Can a Denture Fabricator Achieve Stable Lower Dentures and Natural-Looking Aesthetics?

by Dr. Roy Smudde, D.D.S.

How to achieve stability in the lower denture and how to create solidly functional, natural-looking teeth have been significant quandaries of denture fabricators since dental prosthetics were first fashioned. Indeed, most long-term denture wearers will usually testify that their lower dentures are ill-fitting and uncomfortable, and most edentulous patients considering dentures find them to be unattractive and unnatural looking.

At stake here are two critical issues for denture manufacturers - how to improve the functionality of their dentures, and how to design them so they are aesthetically pleasing. Denture companies have approached these two issues in a variety of ways, using a wide range of designs, technology, and recommended procedures for fittings. However, these issues involve many complex choices, and so it is vital that dentists and denturists understand the pros and cons of the available choices before recommending specific denture products or fitting their patients. In particular, this article discusses the solutions developed by Dr. John Frush, creator of the non-interceptive occlusion approach used in Swissedent® dentures, now marketed as the Geneva 2000® Denture System.

While stability rarely is an issue for the upper denture due to the natural anatomical design of the mouth, the lower denture presents a significant challenge because the bone contour and tissues of the lower jaw do not provide a stable surface on which to rest the denture. Lower dentures seldom remain in position because of two significant challenges.

First, most denture systems create accidental movement in the lower denture. This happens because standard posterior denture teeth are designed to imitate the grooves and cusps in natural teeth. While the goal of this type of design is to allow mastication to function similar to natural teeth in a mortar and pestle fashion, a significant anatomical flaw exists in this denture design. Since dentures have no roots, the seemingly "normal" grinding action and pressure of tooth against tooth creates unwanted movement in the lower denture, reducing stability through the simple act of chewing.

Secondly, and far more importantly, the standard denture design described above causes bone loss even during normal use, which increasingly reduces stability over time. As the forces of the upper denture push on the lower in many directions, the opposing lateral forces create movement in the lower denture. Over a long period of time, this movement literally grinds away the bone beneath the lower denture. This bone loss worsens over time, creating even more instability. Most patients wearing standard dentures experience a tremendous bony change in the mouth after 6 to 8 years of denture wear. At this point, even re-fitting the dentures no longer improves stability, which is why so many denture wearers end up using adhesives that serve only to mask and compound the underlying problem.

Unfortunately, most denture wearers are marvelous adapters and learn to function adequately with ill-fitting dentures. But the danger of this adaptation is they are often causing excessive and unnecessary destruction to their lower jawbone. These patients literally create their own vicious cycle, as the longer they wear an ill-fitting denture, the more bone loss they cause, and then with more bone loss, the more ill-fitting their denture becomes. This cyclical destructive process results in significant problems with denture fit and function.

Some denture systems have tried to correct this flaw by making the lower denture base wider in attempt to add more stability to the denture fit. However, even with this solution, a serious problem remains because the majority of the lower mouth is made up of mobile tissue. With a wider base, the denture rests on the glands and muscles of

the lower mouth. This is why most patients using this type of design report that the wide base cuts into the tissues, creating sore spots as the muscles move about while dislodging the denture.

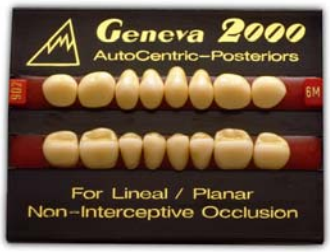

Figure 1 -- Tooth card of Geneva AutoCentric posteriors.

Because of the above flaws of standard denture design, Dr. John P. Frush, created a completely different approach to denture design in the 1970s called non-interceptive linear occlusion. As indicated above, his system was formerly disseminated under the name Swissedent, and is now marketed as The Geneva 2000 Denture System.

Frush's intent was to create a method by which the grinding action of the upper and lower dentures would automatically reinforce stability rather than reduce it. To this end, he abandoned the cusped posterior tooth design, designing instead completely different upper and lower posterior tooth shapes now called AutoCentric posteriors, as shown in Figure 1. In his system, one opposing tooth structure is a flat plane, while the other is designed to be a linear cutting edge. As the setup shows in Figures 2 and 3, this type of occlusion completely changes the way mastication is performed. The linear edge tooth cuts, while the cusp, which never touches the opposing flat surface pulverizes the food, as in a "ball mill."

Figure 2 -- Pencil line on bladed surface indicates the linear cutting edge

Figure 3 - Close-up of occlusal contact of AutoCentric posteriors

The design of non-interceptive linear occlusion presents numerous advantages for denture patients. First, there is no cusp interference, ensuring that there is only one contact point between the upper and lower posteriors as shown in Figure 4. As a result, occlusion occurs at a 90° angle, which tends to keep the lower denture in place rather than moving it around, significantly reducing bone loss over time. Secondly, the 90° angle creates a far stronger biting force than other dentures where the forces are unevenly spread over the tooth structure. In fact, while natural teeth set into bone can chew with approximately 450 lbs. per square inch, a person wearing generic dentures can chew with only about 30 lbs. per square inch. But clinical studies have shown using non-interceptive occlusion allows the patient to chew with a force of roughly 150 lbs. per square inch.

Figure 4 -- Wax set up showing AutoCentric posteriors with anteriors removed

Another beneficial outcome of Frush's system is that the width of the lower denture base is determined by establishing an outline based on the anatomical "myostatic" outline, which consist of only the bony, stable surface of the lower mouth. This also increases stability in the lower denture and reduces the risk of damage to surrounding tissues.

All in all, the two design principals implemented by Dr. Frush and which are still found today in the Geneva 2000 Denture System significantly reduce lower jaw bone loss from dentures because there is far more stability and less movement in the lower denture. Even denture wearers who have worn the Geneva 2000 dentures for more than 20 years report that their dentures are consistently stable. This means that Geneva denture wearers chew better, feel more comfortable while eating, and enjoy better fitting dentures over longer periods of time.

The Aesthetics of Dentures

While the healthy functionality of dentures is of prime importance, it is equally true that patients are feeling beings whose wishes to look and feel good must be considered. This makes it even more ironic that somewhere in the annals of dentures lies the unnatural concept that dentures must all look alike. Ever since Ben Franklin, denture fabricators appear to have considered that designing the six anterior teeth to have very little

characterization and setting them in a perfect row with a flat smile line was an acceptable style, as shown in Figure 5. While the "picket fence" design creates an even smile, it does not mimic the natural smile profile that defines each person's individuality over the course of their lifetime. For example, in most standard dentures, the anterior teeth do not show below the lips when the patient smiles.

Figure 5 -- Standard non-characterized anterior dentures

Figure 6 -- Example of Geneva 2000 anterior aesthetics

In contrast, the original Swissedent® designs developed by Dr. Frush and continuously used in the Geneva 2000 Denture System employ a completely different aesthetic principal called the Dentogentic Concepts of Rehabilitation. The focus of this system is to truly mimic each patient's natural smile in their six anterior teeth, as shown in Figure 6. As a result, the Geneva 2000 Denture System offers gender specific teeth, and with each gender are numerous sizes and shapes that the dentist or denturist selects in order to match to the patient's natural smile profile, personality, and level of activity. In addition, the anterior teeth, Candulor PhysioSet CT, are handcrafted in porcelain, using up to 12 layers of color to provide life-like appearance, coloration, and surface contours.

To set the anterior teeth, the Geneva 2000 System employs two precision measuring instruments, the alameter and the papillameter, to ensure that the patient's smile is as natural as possible. The alameter measures the width of the nares opening of the nose. If you were to drop a vertical line straight down from this measurement, it would land on approximately the middle of the canines. This establishes the correct width of the anterior arch segment. The papillameter measures inside the mouth from the papillae to the length of upper lip at rest, which allows the dentist or denturist to establish on each patient the length of the central incisors in order to have the proper amount of tooth structure showing.

Conclusion

Patients with unscheduled follow-up visits for adjustments, and refittings take up your chair time and create hardships for your office. An alternative occlusal design may be the answer. Denturists and dentists often know the Geneva 2000 teeth and products from their prior name of Swissedent, but many are not familiar with the advantages the complete system offers to both the patient and their practice. Because of the occlusal design and aesthetic concepts developed by Dr. Frush, the Geneva 2000 Denture may be your solution for a more stable lower denture as well as for a higher quality aesthetic that is lacking in so many standard dentures.

For More Information

Hands-on courses are taught at the Geneva Dental Institute in Sacramento, California, and by request at other locations in the US and Canada. To obtain information about Geneva Denture training courses or Geneva 2000 teeth and products, contact Michael at the Geneva Dental institute of Sacramento at 916-967-0013 or email michael@gdiofsac.com. Professional training is highly recommended for optimum use of the dentures.

About the Author

Dr. Roy A. Smudde received his Doctor of Dentistry from Indiana University School of Dentistry in 1966. In 1971, he joined Dr. John P. Frush at the Swissedent Foundation, teaching the principles of Environmental Gnathology, and later was involved in the research with Doctors Frush, T.L. Fitzgibbons, and Alan Lowenstein to improve the Intra Oral Bite Recorder. Between 1978-1989, Dr. Smudde lectured on the medical approach to TMJ Syndrome. He has been a guest teacher at the University of Southern California in the Post Graduate Department in Prosthetic Dentistry. In 1993, he acquired the distribution contract from the Swiss manufacturer, Candulor AG, for the teeth originally imported and distributed by Swissedent. He established Geneva Dental to distribute the product under the brand name Geneva 2000. In 1995, he created the Geneva Dental Institute, an educational facility to disseminate the Geneva 2000 prosthetic system and non-interceptive occlusion technology. In 2008, Dr. Smudde sold Geneva Dental to Candulor USA. He currently owns a private practice in Valencia, CA.