

Textbook of
Removable Prosthodontics
– the Scandinavian Approach

Textbook of

Removable Prosthodontics

– the Scandinavian Approach

Editors

Margareta Molin Thorén

Johan Gunne



MUNKSGAARD DANMARK



Textbook of Removable Prosthodontics

– the Scandinavian Approach

1st e-book edition, 2014

© Munksgaard Danmark and the authors, Copenhagen 2012

ISBN: 978-87-628-1370-0

Publishing editor: Britta Østergaard

Copy editors: Anne Sofie Steens and Liva Skogemann

forlaget@munksgaard.dk

munksgaard.dk

Layout and typesetting: Carsten Valentin

Illustrations: Birgitte Lerche

Cover design: Nete Banke, Imperiet

e-book production: Marketsquare A/S

Printed edition:

1. edition, 1. printrun, 2012

Printing: Livonia Print, Latvia

ISBN: 978-87-628-0955-0

This publication may only be reproduced in accordance with agreement with Copy-Dan and Danish Ministry of Education.

Editors and authors

Professor, DDS, PhD
Margareta Molin Thorén
Department of Odontology
University of Umeå
Sweden

Professor emeritus, DDS, PhD
Johan Gunne
Department of Odontology
University of Umeå
Sweden

Authors

Professor emeritus, DDS, PhD
Einar Berg
Department of Odontology
University of Bergen
Norway

Senior lecturer, DDS, PhD
Tom Bergendahl
Institute for Postgraduate Dental
Education
Jönköping
Sweden

Professor emeritus, DDS, PhD
Gunnar E. Carlsson
Department of Odontology
University of Gothenburg
Sweden

Professor emeritus, DDS, PhD †
Tore Dérand
Faculty of Odontology
Malmö University
Sweden

Professor, DDS, PhD
Flemming Isidor
Faculty of Odontology
Aarhus University
Denmark

Professor, DDS, PhD
Asbjorn Jokstad
Faculty of Odontology
University of Toronto
Canada

Professor, DDS, PhD
Ulf Lerner
Department of Odontology
Umeå University and Institute for
Medicine
University of Gothenburg
Sweden

DDS, PhD
Percy Milleding
Dental Competence Center
Tromsø
Norway

University lecturer, DDS
Harald Nesse
Department of Odontology
University of Bergen
Norway

Associate professor, DDS, PhD
Gunilla Nordenram
Department of Odontology
Karolinska Institute
Sweden

Associate professor, DDS, PhD
Per Stål
Department of Integrative Medical
Biology
Umeå University
Sweden

Assistant professor, DDS, MSc
Bo Sundh
Department of Odontology
University of Gothenburg
Sweden

Preface

The aim of this book is to present the Scandinavian treatment philosophy of removable prosthodontics in which biology and function have priority over the more technical approach favoured by others.

Our ambition has been to include basic theoretical principles and clinical procedures for both complete and partial removable dentures. Without question, there is a need for dental students to acquire adequate knowledge and clinical skills within this field. For several reasons, the advent of implants and reduced prevalence of edentulousness does not alter this fact. Even in affluent Scandinavia the percentage of prostheses retained by implants is still in the single digits. Globally the percentage is even smaller. Accordingly, implants cannot now, nor in the foreseeable future, solve all problems associated with missing teeth. The great majority of patients with these afflictions must still be treated with removable dentures. Without adequate knowledge of such treatment, future dentists fail in providing competent treatment to a substantial proportion of future patients. Finally, knowledge regarding removable dentures may be indispensable when manufacturing extensive fixed restorations.

The Scandinavian treatment philosophy is largely based on periodontal and clinical prosthodontic research, which has demonstrated that the critical factor in tooth (and abutment) survival is establishing and maintaining good periodontal health by plaque control, not by trying to reduce or distribute widely mechanical loading. While we do not claim that this

is a trait uniquely Scandinavian, it is perhaps fair to say that it is typically so.

While the above treatment philosophy, particularly relevant for tooth-borne prostheses, is largely based on reasonable scientific evidence, this is almost absent in regard to complete dentures. For that reason the undocumented use of time-consuming and costly procedures with complicated face bows, articulators and occlusal schemes are rejected in Scandinavia in favour of simpler methods. This also means that treatment with complete dentures is unquestionably more an art than a science. Accordingly, the procedures must be mainly based on clinical experience such as is presented in this textbook, with all the uncertainties thereof.

The editors have consciously avoided too much "streamlining" of the different styles, ways of expression and degree of penetration exhibited by the co-authors. On the contrary, the authors have been given the opportunity of leaving their individual mark on the text.

Without the effort of all co-authors, this textbook would not have come into being. The editors would therefore like to express their gratitude and deep respect for the work that they have diligently invested. We are also most grateful to the publisher Munksgaard, for taking on the task of publishing this book.

Umeå, October 2011

Margareta Molin Thorén *Johan Gunne*

Contents

Editors and authors	5
Preface	7
1 Missing teeth	19
Prevalence of removable prostheses	20
Complete dentures	20
Removable partial dentures	21
Consequences of missing teeth	22
Physical and anatomical consequences	22
Bone resorption	22
Mucosal lesions	23
Changes in oral muscles	23
Pain and discomfort	24
Loss of taste	24
Biomechanical consequences	24
Psychosocial consequences	25
Patients' perspective	25
Present trends	25
Psychological studies	25
Quality of life	26
Phonetic consequences	27
The effect of dentures on speech	27
Speech problems and adaptation	27
Managing speech problems	28
To what extent are denture wearers satisfied with their dentures?	29
Prevalence and causes of dissatisfaction	29
Prediction of patient acceptance	29
Further reading	30
2 Anatomy of the oral cavity	33
Tempomandibular joint	33
Muscles	35
Muscles of mastication	35
Oro-facial muscles	37
Muscles of the tongue and floor of the mouth	40
Muscles of the soft palate	41
Oro-facial region	43
Oral cavity	45

Oral vestibule and cheeks	45
The roof of the mouth	46
Tongue and floor of the mouth	48
Final remarks	49
Further reading	49
3 The biology of bone remodelling in jaw bones with and without teeth	51
Bone cells	52
Bone formation	52
Bone resorption	53
Osteoblast control initiation of bone resorption	54
Bone remodelling and modelling	54
Osteoporosis in jaw bones	56
Inflammation induced bone remodelling	57
Bone remodelling under jaw prosthesis	57
Summary	59
Further reading	60
4 Nutrition in old age with special regard to dentition	61
Body composition in old age	61
Nutritional assessments	62
Food intake in old age	63
Nutrition and dentition in old age	65
Effect of dentures on nutrition	66
Further reading	67
5 Denture-induced sequelae in oral tissues	69
Residual ridge resorption	70
Clinical impact	70
Crista flaccida	72
Denture stomatitis	74
Aetiology and local factors	75
Denture plaque biofilm	76
Yeasts	77
Treatment and maintenance	78
Angular cheilitis	80
Treatment	81
Traumatic ulcers	81
Treatment	82
Denture irritation hyperplasia	82
Treatment	82

Oral cancer . . . . .	. 82
Burning mouth syndrome . . . . .	. 83
Concluding remarks . . . . .	. 83
Further reading . . . . .	. 84
6 Prognosis and evidence based prosthodontics . . . . .	. 85
Prosthodontic therapy . . . . .	. 86
Prognosis, general considerations . . . . .	. 89
Qualitative (What can happen over time?) . . . . .	. 90
Time factor . . . . .	. 92
Quantitative (What's the probability that certain events will develop?) . . . . .	. 93
Observation viewpoint (Therapy defined disease versus patient experienced illness?) . . . . .	. 93
Documentation estimations on prognosis (aggregated data from published studies of populations versus the individual clinician and patient?) . . . . .	. 95
Treatment planning . . . . .	. 96
The operator and patient factor . . . . .	. 96
Correct identification of the patient's problems . . . . .	. 97
How should we explain prognosis to our patients? . . . . .	. 97
Further reading . . . . .	. 98
7 Examination and diagnostics . . . . .	. 101
Disease and illness . . . . .	. 101
Definitions . . . . .	. 101
Practical aspects of disease and illness . . . . .	. 102
Anamnestic information and interview . . . . .	. 102
Unstructured interview . . . . .	. 102
Structured interview . . . . .	. 103
General health . . . . .	. 103
Previous and present diseases . . . . .	. 103
Medication . . . . .	. 103
Hypersensitivities and allergies . . . . .	. 104
Social aspects . . . . .	. 104
Dental history . . . . .	. 104
Patient experiences and expectations . . . . .	. 104
Clinical examination and diagnosis . . . . .	. 104
Extraoral . . . . .	. 104
Facial changes of the edentulous . . . . .	. 104
Findings of aesthetic importance . . . . .	. 105
Signs of mandibular dysfunction . . . . .	. 105
Intraoral . . . . .	. 105

Ridges	105
The relationship between maxilla and mandible	106
Mucosa	106
Tongue and intraoral muscles	107
Saliva	107
Residual dentition and surrounding tissues	107
Existing dentures	108
Diagnostics and therapy	108
General principles	108
Important aspects related to diagnostics and therapy	109
8 Treatment planning	111
Primary treatment plan	112
Initial treatment	113
Second treatment plan	114
Aesthetics	114
Social aspects	114
Chewing ability	115
Occlusal support	115
Phonetics	115
General and local conditions	115
Removable partial dental prostheses versus fixed dental prostheses	116
Tooth supported versus mucosally supported removable partial dental prostheses	118
Treatment with removable partial dental prosthesis or not?	118
Main points	118
Further reading	119
9 Jaw relation registration and articulators	121
Articulators	121
Classification of jaw relations	122
Orientation relations	123
Vertical jaw relations	124
Occlusal vertical dimension	125
Rest vertical dimension	125
Interocclusal rest space	125
Establishment of the vertical maxillomandibular relations for complete dentures.	126
Methods of determining the vertical dimension	127
Mechanical methods	127
Physiologic methods	127
Horizontal jaw relations	128
Horizontal position of occlusion	128

Eccentric relations	129
Recording the horizontal position of occlusion	129
Short summary of clinical procedures in recording of jaw relations.	130
Removable partial dental prostheses	131
Further reading	131
10 Retention of complete dentures	133
Factors of retention	133
Physical retention	133
Function of adhesion, cohesion, atmospheric pressure and flow properties of thin films of liquid	133
How to influence different physical factors of retention	134
Physical retention of maxillary and mandibular dentures	134
Clinical importance of physical retention	134
Muscular retention	135
How to influence muscular retention	135
Retention and stability	137
Denture supporting tissues and retention of dentures	137
Retention and surgical intervention	138
Retention and occlusion	138
Retention and pain	138
Further reading	138
11 Removable complete dental prosthesis – clinical procedures	139
Impression	140
General aspects	140
Mucostatic impression	140
Compression impression	140
Dynamic impression	141
Primary impression	141
Special tray	142
Final impression	142
Intraoral adaptation of special tray	142
Border moulding	144
Securing attachment of impression material	145
Procedures for final impression	146
Inspection of final impression	147
Special impressions	147
Recording jaw relations	148
Occlusion rims	148
Determining the basis for aesthetics	149

Lip support	149
Level of incisors	151
Orientation of occlusal plane	152
Midline	153
Choice of artificial teeth	153
Determining the relationship between jaws	154
Occlusal vertical dimension	154
Horizontal relationship	156
Choice of horizontal relationship	156
Determining RP	157
Fixation of occlusion rims	158
Recording materials	158
Transferring recording to articulator	159
Try-in stage	159
Controlling and adjusting horizontal relationship and occlusion	159
Controlling and adjusting the vertical relationship	159
Controlling and adjusting the aesthetics	160
Determining the A-line	160
Insertion stage	161
Inspection of the denture prior to insertion	161
Inspection and clinical control of the denture after insertion	161
Information and post insertion control appointment	162
Post insertion problems and treatments	162
Immediate dentures	163
Introduction	163
Clinical procedure	164
Optimizing the denture supporting area	164
Preliminary impression	164
Insertion and post insertion treatment	167
Further reading	168
12 Removable partial dental prosthesis – clinical procedures	169
Classification of RPDPs	170
According to type of framework	170
According to type of support	170
According to location of missing teeth (Kennedy classification)	170
Indications and contraindications for RPDPs	171
General principles	171
In relation to the functions of the dentition	172
In relation to possible harmful effects	173
In relation to type of RPDP	176

In relation to alternative treatment	177
Summing up indications for RPDs	179
The Scandinavian approach to RPDs	179
Measures to avoid/reduce mechanical trauma	179
Measures to avoid/reduce the effect of added plaque retention	179
Treatment planning	180
Preliminary treatment plan	180
Journal	180
Interview	180
Clinical examination	181
Radiographs	181
Analysis of study casts	181
Treatment options	182
Pre-prosthetic treatment	182
Final treatment plan	182
Assessment of oral condition, definite treatment plans	182
Treatment optimizing clinical outcome	183
Anticipated additions	183
Supporting, retaining and stabilizing components	183
Supporting components	183
Dental rests	184
Mucosal support	186
Retaining components	186
Surveyor: function and basic concepts	186
Active/direct retainers, clasps	188
Active/direct retainers, attachments	192
Passive/indirect retainers	192
Stabilizing components	193
Designing the construction	193
Sequence in designing	193
Determining position and extension of saddles	194
Choosing major connector	194
Determining number and position of dental rests	198
Surveying cast, determining path of insertion/removal, positioning clasps, their number and type	199
Evaluating need for passive/indirect retention	200
Evaluating if the construction is sufficiently retained and stabilized	201
Special problems with free-end dentures (Kennedy Class I and II)	201
Special problems for RPDs with a unilateral free-end saddle (Kennedy Class II)	203
Special problem with Kennedy Class IV	203
Clinical procedures, removable partial dentures	203

Preliminary measures prior to impression	203
Occlusal adjustments	203
Recontouring tooth surfaces	204
Procedures when crowns and FPDs are manufactured at the same time	205
Blocking out interdental spaces and large undercuts	205
Impression	206
Special tray	206
Requirements	206
Final impression	207
Altered cast impression	207
Choice of impression material	208
Inspection of the final impression	209
Recording the jaw relations	209
Metal framework	210
Controls on the cast	210
Controls in the mouth	210
Adjustments	211
General principles	211
Framework does not seat properly	211
Adjustment of clasp arms	211
Occlusal adjustments	211
Borderlines	212
Try-in stage	212
Tooth set-up	212
Controlling and adjusting the set-up	212
Insertion stage	213
Inspection of the denture prior to insertion	213
Inspection and clinical control of the denture after insertion	213
Information and post insertion control appointment	214
Post insertion problems and treatments	214
General comments	214
Specific problems	214
Repairs, relinings, rebasements	215
Concluding remarks	215
Further reading	216
13 Relining and rebasing	219
Reline or rebase	220
Indications	220
Contraindications	221
Clinical procedures	221