A Retrospective Analysis of the Anterior-Posterior Spread to Distal Cantilever Length Relationship in Temporary and Definitive Prostheses Following the All-on-Four Protocol

Thomas J. Balshi, DDS, PhD, FACP[1]/ Glenn J. Wolfinger, DMD, FACP[1]/ Robert W. Slauch, BS[1,2]/ Stephen F. Balshi, MBE[1]

[1]PI Dental Center at the Institute for Facial Esthetics; Fort Washington, Pennsylvania

[2]University of Maryland, Baltimore, College of Dental Surgery; Baltimore, Maryland

Purpose:

A 1990 report by English[1] proposed a biomechanical relationship between the anterior-posterior (AP) spread and the distal cantilever lengths of an implant-supported prosthesis. His guidelines suggest a cantilever can extend off the distal abutment a maximum length of 1.5 times the respective AP spread before it becomes biomechanically unfavorable. The purpose of this retrospective study is to examine the temporary and definitive prostheses in patients treated with the All-on-Four protocol in a single private practice and determine if there is a significant correlation between a violation of the anterior-posterior rule and patients experiencing mechanical and biomechanical complications.

Methods:

A customized metal caliper was used to measure the AP spread and cantilever lengths of the temporary and definitive prostheses in patients treated with the All-on-Four protocol. AP spreads were measured from the midpoint of the anterior implant to the most distal aspect of the distal implant on the patient's master cast. Two AP spreads (Left &Right) were measured for each dental arch. Both cantilever lengths (Left & Right) were measured from the most distal aspect of the distal abutment cylinder to the end of the prosthesis. The actual cantilever length was compared to English's recommendations (allowed cantilever length). A retrospective chart review was performed to see if a patient ever experienced a fractured cantilever in the temporary or definitive prosthesis.

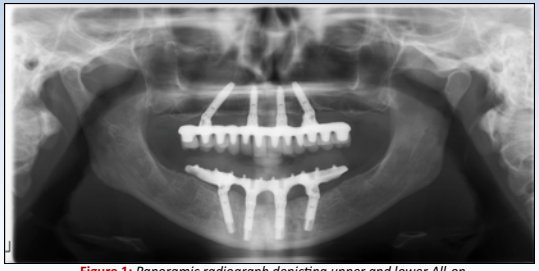

Figure 1: *Panoramic radiograph depicting upper and lower All-on-Four rehabilitation with definitive prostheses*

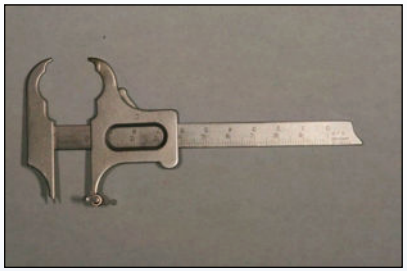

Figure 2: *Customized metal caliper used to measure AP Spreads on master casts and cantilever lengths on the temporary and definitive prostheses.*

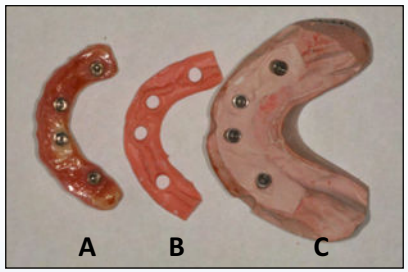

Figure 3: **A)** *Temporary All-on-Four Acrylic Prosthesis.* ***B)*** *Gingival impression.* **C)** *Master Cast*

Figure 5: *Measurement of cantilever length from the inferior distal aspect of the distal abutment cylinder to the most distal aspect of the prosthesis.*

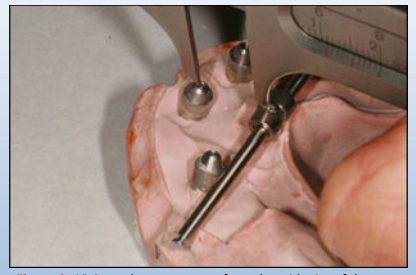

Figure 6: *AP Spread measurement from the midpoint of the anterior abutment to the distal aspect of the posterior abutment.*

Acknowledgements: The authors sincerely appreciate the assistance from Chris Raines with data collection; the staff of the PI dental Center for their kind and gentle treatment of the patients; and Dr. Brian Wilson and Mr. Dan Delaney for their support in the administration of general anesthetics, when needed

References:

1. English CE. The critical A-P spread. Implant Society 1990; 1(1):2-3.

Results:

Table 1: Summary of Data

N (arches)	MAXILLA	MANDIBLE	Avg. AP Spread	Avg. **Allowed** Cantilever	Avg. **Temporary** Cantilever	Avg. **Definitive** Cantilever	AP Violations	**Temporary** Failures	**Definitive** Failures	**Temporary** Cantilever Survival Rate	**Definitive** Cantilever Survival Rate
25	**10**	**15**	**13.2** (±3.78)	**19.9** (±5.67)	**9.9** (±3.93)	**12.3** (±3.78)	**1**	**2***	**1**	**96.0%**	**98.0%**

Two cantilever lengths (left and right) for each arch. AP Spreads for each arch were combined to make average length categories. (Note: Temporary prosthesis were made of all-acrylic)*

AP Violation Case: Mandibular Arch • AP Spread= 8mm • Allowed Cantilever Length= 12mm • Temporary Cantilever= 12.6mm • Final Cantilever= 20.5mm •All-acrylic temporary prosthesis •Titanium-framed Acrylic definitive prosthesis • NO FRACTURE

Table 2: Cantilever Survival Rates for the Different Materials Used in the Definitive Prosthesis

Material Used	N (arches)	Failures	Cantilever
All-Acrylic	**6**	**0**	**100.0%**
Acrylic with Titanium Frame	**12**	**2**	**83.3%**
Acrylic with TiLite Frame	**1**	**0**	**100.0%**
Porcelain with TiLite Frame	**4**	**0**	**100.0%**
Porcelain Titanium Frame	**1**	**0**	**100.0%**
Porcelain with Gold Frame	**1**	**0**	**100.0%**

AP Spread/Cantilever Ratio:

This study: Temporary= **50%** Definitive: **62%** (of length allowed)

HOW TO CACULATE A NEW PROPOSED AP SPREAD??

Conclusions: Any suggestions?