COMPLETE DENTURES

The Legacy Prosthetic System

Steffen Rohrbach, ZT

QUINTESSENCE PUBLISHING

Complete Dentures: The Legacy Prosthetic System

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The Legacy Prosthetic System

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FOREWORD

Over the years, respect for the treatment of the edentulous patient has been lost. While it may be true that partial or complete tooth loss is not to be expected until later stages of life, it does not change the fact that edentulism should be treated therapeutically when it occurs.

Edentulous patients are looking for professionals, they are looking for medical assistance, and they are looking for solutions to restore their quality of life. But the necessary knowledge and skills to treat them has increasingly been forgotten in the education of dentistry and dental technology in favor of modern technologies. Consider that the patient has not only lost their teeth but also a part of their identity. Yet to many in the practice of dentistry and dental technology, total prosthetics has become an annoying part of the job. This cannot continue to be the case; conditions must be created for edentulous patients that meet their individual needs for quality of life. The provision of functional full dentures must not be a privilege of prosperity.

Steffen Rohrbach, born in Germany and trained as a dental technician, was influenced early on by the philosophy of Prof Dr A. Gerber and myself, and he increasingly focused his career on solving the problem of rehabilitating the edentulous patient. After moving to the United States in 2004, for several years he worked as a clinical dental technician before joining the management team of Edmonds Dental Prosthetics in 2013. The creation of a training center for prosthetics in Springfield, Missouri, was then realized with the support of Candulor and Dr Anna Gerber in 2020.

Steffen Rohrbach's goal is to resensitize dentists and dental technology professionals to the challenges and possibilities in total prosthetics and to offer a new standard of training. In this book he records the treatment concepts that have benefitted his many patients over the years. His reflections are chronologically and extensively documented with text and excellent visual material.

This book is intended to show colleagues the way to a promising integration of individual dentures.

Peter Lerch, Prothetier SPV
Zürich, Switzerland

PREFACE

The dental rehabilitation of the fully edentulous patient has long been one of the most challenging, most distinguished, and most rewarding objectives in the fields of both dentistry and dental technology.

An overall successful rehabilitation of the edentulous patient requires both a dentist who understands how to capture all necessary data clinically and a dental laboratory technician who understands how to evaluate the gathered data and implement it into the prosthetic design. Hardly any other type of prosthetic requires such diverse skillsets from all members of the treatment team. Unlike with fixed prosthodontics, the complete denture must restore not only the patient's ability to masticate food, along with appropriate esthetics and phonetics, but also replace the hard and soft tissues lost because of atrophy. An orchestrated effort in the clinic and laboratory must include a wide range of competencies. These include comprehensive knowledge of anatomy, morphology, biology, as well as physics and mathematics. Of equal importance are excellent communication skills, tact, and intuition, along with the pertinent craftsmanship for each step.

And while our industry has made numerous efforts in the past decades to somehow simplify the process of denture-making, be it by introducing new manufacturing protocols or developing new materials, an unfortunate oversimplification has done little to improve patient care. On the contrary, patients are more than ever supplied with insufficient prosthetics, and the remaining adequately skilled clinicians and technicians are now almost considered specialists—an alarming trend that I expect will lead to a critical shortage of adequate patient care.

Personally, I had the privilege of spending my apprenticeship years in a German dental laboratory with a reputation for crafting high-end removable prosthetics. Here I learned not only how to properly fabricate complete conventional dentures but also how to design combination restorations with telescopes, including every step necessary to complete such sophisticated casework. While I also received extensive training in fixed prosthodontics, my fascination with dentures continues to this day.

In my daily work as a dental technician as well as in my role as an instructor and mentor, I attempt to raise awareness of the shortcomings of quickly produced dentures. The inadequacy of many contemporary approaches is typically the result of cost pressure in the laboratory, lack of training opportunities, and

economic considerations by the treating dentist. The one who suffers is of course the patient, often unbeknownst to the treatment team, as I have found that denture patients accept even the most suboptimal solutions as an inevitable result of their tooth loss. Some of them have simply given up altogether.

It's time to change that. Our patients deserve better. Therefore, this book is intended to be a work of reference for diligent clinicians and dental technicians who want to improve patient care and deliver exceptional dentures to every patient who comes seeking their help.

Acknowledgments

My enormous gratitude goes to Quintessence Publishing for making this work possible, and to the many colleagues who encouraged me to author this book, as well as my mentors, who took a leap of faith and decided to share their own knowledge and skills with me.

This also includes the authors before me, who have inspired me over the years, first and foremost Peter Lerch, whose contributions to the field of removable prosthetics cannot be overstated. His 1986 book *Die Totale Prothetik* served as a guideline for this current work and has been a companion during my career of over 30 years. The pioneering work of Max Bosshart and Jürg Stuck should also be mentioned here in a meritorious way, as their contributions are as indispensable now as they were when first published. I am also particularly thankful to the many dentists I had the pleasure of working chairside with; without a solid understanding of their clinical procedures and challenges, my own development as a technician would not have been possible.

I also want to express my sincere appreciation to Dr Sungyong Ban, not only for his diligent review of the clinical procedures described in the following pages but also for supplementing the clinical photography. Dr Ban continues to stand out in our field with his passion, extraordinary skills, and commitment to the rehabilitation of the edentulous patient at the highest level.

Special thanks also go to my incredible team who contributed to this volume in many different ways—you guys rock! Finally, I want to thank my wife, Melissa, for her unwavering support during the creation of this work and for allowing me my "hobby" of dental technology.

"If I have seen further, it is by standing on the shoulders of giants."
—Sir Isaac Newton

THE PRIMARY (ANATOMICAL) IMPRESSION

The Goal of the Primary Impression

The paramount goal of any complete, partial, or hybrid dental prosthesis is the preservation of the supporting bone, soft tissues, abutment teeth, or implants. Any form of imbalance caused by unfavorable force vectors can lead to any combination of the following:

- Discomfort, pain, and the development of repeated sore spots
- Accelerated atrophy of the residual jawbone (Fig 1-1)
- Formation of connective tissue ("flabby ridge"; Fig 1-2)
- Overgrowth of tuberosities
- Loosening of abutment teeth or implants

Unlike single-unit or most multiunit fixed prosthodontics, full-arch or removable partial restorations are connected *across* the arches, either through a denture base or a framework major connector. Therefore, we must aim for a uniform stress distribution to avoid imbalances.

The extent and shape of the denture bases, and consequently the retention, is one of the most important contributing factors to the positional stability of the prosthesis. Good positional stability achieved with a well-designed denture base will avoid or at least delay the destructive processes mentioned above. The techniques and materials used for impression taking literally lay the foundation for the prosthesis and can therefore dramatically influence case outcomes.

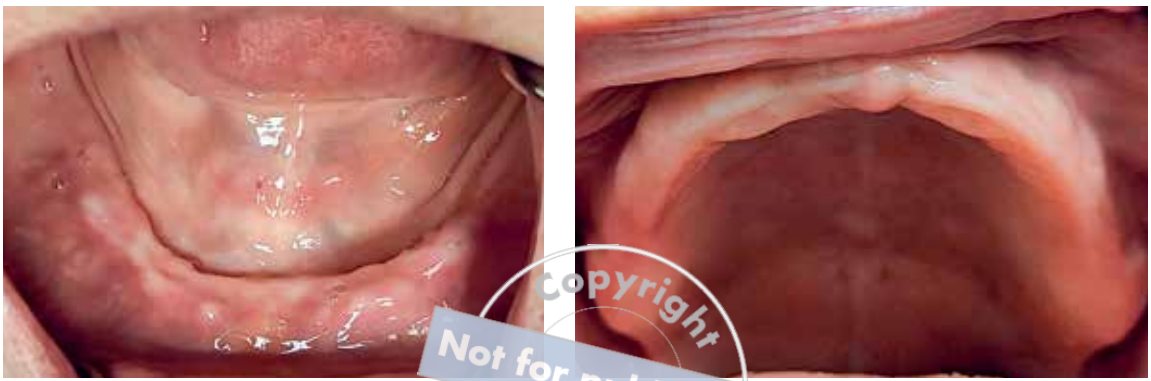

FIG 1-1 Nearly obliterated residual ridge in the mandible. Edentulous maxilla with mild connective tissue formation in the anterior ("labial ridge").

In general, all complete dentures and some partial dentures (altered cast technique) require a primary impression and a secondary impression. The primary impression is a deliberately overextended, static impression of the denture-bearing structures and surrounding tissues. The resulting anatomical model is used to fabricate the custom impression tray for the final functional, or myodynamic, impression.

Any subsequent steps depend on the quality of the primary impression. Missing data or defects result in more time-consuming adjustments of the custom tray and, if uncorrected, can lead to a suboptimal final model. In this scenario, inferior fit and retention of the final denture base can be expected.

Ideally, the patient should not wear any existing dental appliance for several hours prior to any impressions. A potential suction effect of the previous denture base and/or denture adhesives can lead to increased blood perfusion, which may enlarge the soft tissue. If the tissues are impressed in this engorged state, the denture fabricated will likely not fit well shortly after delivery, once the tissues recover and return to their unstressed state.

A part of the preprosthetic planning and potential treatment prior to the fabrication of any new appliance must focus on the condition of the denture-bearing structures. Any inflammation, ulceration, or other tissue

pathologies should be addressed at this stage. This is of particular importance in the case of a flabby ridge (see Fig 1-2). Adapting or even relining the existing dentures can help the tissue recover and avoid the need to fabricate a new denture on potentially compressed connective tissues. A so-called "barrier reline" can also help in the treatment of denture stomatitis (thrush) in conjunction with medication treatment. Other considerations for preprosthetic treatment are discussed in chapter 4.

Maxillary primary impression

The following areas must be captured with the maxillary primary impression (see Fig 1-4):

- Complete extent of the residual alveolar ridge
- Maxillary tuberosities
- Zygomatic process
- Hamular notch/pterygomandibular fold
- Vestibular fold in an extended stage
- Labial and buccal frenula in a nondisplaced, static state
- Vibrating zone/transition area between the hard and soft palate

Mandibular primary impression

The following areas must be captured with the mandibular primary impression (see Fig 1-5):

- Complete extent of the residual alveolar ridge
- Retromolar pads
- Pterygomandibular raphe
- Sublingual and retromylohyoid areas
- Mylohyoid ridge
- Vestibular fold in an extended stage
- External oblique ridge
- Labial, lingual, and buccal frenula in a nondisplaced, static state

Selection of the Stock Tray

The selection of the stock tray influences the quality of the impression. Along with a good assortment of metal trays for edentulous arches, plastic trays are increasingly becoming the norm. Cutaway trays and thermoplastic trays are particularly useful. They can be adjusted in such a way as to not compress and distort sensitive soft tissues and structures, such as the retromolar pads.

A set of dividers can be helpful in selecting the correct width of the stock tray. In the maxilla, the buccal aspects of the tuberosities serve as a reference. In the mandible, the center points of the retromolar pads are an excellent reference. Further, the tray length must be adequate to support the impression material from anterior vestibule to the pterygomandibular raphe/folds. An existing denture can also be used to aid in the selection of the proper tray size.

Care must be taken to create approximately 3 mm of space in all directions to allow room for the impression material. Tissue stops can be applied with, for example, a soft silicone putty to avoid overseating of the tray during the impression. The vestibular and sublingual tray margins may be extended with compound stick, hard wax, or silicone putty. This is of particular importance in cases of advanced ridge resorption. The structures of the floor of the mouth must be prevented from prolapsing over the ridges.

Choice of Impression Material

An important goal of both primary and secondary impressions is to capture the denture bed with the soft tissues properly adapted to the underlying bone. The material of choice today is irreversible hydrocolloid (alginate). A two-viscosity system, such as AccuDent XD (Ivoclar) produces superior results (Fig 1-3). A regular alginate may be used in a similar fashion as described below, mixed in two different viscosities, with the lower viscosity loaded into a large-gauge syringe.

The material must have a consistency that allows capture of the tissue with optimal adaptation to the underlying bone, as well as adaptively extended vestibular folds and sublingual aspects. The borders of the primary impression deliberately end beyond the future prosthetic periphery to reveal all relevant landmarks and the borderline between the unattached mucosa and

FIG 1-3 AccuDent XD with thermoplastic impression trays.

the attached gingiva, the so-called "action boundary." It must not be too dense to prevent deformation or displacement of the frenula.

Impression of the Maxilla

After the stock tray of choice has been selected and adjusted, a tray adhesive for irreversible hydrocolloids must be applied to the entire inside and outside peripheral borders of the tray. Prior to the insertion of the material into the mouth, an aspirator is used to remove saliva pools, followed by drying of the tissue with gauze. For the two-viscosity method, the low-viscosity material is mixed first and loaded into a syringe. The material is injected into the vestibule,

starting from one hamular notch toward the labial frenulum. This step is then repeated on the other side. A small amount of the low-viscosity material is placed into the palatal vault. The use of retractors is recommended to prevent the loss of impression material while inserting the tray.

While the low-viscosity material is applied in the mouth, the high-viscosity component of the system is mixed, and the impression tray is loaded. The tray is then inserted into the oral cavity at a slight angle and pivoted in a rotational motion from anterior to posterior. Once the low-viscosity component previously placed in the palatal vault becomes visible at the dorsal portion of the impression, the tray is held in place.

With the impression remaining in place, the clinician reshapes the anterior vestibule by placing the index finger and thumb to the left and right of the philtrum, gently moving the upper lip inferiorly. The buccal vestibule is shaped in a similar fashion by gently moving the cheeks in a rotating and downward motion.

Once the material is set, the impression is removed and checked for any voids or defects (Fig 1-4).

Impression of the Mandible

The preparation of the tray for the mandible is analogous to the maxilla, as described above. The sublingual borders of the tray must be checked once more to ensure that the sublingual glands are prevented from prolapsing onto the posterior ridge.

The low-viscosity component is mixed and loaded into a syringe and injected from one retromolar pad to the labial frenulum. This is repeated on the other side before the tray loaded with the high-viscosity component is inserted into the oral cavity. Again, the use of retractors is recommended. For the impression of the mandible, the tray is seated first around the retromolar pads and then pivoted toward the anterior vestibule. Great care must be taken not to compress or distort the retromolar pads and pterygomandibular ligaments by applying excessive pressure.

Once the material is set, the impression is removed and checked for any voids or defects (Fig 1-5).

FIG 1–4 Preliminary impression of the maxilla.

FIG 1–5 Preliminary impression of the mandible.

Disinfection

After the impressions are completed, they are rinsed under cold running water and disinfected. The disinfectant manufacturer's instructions for use must be strictly followed to avoid contamination with any potential infectious material. Irreversible hydrocolloid is to be poured immediately. However, dimensional stability and storage times differ from one system to another.

The Anatomical Model

Safety always comes first. As such, all materials and impressions received from the dental office must be disinfected upon arrival at the laboratory. The impression should be dabbed with tissue to remove water or pools of disinfectant. Compressed air should not be used because it could introduce potentially infectious material into the air and damage the delicate alginate material.

For the fabrication of the anatomical model, an ISO Type 3 gypsum stone is recommended. The stone powder and the water must be measured diligently and ideally mixed under vacuum. The manufacturer's instructions for use will show the powder-to-water ratio, along with soaking, stirring, and setting times. The use of a model base former is highly recommended. This will save material and time when trimming the models.

In general, light vibration should be used when pouring the impressions to avoid air bubble inclusion. The maxillary impression is best poured by placing a small amount of stone onto the highest point of the palatal vault. The stone then flows into the alveolar ridge. For the mandibular impression, it is best to place a small amount of stone into one retromolar pad area and guide the stone through the alveolar ridge toward the other side.

When the impression is filled, it should be placed away from the vibrating table to avoid spilling while pouring the base. A wall-mounted bracket can be useful here. The primary impressions are then inverted onto the prepared stone base. Building up small mounds of stone dorsal to the retromolar pads helps to prevent breakage of the model heels during later steps.

FIG 1-6 Anatomical models from preliminary impressions.

Once the stone has completely set, the impression tray is removed, and the model is inspected (Fig 1-6). Any small beads are cleared. Before trimming the model base, it can be helpful to mark the periphery; this prevents accidental overtrimming. A uniform, 2- to 3-mm-wide model margin is to be created. The underside of the model should be parallel to the alveolar ridge and at a right angle to the sides of the model.

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