Akademska godina 2021./2022.

Naziv predmeta: Analysis of bone tissue of the mandible and the maxilla; impact of function, aging, implant insertion and/or prosthodontic treatment

Zavod/katedra na kojoj se predmet izvodi: Department of Removable Prosthodontics

Adresa sjedišta zavoda/katedre: Ivana Gundulića 5, 10000 Zagreb

Broj ECTS-a: 5

Nositelj predmeta: prof.dr.sc. Asja Čelebić

Suradnici na predmetu koji sudjeluju u izvođenju nastave: None

Broj sati nastave

	Br. sati
Predavanja	6
Seminari	7
Vježbe	7
Ukupno	20

1 hour = 45 minutes

Opis predmeta:

Information about jaw bone quantity and quality is very important in planning reconstructive prosthodontic treatment, especially when planning implant-supported overdenture rehabilitation in completely edentulous patients.

This course will first repeat what we know about histology and physiology of bone tissue of the mandible and maxilla, all consequences of partial or complete tooth loss. Forces elicited by function will be analyzed under different scenarios: with all teeth present, with some teeth missing and with all teeth missing. Attached keratinized mucosa and movable tissues will be analyzed, as well. Radiomorphometric indices and their measurement and importance will be explained.

Throughout lectures and seminars students will learn about consequences of tooth loss, consequences of aging, osteoporosis, and consequences of wearing removable dentures. Continuous loss of residual ridges after teeth extraction will be explained and morphologic classifications dependent on the lost bone volume will be introduced (eg. Leckholm and Zarb classification, Atwood's classification, Judy and Misch classification, etc.). Analysis of different forces exerted to bone will be explained (compression, torque, strain), and bone response to them. Quality of bone will also be explained and Misch's, and Leckholm and Zarb's classification will be presented, together with the importance of bone density in dental implant planning and in obtaining implant primary stability. Surgical techniques in different bone densities will be mentioned.

Different radiographic techniques and linear measurement errors will be explained. Bone density measurements by means of different step-wedges on 2D radiographs will be explained. CBCT and CT techniques will also be explained, together with linear measurements important for dental implant planning. Moreover, volumetric picture elements (voxels) and Hounsfield's units will be explained, as well as average HU values in different regions of interests (ROIs) and classification into one of four bone density categories. Also, it will be presented how to position tools for ROI determination for obtaining average HU values, or sectional density analysis on CBCT images. Principles and measurement of implant osseointegration in residual ridges and values obtained in different bone densities will be explained.

Oral implant biomechanics and peri-implant bone level changes will be explained dependent on the width of viable bone left around implants, fixed and removable superstructures, implant splinting or not splinting, occlusal concepts for implant born restorations and selection of appropriate restorative biomaterials. Osseoperception will be explained as well as its importance.

Practice will include bone analysis, bone atrophy classification, CBCT measurements of bone width and length, analysis of structures important for dental implant insertion, alveolar inferior nerve tracing, mental foramina tracing, cortical and trabecular bone analysis, measurements of bone density in different regions of jaws. Marginal bone level changes after implant loading and over a certain period of denture wearing will be analyzed. Criteria for implant success, survival and failure will be applied after analyzing digital periapical images of dental implants obtained in patients' prospective clinical studies and follow-up examinations.

Comparison of tooth-root and implant supported overdentures will be done.

Importance of underlying mucosa thickness and bone support will be analyzed, as well.

Ishodi učenja:

1. to understand biology of jaw bone tissue with all teeth present, or when some or all teeth are missing,
2. to be able to analyze consequences of complete edentulism, to calssify bone dependent on its morphology and the amount of residual alveolar ridge atrophy, to classify bone dependent on its density.
3. to measure bone density ob CT or CBCT scans in ROIs important for oral implant insertion or loading with different types of dentures, fixed or removable, or implant supported, loading (delayed, early and immediate) in both jaws.
4. to classify implants dependent on the amount of MBL into success, survival or failure category.
5. To analyze peri-implant bone dependent on various factors, such as thickness of keratinized tissue, amount of periimplant bone left, loading protocol, amount of implant sub-crestal position, etc .

Sadržaj predmeta

Predavanja

	Teme predavanja	Broj sati nastave
1.	Bone tissue, anatomy and histology of flat bones, reparatory mechanisms	1
2.	Jawbone characteristics, functional loadings with or without teeth present, consequence of one tooth or all teeth loss, shorten dental arch concept	1

3.	Classifications of edentulous ridges (jaws) dependent of morphometric characteristics and bone density; radiomorphometric indices, measurement and importance	1
4.	Measurement of bone density on CT or CBCT scans and analysis of HU units, classification into one of four density categories	1
5.	Analysis of MBL change on digital periapical radiographs, measurement error, clasification of implants into success, survived or failed category	1
6.	Measurement of implant stability, importance of occlusion, implant biomechanics, occlusal concept, material used, etc. on periimplant bone level	1
7.		-
8.	-	-
9.	-	-
10.	-	-

1 sat = 45 minuta

Seminari

	Teme seminara	**Broj sati nastave**
1.	Classification of bone tissue, 5 types of bone, reparatory mechanisms	1
2.	Biomechanics of bone around teeth, fixed and removable dentures, periimplant bone biomechanics	1
3.	Classifications of different degrees of edentulous jaw atrophy and bone densities; radiomorphometric indices dependent on gender, body mass index, osteoporosis and functional dental status	1
4.	CBCT linear measurements and HU measurements (density) in ROIs and in sections of residual alveolar bone (profile measurement)	1
5.	Implant planning on CBCTs	1
6.	How many implants are needed for support of mandibular or maxillary overdenture dependent on the quality and quantity of bone tissue and implant dimension and surface characteristics	1
7.	Bone analysis in clinical prospective studies: different methods, measurements, and classifications, PRP, PRF, mechanisms of bone reparatory mechanisms, implant macro and micro surface characteristics, micro and nano implant surface treatments, implant stability, implant loadings	1
8.	-	-
9.	-	-
10.	-	-

1 sat = 45 minuta

Vježbe

	Teme vježbi	Broj sati nastave
1.	Analysis of cortical and trabecular jawbone tissue and comparison with other types of bones	1
2.	Classification of alveolar bone atrophy on different panoramic radiographs, teleradiograms; analysis of periimplant MBL change over time. Standardization of digital periapical imaging techniques	1
3.	Use of software for HU measurement in different ROIs (classification in a certain group of bone density)	1
4.	Measurement and analysis of radiomorphometric indices	1
5.	Classification of implants into success, satisfactory or compromised survival category or failure, MBL change measurement over time on digital retroalveolar radiographs	1
6.	Tracing of important structures for implant insertion planning on CBCT scans, planning of implant dimensions	1
7.	Analysis of occlusal concepts, cusp inclination, occlusal scheme, tooth width in different rehabilitation options	1
8.		
9.		
10.		

1 sat = 45 minuta

Literatura

1. Jimenez-Lopez V. Immediate Loading in Implant Dentistry. Surgical, Prosthetic, Occlusal, and Laboratory Aspects. Barcelona, Quintessence, 2005. ISBN:84-89873-33-X
2. Wismeijer D, Buser D, Belser U. ITI Treatment Guide. Loading Protocols in Implant Dentistry. Edentulous Patients. Berlin, Quintessence, 2010. ISBN: 978-3-938947-16-6
3. Wolfart S. Implant Prosthodontics. A Patient-Oriented Strategy. London, Quintessence, 2016. ISBN 978-1-85097-282-2
4. Zarb G, Hobkirk JA, Eckert SE, Jacob RF. Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-Supported Prostheses. St Louis, Mosby, 2013. ISBN:978-0323-07844-3
5. Christian Crowder and Sam Stout. Bone Histology: An Anthropological Perspective. 2011, pp 1-413 ISBN-13: 978-1439866917
6. Pubmed search based on given key words for different topics
7. Čelebić A i sur. Miniimlantati u kliničkoj praksi. Naklada Slap 2022, pp 1-276.

Životopis voditelja kolegija i bibliografija

Prof. Ph.D. Asja Celebic graduated at the School of Dental Medicine, University of Zagreb in 1980. She received two Rector's Awards for student's research and another one as the best student. She has been employed at the same Dental School since 1982. She has been a Full

Professor with tenure at the Department of Prosthodontics since 2007. She was the principal teacher of the course „Preclicical removable prosthodontics“ from 2005-2013. She is the principal teacher of the undergraduate course "Temporomandibular disorders ", and the course „Removable prosthodontics 1“ for the English language students. She is also the principle teacher of 4 courses in the Master programme and Ph.D. study. She teaches all preclinical and clinical courses in Removable prosthodontics. She won several scientific awards at the European and the International Prosthodontic conferences, alone or with her Ph.D. students (EPA Oral presentation Award, 3 EPA poster Awards, the first poster runner-up at ICP, the first award for clinical research in the join ICP-EPA conference in Amsterdam in 2019., etc.). She was the principal investigator of several research projects funded from Croatian Ministry of Science, Croatian Scientific Foundation (Mini Dental Implants) and of two International bilateral projects with the researchers from Slovenia. She collaborates with Japanese, USA, Sweden, Slovenian, Hungarian, German, Yemen, Bulgarian, Serbian and Romanian researchers. She was an invited speaker at many national and international conferences. In 2010 year she received the „Croatian State Award for Science“ for research in the field of Biomedicine and health, as the first doctor of Dental medicine in Croatia. She also received the award from the Croatian Ministry of Health in 2015. In 2020 she was the first doctor of Dental Medicine who received the national prize: „Andrija Stampar“. In 2021. she was elected as Visiting professor in the School of Dentistry, Skopje, Macedonia.

She published over 100 CC/SCI papers in WoS. Her papers reached more than 1850 citations in the WoS with H index 25. She has been a reviewer of many scientific WoS journals. She has also been a member of Editorial boards of many scientific journals. She wrote the University texbook: Mini Dental Implants in a Clinical Practice. She is a member of numerous professional Societies and a member of Croatian Academy of Medical Sciences.