COMMENTARY

A STUDY OF DENTISTS' PREFERRED MAXILLARY ANTERIOR TOOTH WIDTH PROPORTIONS: COMPARING THE RECURRING ESTHETIC DENTAL PROPORTION TO OTHER MATHEMATICAL AND NATURALLY OCCURRING PROPORTIONS

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Intra-arch (tooth-to-tooth) proportion (IAP) relationships for smile design, the most notable being the golden proportion (GP), has been one of the most misunderstood and confusing topics for the general practitioner and esthetic restorative dentist, yet the most discussed since Levin[1] and Lombardi[2] published articles in the 1970s conversing their applications in clinical dentistry. Such smile design relationships differ diametrically from individual tooth proportion (ITP) relationships, where the latter can be thought of as the building blocks of a smile.[3] The simplest analogy that can be made relates to removable prosthodontics, specifically denture prosthetics, where the proper-sized teeth (ITP) are selected prior to their arrangement within the dental arch (IAP). The proper arrangement of teeth within the dental arch, intra-arch tooth relationships, is the very core of what this article addresses: how should we display the teeth within the dental arch as well as how much tooth width should be exposed from the frontal perspective to create the proper smile for the patient? The assumption is that the individual tooth dimensions are the correct size and are proportional before they are aligned within the arch. Imagine trying to set up an esthetically pleasing and functional maxillary denture if the improper-sized teeth were selected or the individual tooth dimensions themselves were deformed or discrepant? The task would not only be futile but also impossible. With the natural dentition, this task is infinitely more difficult, as the dilemma is that existing teeth may exhibit altered width and/or length discrepancies caused by developmental anomalies, changes from the aging process, or prior restorative procedures. Therefore, individual tooth size correction (ITP) may require combination therapies, such as orthodontics and/or periodontics, prior to esthetic restorative dentistry including smile design (IAP).

The dental professional almost has been subconsciously conditioned into the belief that GP is the standard in which we should arrange the anterior teeth. No wonder, with authors such as Rufenacht,[4] who wrote intellectually stimulating books on esthetics and design, in addition to dental laboratories supporting these concepts into usable media such as the Golden Proportion Ruler (Bayview Dental Lab, Chesapeake, VA, USA) or the Golden Proportion Waxing Templates (Panadent Corp., Grand Terrace, CA, USA). Not until the 1990s did Preston[5] start to dispel this concept and showed that GP may occur in nature but not for the natural dentition, with an occurrence of 17%; certainly not the majority.

What is so appealing is that Ward,[6] since 2001, has done a significant body of work, and more recently, collaboratively, hypothesizing that GP should not be the IAP standard. In this time of evidenced-based dentistry, it is refreshing to see that Dr. Ward has turned to perception-based criteria for acceptance, which has tremendous clinical relevance. Similar studies have been done in the arena of esthetics by Kokich Jr.[7] and LaVacca,[8] with tremendous recognition in the dental literature. Dental surveys of patients' and dentists' perception of acceptability vote credence to trends and direction of treatment for our patients. That is truly the bottom line: not what clinicians want for their patients but what do patients want in relation to smile designs? It is also interesting to note in this study that dentists not only do not like GP as a smile design criteria but also prefer the recurring esthetic dental proportion as the IAP relationship over GP.

The esthetic restorative treatment of complex restorative space management type of cases[9] raises the question of not only how the ITP should be created but also how the teeth are to be arranged (IAP). The only consideration is that if an arch-size discrepancy exists, will there be enough space—either excessive, where the arch form may be broad and

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square, or insufficient, where the arch form may be narrow and constricted—to arrange the teeth in accordance with the newly defined RED proportion standard?

In regard to ITP, there exists a correlation in tooth width between anterior tooth groups[10]; if the central incisor is *X.0 mm* in width, then the lateral incisor (LI) width is *X-2.0 mm* and the canine width is *X-1.0 mm*.[3] Length is frequently a variable in individual tooth size/proportion and can be easily calculated with the equation *L = W/% ratio*. Lastly, there exists a correlation of tooth length to tooth width, with a predefined ITP of 78%; the length of a tooth is *+2.0 mm* the width of the tooth (i.e., LI = W6.5 mm/L8.5 mm at 78% ITP ratio). How these numerical formulas and values relate to how the teeth should be arranged within a given dental arch for each individual patient remains the future question and research orientation.

Clearly, much work has been done to elucidate what IAP ratio patients and dentists in North America prefer; however, future work is necessary to correlate how ITP relates to the aforementioned relationships, as they are completely dissimilar entities yet are interrelated and have bearing on esthetic dentistry as a whole. Kudos to Dr. Ward and his colleagues.

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