

Stewart's Clinical

REMOVABLE PARTIAL PROSTHODONTICS

Fourth Edition

Rodney D. Phoenix, DDS, MS, FACP

Colonel and Director of Prosthodontics Resident Education
US Air Force Graduate Prosthodontics Program
Lackland Air Force Base
San Antonio, Texas

David R. Cagna, DMD, MS, FACP

Professor and Director of Advanced Prosthodontics Program
College of Dentistry
University of Tennessee Health Science Center
Memphis, Tennessee

Charles F. DeFrest, DDS, FACP

Colonel and Commander
59th Dental Support Squadron
59th Medical Wing
Lackland Air Force Base
San Antonio, Texas



Quintessence Publishing Co, Inc

Chicago, Berlin, Tokyo, London, Paris, Milan, Barcelona, Istanbul, São Paulo,
Mumbai, Moscow, Prague, and Warsaw

Library of Congress Cataloguing-in-Publication Data

Phoenix, Rodney D.

Stewart's clinical removable partial prosthodontics / Rodney D. Phoenix, David R. Cagna, Charles F. DeFreest. — 4th ed.
p. ; cm.

Includes bibliographical references and index.

ISBN 978-0-86715-485-6 (hardcover)

I. Partial dentures, Removable. I. Cagna, David R. II. DeFreest, Charles F. III. Stewart, Kenneth L. IV. Title. V. Title:
Clinical removable partial prosthodontics.

[DNLM: 1. Denture, Partial, Removable. 2. Denture Design. WU 515 P574s 2008]

RK665.S73 2008

617.6'92—dc22

2008016539



©2008 Quintessence Publishing Co, Inc

Quintessence Publishing Co Inc
4350 Chandler Drive
Hanover Park, IL 60133
www.quintpub.com

All rights reserved. This book or any part thereof may not be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, or otherwise, without prior written permission of the publisher.

Editor: Kathryn Funk
Design: Annette McQuade
Production: Angelina Sanchez

Printed in Canada

TABLE OF CONTENTS

Preface *vii*

Contributors *ix*

- 1 Introduction and Classification *1*
- 2 Major Connectors, Minor Connectors, Rests, and Rest Seats *19*
- 3 Direct Retainers, Indirect Retainers, and Tooth Replacements *51*
- 4 Mechanical Principles Associated with Removable Partial Dentures *95*
- 5 The First Diagnostic Appointment *119*
- 6 The Second Diagnostic Appointment *159*
- 7 Survey and Design *205*
- 8 I-bar Removable Partial Dentures *249*
Michael A. Mansueto
- 9 Implant-Assisted Removable Partial Dentures *259*
Thomas R. Schneid and Patrick A. Mattie
- 10 Mouth Preparation and Master Cast *279*
- 11 Laboratory Procedures for Framework Construction *313*
Raymond G. Koeppen and Michael A. Mansueto
- 12 Fitting the Framework *339*

13	Special Impression Procedures for Tooth–Tissue–Supported Removable Partial Dentures	351
	<i>Ronald G. Verrett</i>	
14	Establishing Occlusal Relationships	367
15	Try-In and Completion of the Partial Denture	397
16	Delivering the Removable Partial Denture	429
17	Postinsertion Observations	447
18	Maintenance and Repair of Removable Partial Dentures	457
	<i>James S. Brudvik</i>	
19	Interim, Transitional, and Treatment Protheses	469
20	Other Forms of Removable Partial Dentures	487
21	Attachments for Removable Partial Dentures	501
	Index	511

PREFACE

In 1983 Dr Kenneth Stewart collaborated with Drs Kenneth Rudd and William Kuebker to publish *Clinical Removable Partial Prosthodontics*. This textbook provided a new, more practical approach to removable partial denture therapy. Unlike previous texts in the field, the book was arranged in the sequence of patient treatment. Supported by an impressive collection of expertly crafted photographs and illustrations, the textbook was well received by the dental profession, and a second edition was released in 1992.

We were blessed to have worked under the collective guidance of Drs Stewart, Rudd, and Kuebker. In our estimation, there has been no finer collection of professional minds within the discipline of removable prosthodontics. In addition, there has been no group more deserving of the description “gentle men.” Their knowledge, patience, and availability were instrumental in our professional development, and we—like so many dental professionals—owe them an incalculable debt of gratitude.

In 1996 Dr Stewart died following an extended battle with cancer. We were honored when Drs Rudd and Kuebker approached us with the opportunity to author a new edition of the text, and we gratefully accepted. Published in 2003, the third edition of this textbook was the culmination of our efforts. In 2008, we have been afforded the chance to publish the fourth edition of *Stewart’s Clinical Removable Partial Prosthodontics*.

Like the preceding editions, this book is intended for dental students, residents, and practitioners and is presented in chronological sequence. Each chapter is intended to build upon the information presented in previous chapters, thereby providing a firm foundation in removable partial denture design, construction, and placement. The text is supported by numerous photographs and illustra-

tions designed to facilitate understanding. This edition also features a section describing the Prosthodontic Diagnostic Index (see chapter 6) as well as a new chapter on implant-assisted removable partial dentures (see chapter 9). As before, our aim is to provide readers with a clear understanding of removable partial denture concepts and procedures. In turn, we hope this book will lead to improved patient treatment and years of enjoyable dental practice.

We would like to thank the family of Dr Kenneth Stewart for their encouragement and support throughout this process. We also would like to thank Dr Kenneth Rudd and Dr William Kuebker for their contributions to dentistry, their mentorship, and the opportunity to author this textbook. They have been superb role models and have provided indispensable counsel throughout our professional and personal lives.

We would like to acknowledge Drs James Brudvik, Raymond Koeppen, Michael Mansueto, Patrick Mattie, Thomas Schneid, and Ronald Verrett for their contributions to the current edition of this textbook. They are among the most talented and dedicated professionals in contemporary dentistry, and their continued support and friendship are greatly appreciated.

We would be remiss if we did not thank our instructors and mentors through the years for their wisdom and counsel. The countless hours they spent with us are very much appreciated. Likewise, we would like to thank our many students who continue to motivate and inspire us on a daily basis.

Finally, our heartfelt thanks go to our families and friends, particularly our wives and children. Without their support, none of this would have been possible.

CONTRIBUTORS

James S. Brudvik, DDS, FACP

Professor Emeritus of Prosthodontics
University of Washington School of Dentistry
Seattle, Washington

Patrick A. Mattie, DDS, MS, FACP

Travis Air Force Base
Fairfield, California

Raymond G. Koeppen, DDS, MS, FACP

Colonel
United States Air Force Dental Corps

Thomas R. Schneid, DMD, MS, FACP

Lackland Air Force Base
San Antonio, Texas

Michael A. Mansueto, DDS, MS, FACP

Assistant Professor
University of Texas Health Science Center
San Antonio, Texas

Ronald G. Verrett, DDS, MS, FACP

Assistant Professor
University of Texas Health Science Center
San Antonio, Texas

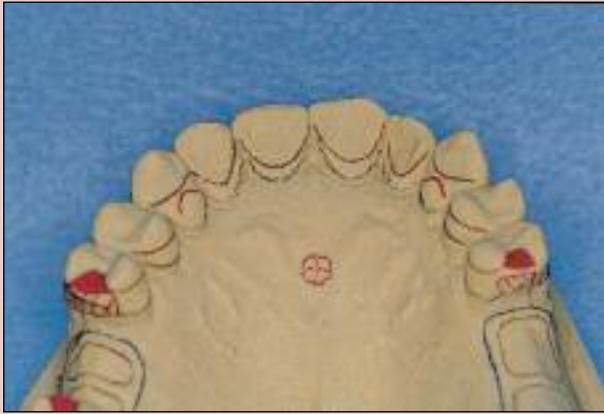


Fig 7-118 Closer view of Fig 7-116 showing the scalloped appearance that should be displayed by lingual plating. Plating should extend from the gingula to the proximal contacts in a series of connected arcs.



Fig 7-119 Closer view of Fig 7-117 showing the modifications of lingual plating that are often necessary to avoid the display of metal interproximally. In this instance, lingual plating includes a series of drop aways. It is important to recognize that a minimum vertical height (5 mm) of the major connector must be maintained or rigidity will be compromised.

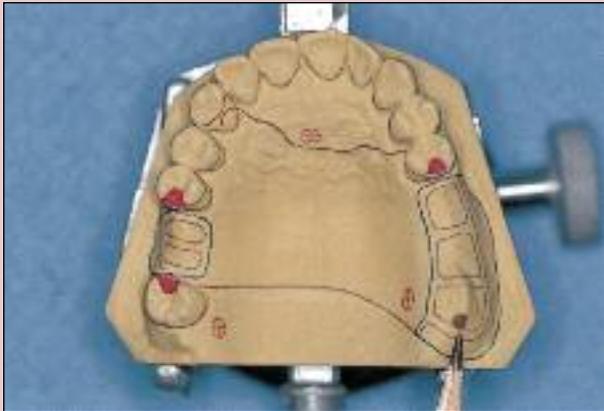


Fig 7-120 Cast stops are represented as projections originating from distal extension areas of a maxillary framework. Cast stops should be solid brown and should be located on relatively horizontal areas of the cast. These auxiliary components are necessary to prevent distortion of framework components during resin-packing procedures.

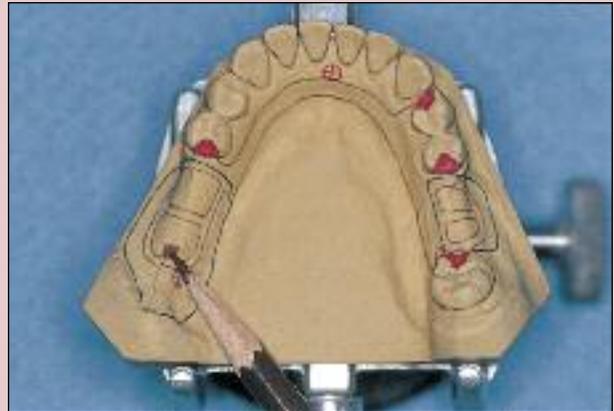


Fig 7-121 Cast stops also are included for distal extension areas of mandibular frameworks. As previously noted, cast stops should be solid brown and should be located on relatively horizontal areas of the cast.



Fig 7-122 At this stage, maxillary retentive elements are drawn using a brown pencil. For circumferential clasp assemblies, only the terminal third of each retentive arm should enter the undercut. It is important to note the position of each clasp relative to the red line that identifies the measured undercut. Only the apical border of the clasp terminus should contact the red mark.

Fig 7-123 The mandibular retentive elements should be drawn using the guidelines described in Fig 7-122. Note that a retentive arm is located on the facial surface of the second premolar; while a reciprocal arm is located on the facial surface of the third molar. The retentive element for the third molar clasp assembly is located on the lingual surface of the abutment (see Fig 7-125).



Fig 7-124 Maxillary reciprocal elements also are drawn using a brown pencil. A reciprocal clasp arm has been used on the third molar; while lingual plating has been employed on the second premolar. Notice that the entire reciprocal arm is located occlusal to the survey line. Lingual plating is an extension of the major connector and also extends occlusal to the survey line.



Fig 7-125 A retentive element has been placed on the lingual surface of the mandibular right third molar. Such retentive elements are commonly used for mandibular molars.



Fig 7-126 A distal $\frac{1}{2}$ T retentive arm is placed on the maxillary left second premolar: The approach arm originates from the resin-retaining component, travels anteriorly, and then turns occlusally. After passing occlusal to the survey line, the clasp arm turns distally to engage a 0.010-inch undercut at the distofacial line angle.

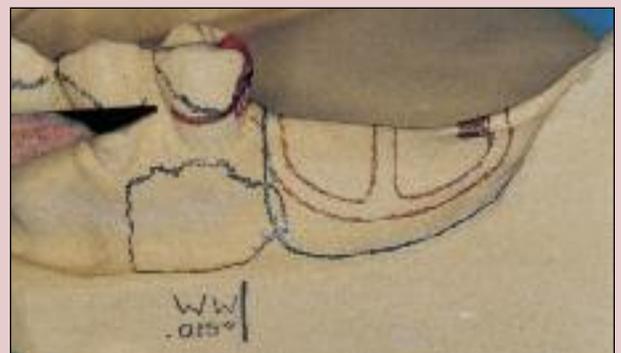


Fig 7-127 A wrought-wire retentive arm is placed on the mandibular left second premolar. Unlike other clasp arms, a wrought-wire retentive arm is drawn as a solid brown component. When using a wrought wire, the symbol WW must be placed on the base of the cast and must be accompanied by the prescribed undercut.

IMPLANT-ASSISTED REMOVABLE PARTIAL DENTURES

Thomas R. Schneid, DMD, MS, FACP

Patrick A. Mattie, DDS, MS, FACP

Removable partial denture patients can be assisted in many ways when implants are incorporated into comprehensive treatment plans. The term *implant-assisted* is preferred by the authors and was chosen for the title of this chapter because it best describes what implants can do for patients treated with removable partial dentures. The more widely used terms *implant-retained* and *implant-supported* are inadequate and imply that the prosthesis is retained or supported solely by the implants. In reality, implant-assisted removable partial dentures are also supported by natural teeth and/or soft tissues; retention also may involve conventional clasping systems. Implants can offer many benefits for removable dental prostheses, including improved support, retention, comfort, and esthetics. Implants also can result in increased patient satisfaction and therapeutic success.

Fixed dental prostheses, retained by teeth or dental implants, are considered by patients and dentists to be the ideal treatment modality whenever possible. This is due to the inherently stable nature of fixed restorations and perceived problems with conventional removable partial dentures. Despite this preference, the use of implant-supported fixed partial dentures is not always the best method for replacement of missing teeth. In fact, a 2003

review of the literature indicated a higher incidence of complications for implant-retained fixed prostheses than for their conventional counterparts.¹

Many of the problems associated with conventional removable partial dentures can be overcome with the proper placement and use of one or more implants. Such therapy can result in exceptionally stable, retentive, and esthetic restorations that are biomechanically sound and readily maintained. As a result, implant-assisted removable partial dentures may represent the treatment of choice in many clinical situations.

Literature Review

Dental implant therapy has proven to be a successful and predictable treatment modality for edentulous and partially edentulous patients.²⁻⁴ Implants can be used to support a wide range of fixed and removable prostheses. Brånemark et al first described the use of dental implants to restore edentulous mandibular arches with fixed restorations attached to four or more implants.⁵ In subsequent years, practitioners began using multiple implants to