



Application of the

Neutral Zone in Prosthodontics



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Foreword

The Need to Understand Edentulous Patients

With persistent efforts towards improved oral care, the world is experiencing a decline in the number of edentulous individuals. Despite this, the need for complete denture treatment is still in demand. In fact, dentistry continues to offer innovative denture services, such as computer-assisted design, computer-assisted manufacturing, better-controlled resin processing methodologies, and new materials. Recent developments in denture therapy largely reflect the evolving mindset of patients around the globe. Dentistry has come a long way from the days of vulcanite and ivory teeth. The evolving thoughts, perceptions, and expectations of patients are underpinning denture evolution and denture service delivery.

A major shift in demographics has fueled this evolution. Developing countries have witnessed a steep increase in life expectancy. In Japan life expectancy is now 83.7 years, and in the United States 79.3 years. The same is true in developing nations like India, where life expectancy is now 68.3 years. These changes are related to improved medical care. Individuals living longer and previous dental neglect, combine to create a cohort possessing complex dental problems that require specialized prosthodontic management.

Improved economic stability, resulting from monetary and insurance reform, also influences changing attitudes on dental

rehabilitation with complete dentures. Again this trend is clearly evident in developed nations, but also significant in developing countries. More than ever before, patients are electing to invest in enhanced denture services.

Continuous movement of populations across borders has heightened awareness of the benefits of oral health worldwide. Dentists regularly encounter patients well versed in the importance of good oral health and treatment necessary for its maintenance, to include the full range of prosthodontic services. Dentures are no longer seen as a “taboo.” Patients appreciate oral health as a gateway to improved general health, and insist on the optimal replacement of missing teeth.

The improved lifestyles of modern populations catalyze the demand for optimal denture services. The desire to elevate personal image and social acceptance, regardless of age, drives patients seeking esthetic dental rehabilitation. Lost facial support leading to an aged appearance, encourage patients to seek esthetic improvements through quality denture services. Likewise, replacing old complete dentures that fail to provide esthetic advantage occurs more frequently today than ever before in dentistry.

Changing dietary patterns and food selections, with greater emphasis on foods requiring efficient masticatory function, lead patients to appreciate well-functioning prosthetic replacement of missing teeth and to seek high-quality denture service. With

edentulism and/or inadequate complete dentures, patients are at risk of suboptimal nutritional intake due to compromised masticatory ability. This too is a common complaint from patients seeking high-quality denture services.

In the face of this increased demand, it is important to revisit the classic dictum put forward by Dr. Muller M. DeVan¹ so many years ago, “*The dentist should meet the mind of the patient before he meets the mouth of the patient.*” Unless we understand our patient, his motivations, and the road he traveled to edentulism, any dental rehabilitative effort will be compromised at best. The patient may be elderly, reporting to the dentist as a result of tooth loss over several decades of organized personal hygiene neglect. He may be middle aged and suffering from masticatory inefficiency as a result of anodontia, hypodontia, ectodermal dysplasia, or some similar disorders, or due to traumatic tooth loss. A thorough understanding of the motivations driving these dramatically different patients may provide insight to both mindset and expectations. Unrealistic expectations are all-too-often therapeutically insurmountable, requiring that the patient be made aware of treatment and prosthesis limitations. Frequently, older patients lack tolerance for, and compliance with, the long appointment times required for optimal

prosthodontic treatment. When successfully detected during the first patient interview, this important consideration will likely influence appropriate treatment selection.

In summary, it is paramount to “*meet the mind*” of edentulous patients so that rehabilitative dental therapy can be optimized. Several considerations introduced in these few introductory paragraphs, and further detailed throughout this important text, will aid enthusiastic and meticulous dentists in greater appreciation of edentulous patients in order to offer sound solutions in the management of their concerns.

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Reference

- 1 DeVan MM. Methods of procedure in a diagnostic service to the edentulous patient. *J Am Dent Assoc* 1942;29:1981–1990.

Preface

The concept of the neutral zone is by no means original and was discussed in 1933 in a textbook titled *The Principles of Complete Dentures*, authored by Sir Wilfred Fish. In 1973, Dr. Victor Beresin and Dr. Frank Schiesser published a textbook titled *The Neutral Zone in Complete Dentures*. The neutral zone concept was initially intended for edentulous patients; however, in 1978, Beresin and Schiesser published a second edition titled *The Neutral Zone in Complete and Partial Dentures*.

Even though complete dentures are not ideal replacements for natural dentition, they should not be noticeable or feel like a foreign object in the patient's mouth. Incorporating the actions of the surrounding muscles of facial expression, speech, and mastication is often overlooked in the fabrication of maxillary and mandibular complete dentures. All oral functions that include chewing, swallowing, speaking, laughing, and sucking, involve the harmonious action of the lips, cheeks, tongue, and the floor of the mouth. These actions have an influence on prosthetic design and can be recorded by a functional method. Failure to acknowledge these functions can affect tooth positions, border extensions, the occlusal plane location, and the contours of the polished surface, which may result in unstable and unsatisfactory prostheses. The concept of the neutral zone takes into account the neuromuscular functions that contribute to denture stability. This book will discuss and illustrate a step-by-step method to identify and record the neuromuscular actions that help to define

appropriate tooth positions and develop cameo surface contours which feel more normal to the patient. This method has been expanded to include the dentate patient preparing for immediate dentures, implant-supported overdentures, and fixed complete dentures (hybrid implant prostheses). Complete dentures fabricated by the methods described, can become a guide for optimal placement of implants within the confines of the prosthesis contours.

Successful complete denture therapy is often a considerable challenge for the less-experienced practitioner, so many dentists choose to limit, or not offer, this service in their practice. The number one denture problem reported by dentists globally has been fit and stability, followed closely by occlusal disharmony and compromised esthetics. This book is similar to others on this subject in that it will cover all phases of complete denture records and fabrication. It reviews a step-by-step assessment and examination protocol, designed to deliver an accurate diagnosis and prognosis prior to committing to treatment. It also describes a very predictable "impressioning" procedure that can be accomplished in a single appointment with a level of accuracy that is similar to, or better than, conventional methods. It discusses the severely vertically closed patient and the resolution of this condition, and describes the techniques of making maxillo-mandibular jaw relationship records to accommodate optimal treatment results.

The problem of esthetics, one of the most critical issues plaguing the dental practitioner,

can be avoided. As esthetics is on most patients' minds today, we have dedicated a portion of the first chapter to the identification and hopefully the elimination of any unrealistic patient demands. In this textbook, we have utilized the concept of "anticipating failure in order to avoid it." Lack of knowledge and failure to recognize the patient's desires and needs can and will have a disastrous effect on the prognosis of any prostheses. However, if we understand human nature and ask the right questions of each of our patients, then it becomes much easier to understand their actual requirements and allows them to be part of the process in building the esthetic result.

The primary objective of this book is to describe current procedures in the fabrication of complete dentures by blending multiple clinical procedures and philosophies to create a contemporary recipe for optimal outcomes. The intent is to identify fundamental applications that can be related to various prosthodontic procedures practiced today. Another goal is to empower the reader with additional knowledge, confidence, and practical applications in the provision of prosthodontic services.

To begin the journey, I would like to thank all those who have assisted me in becoming a more astute, compassionate and learned practitioner; particularly my mentors Drs. Frank Schiesser, Kenneth Rudd, Thomas Shipmon, Lindsay Pankey, and John Frush. I am very

grateful to have highly respected co-authors, Drs. David Cagna, Charles Goodacre, Russell Wicks, and Swati Ahuja, and contributing author Mahesh Verma. A special thank you to Dr. Ahuja for compiling all the information from all the authors to complete this manuscript. I want to add my sincere thanks to my multiple reviewers for their suggestions as to the content of this manuscript. They are Drs. Mahesh Verma, Tony Daher, David Little, William Davis, Mostafa ElSherif, Richard June, William Lobel, Samuel Strong, and Joseph Thornton. It is also very important to me to thank Mr. Todd Heilmann for his expertise in taking and preparing all the photographs and illustrations.

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I dedicate this textbook to my lovely wife Darlene, and my wonderful children Jolene, Jordan, Joshua, Jodain, and Joslyn.

Joseph J. Massad

About the Companion Website

This book is accompanied by a companion website:

www.wiley.com/go/massad/neutral

The website includes:

- Video clips
- Student handouts for download

Your password for the site is **ghx19cb354e**.

Instructors can also gain access to a companion website with the above materials and instructional PowerPoints, which are for faculty use only and should not be distributed to students. To access this site, please go to the book's page on wiley.com and navigate to the Instructor Site; you can then register your information to gain access.

1

Assessment of Edentulous Patients

Introduction

A critical and somewhat perplexing aspect of the management of the edentulous condition is the prediction of therapeutic outcomes and patient satisfaction. The most fundamental factor determining a precise prognosis is a thorough and accurate pretreatment examination [1–3]. Even though patients may receive the best therapy, the treatment will fail if underlying conditions remain undiagnosed.

This chapter reviews a method for the pretreatment evaluation of edentulous patients and existing prostheses to arrive at a sound understanding of factors that will affect therapy and the probability that the treatment's objective can be achieved. Using appropriate assessment tools, the practitioner can better determine if the patient's expectations can be met.

Much has been published in the dental literature regarding anatomic [4, 5] and psychological variations [6, 7] in edentulous patients. Before considering management of these challenging patients, objectives include thorough examination, diagnosis of existing conditions, consideration of available therapy, and assessment of the prognosis of each available treatment option [1, 2]. Both subjective and objective patient factors must be taken into consideration [1]. A rational stepwise pretreatment protocol will help to prevent critical diagnostic information from being overlooked. Detailed documentation

of findings is essential from a dento-legal standpoint.

The pretreatment protocol provided is relatively easy to follow, quick to perform, and easy to reproduce. It yields summary findings that correspond with specific prognostic conclusions. The protocol is divided into: (i) patient interview; (ii) examination of existing facial characteristics; and (iii) examination of edentulous conditions, i.e., anatomic, morphologic, and muscular status.

The Patient Interview

Successful therapy is facilitated by the provider coming to know the patient, from both personal and logistical perspectives; this includes how the patient arrived in the practice. If the patient was referred, the referral source should be known and contacted, and the reason for the referral noted. If the patient arrived due to marketing of the practice, care must be taken to investigate if the patient's needs are consistent with therapy provided by the practitioner.

The initial patient interview permits the patient and the practitioner to know one another [8]. Quality time spent at the beginning sets the stage for an optimized patient-provider relationship. Both the physical and psychological status of the patient should be triaged during the first appointment [8]. Anticipation of communication problems and interception of commonly encountered interpersonal