:556-559
4. Molinari JA. Infection control: Its evolution to the current standard precautions. J Am Dent Assoc, 2003; 134(5): 569-574
5. Kugel G, Perry RD, Ferrari M, Lalicata P, Disinfection and communication practices: A survey of U.S. dental laboratories. J Am Dent Assoc 2000; 131:786-792
6. Powell GL, Runnells RD, Saxon BA, Whisenant BK. The presence and identification of organisms transmitted to dental laboratories. J Prosthet Dent 1990; 64:235-7
7. Verran J, Kossar S, McCord JF. Microbiological study of selected risk areas in dental technology laboratories. J Dent, 1996; 24:77-80
8. Miller CH, Palenik CH, Infection control and management of hazardous materials for the dental team, 2nd ed., Mosby, 1998, p: 325
9. Bhat VS, Shetty MS, Shenoy KK, Infection control in the prosthodontic laboratory, J Indian Prosth Soc, 2007, 7(2): 62-65

This Poster was submitted by Prof. Mihaela Pauna.

Correspondence address:
Prof. Mihaela Pauna, PhD
University of Medicine Carol Davila Bucharest
Faculty of Dentistry, Department of Removable Prosthodontics
37 Dionisie Lupu Street
020021 Bucharest
Romania

Poster Faksimile:

Cross-contamination risks in the dental laboratory during denture processing

MIHAELA PĂUNA[1], MADALINA MALITA, IULIANA BABIUC[1], LUCIA CIUDIN[2], DANIELA CRISTEA[2], MARIA CONDEI[2], MADALINA BALTOIU[2], VASILICA UNGUREANU[2], ANCA PETRINI[2], ANDI MARIAN PALADE[2]
1 Faculty of Dentistry, University of Medicine Carol Davila Bucharest, Romania
2 National Institute of Research-Development for Microbiology and Immunology Cantacuzino, Bucharest, Romania

INTRODUCTION

Cross-contamination may arise during different prosthetic stages, such as impression, casts, occlusal rims, articulators, dental prostheses and during repairs, relining or polishing of the dentures.
The aim of this study was to investigate the potential for microbial contamination in the dental laboratory during dentures' processing.

MATERIALS AND METHODS:

A total of 14 patients from the Department of Removable Prosthodontics of the Faculty of Dental Medicine in Bucharest participated in this study. They were of both sexes, ranging in age from 48 to 84 years, wearing 20 removable dentures. The subjects were divided into 2 groups: partially edentulous (n=8) and completely edentulous (n=6).
The samples were collected from the dentures at the Faculty of Dentistry, using a cotton pad. The cotton pad was placed in coded tubes and sent to INCDMI Cantacuzino. The samples were inseminated and incubated then the isolated aerobic species were biochemically identified using API galleries, rapid ID and/or Vitek ID cards and PCR targeting either species/specific genetic regions or gft genes coding for pathogenicity.

RESULTS:

50 bacterial strains have been isolated from 20 collected samples. All the microbial strains were aerobic species.
First group - partially edentulous patients - 11 samples from 8 subjects were analyzed, which led to the identification of 30 bacterial strains. Two subjects displayed signs of stomatitis and 7 were diagnosed with advanced periodontitis.

	Pacient sex/age	Sample No./Date	Sample collection area	Isolated aerobic species
1	B.G./M/ 73 years	2c/6.05.08	Upper partial denture	1.S. pluranimalium 2.Proteus mirabilis 3. Candida spp.(frotiu)
2	C.M./F/73 years	5c/6.05.08	Impression surface of upper partial denture	1. S. intermedius 2. Neisseria spp 3. E.coli
		6c/6.05.08	Impression surface of lower partial denture	1. S. gordonii 2. S. mitis/oralis 3. Enterobacter cloacae
3	P.E./F/ 55	5c/27.05.08	Lower partial denture	1.S. parasanguinis
4	S.C./F/ 57 years	10c/27.05.08	Lower denture – frontal base	1. S. anginosus 2. S. parasanguinis 3. Candida spp.
5	H.I./F/ 65 years	7c/17.06.08	Impression surface of lower partial denture	1. Rothia mucilaginosa 2. S. parasanguinis 3. Enterococcus cecorum
6	M. R./F/ 80 years	8c / 17.06.08	Impression surface – upper denture	1. S. mitis/oralis 2. S. pluranimalium
		10c/17.06.08	Impression surface – lower denture	1. S. pluranimalium 2. Klebsiella pneumoniae
7	S. B./F/ 48 years	8c/24.06.08	Impression surface	1.S. mitis/oralis 2. S. gordonii
8	B. E./F/ 70 years	10c/24.06.08	Impression surface – upper denture	1. S. gordonii 2. S. parasanguinis 3. Citrobacter braakii 4. Klebsiella oxytoca
		12c/24.06.08	Impression surface – lower denture	1. S. gordonii 2. S. mitis/oralis 3. Citrobacter braakii 4. Klebsiella oxytoca

Fig. 1 Puss in the proximity of a root (23). Microbial samples turned positive for E. coli.

Fig. 2 A silicone impression was taken. The denture and the silicone material were immersed in Printosept for 10 minutes.

Fig.3 Microbial analysis of the sample collected from the mucosal surface of this 8 years old denture turned positive for Enterobacter cloacae

Group II - totally edentulous patients - 9 samples from 6 patients were collected. Four patients showed signs of denture-induced stomatitis, sometimes in connection with denture defects of construction.

	Pacient sex/age	Sample No./Date	Sample collection area	Isolated aerobic species
1	I. M./F/ 74 years	10c/6.05.08	Upper complete denture - calculus	1. E. coli
2	P. E./F/ 84 years	2c/20.05.08	Upper complete denture	1. S. mitis/oralis 2. S. parasanguinis 3. Sphingomonas paucimobilis
		4c/20.05.08	Lower complete denture	1. S. mitis/oralis 2. Rothia mucilaginosa
3	M. A./F./ 75 years	5c/10.06.08	Lower complete denture – frontal base (relined with resilient material)	1. S. mitis/oralis 2. S. parasanguinis 3. E. coli 4. Candida spp.
		7c/10.06.08	Impression surface – upper complete denture (relined with resilient material)	1. S. parasanguinis 2. Candida spp.
4	R. C./F/ 53 years	8c/10.06.08	Impression surface – complete upper denture	1. S. gordonii 2. S. mitis/oralis
5	G. S./F./ 80 years	12c/10.06.08	Complete lower denture	1. Gemella morbillorum 2. S. mitis/oralis
		14c/10.06.08	Impression surface – complete upper denture	1. Gemella morbillorum 2. S. alactolilyous
6	H. I./F/ 65 years	4c/17.06.08	Impression surface – upper complete denture (relined with resilient material)	1. Aerococcus viridians 2. Candida spp.

Fig. 4, 5 Complete upper denture with heavy deposits of calculus. The microbial analysis isolated one strain of E. Coli and one strain of Pseudomonas aeruginosa, very sensible to multiple antibiotics.

ACKNOWLEDGEMENTS:
This study was supported by the Romanian Ministry of Education and Research, contract IDEAS 254/2007.

CONCLUSIONS:

Dentures tend to accumulate plaque and they become a reservoir for numerous microbial species, some of which may be responsible for a wide range of infections.
A faulty manipulation in the dental office and in the laboratory of the removable dentures presents a risk of cross-contamination.

REFERENCES:
1. Marya CM, Shukla P, Dahiya V, Rampal N, Disinfection of dental impressions in dental colleges in India: a cause of concern, Int J of Infection Control, 2010, 6:1-2
2. Agostinho AM, Miyoshi PR, Ginostto N, Parenhos HO, de Figueiredo LC, Salvador SL, Cross-contamination in the dental laboratory through the polishing procedure of complete dentures, Braz. Dent. J., 2004, 15(2): 138-143
3. Kalen RC, Lancaster MV, Kate W. The microbiologic cross-contamination of dental prostheses. J Prosthet Dent 1982;47:556-559
4. Molinari JA. Infection control: its evolution to the current standard precautions. J Am Dent Assoc, 2003; 134(5): 569-574.
5. Kugel G, Perry RD, Ferrari M, LaBriola P, Disinfection and communication practices: A survey of U.S. dental laboratories. J Am Dent Assoc 2000; 131:796-792
6. Powell GL, Runnells RD, Saxon BA, Whisenant BK. The presence and identification of organisms transmitted to dental laboratories. J Prosthet Dent 1990; 64:235-7
7. Verran J, Kossar S, McCord JF. Microbiological study of selected risk areas in dental technology laboratories. J Dent, 1996; 24:77-80
8. Miller CH, Palenik CH, Infection control and management of hazardous materials for the dental team, 2nd ed., Mosby, 1998, p. 325

Correspondence to: Prof. Dr. Mihaela Păuna, mihaela.pauna@gmail.com