

## INTRODUCTION

Assessing a patient's envelope of function is a concept that is often overlooked by dentists. Evaluating for signs and symptoms of a constricted envelope of function should be a priority for both major and minor rehabilitations. Restorations and implants can fail repeatedly in the anterior region if there is a constricted chewing pattern. As long as the mandible moves within Posselt's envelope of function without interference of opposing teeth, and the occlusion is in harmony with the muscles of mastication, the teeth can be protected<sup>1</sup>. This case demonstrates the importance of accurately diagnosing and treatment planning such cases appropriately.

## CASE BACKGROUND

**Medical hx:** denies | **Medications:** denies | **Allergies:** denies

### Dental hx:

- 2016: Patient had trauma to teeth #7-10.
- 2017: Patient had RCT & crowns completed on #7-10.
- 2018-2019: Patient's crowns repeatedly dislodged and recemented.
- 2019: Tooth #7 - crown and root fracture; #7 extracted and implant fixture/crown placed.
- 2020: #7 implant fixture failure. #8-10 root fractures. #7 implant fixture and teeth #8-10 extracted and bone grafted.

## CLINICAL EXAM

**EOE:** Patient has a skeletal class III (Fig. 5), obtuse mandibular angle, obtuse nasolabial angle, midface deficiency and mandible slightly deviated to the left.

**IOE:** Patient has existing flipper #7-10 (Fig. 6), moderate dentofacial display (Fig. 1), class III tendency (Fig. 3), #27 in a crossbite, mandibular midline deviated to the left. Missing teeth #3,5, 7, 8, 9, 10, 19, 30. Caries # 2, 6, 11, 18, 22, 23, 24, 25, 26, 31

### Risk Assessment:

Periodontal: low-risk - periodontal health and gingival health

Biomechanical: high-risk - multiple carious lesions

Functional: moderate risk - constricted chewing pattern

Dentofacial: moderate risk - medium lip dynamics

## TREATMENT PLAN

When restorations fail multiple times in a short period we must identify the underlying etiology. In this case the patient reported that his permanent crowns had dislodged on numerous occasions, followed by root fractures of teeth #8,9,10 and implant failure of fixture #7. Immediately one must consider an occlusal issue as a primary cause. From the images alone we can see there is minimal inter-occlusal space, class III occlusion and an anterior crossbite (Fig. 5). The restorations failed due to a constricted envelope of function which needs to be addressed in order for restorations to be successful in the anterior region<sup>2</sup>.

### Tx Options:

- 1) Orthodontically position lower anterior teeth lingually and correct anterior crossbite followed by implants/crowns #7-10
- 2) Orthognathic surgery to correct crossbite and minimal orthodontics - followed by implants/crowns #7-10
- 3) Increase VDO on remaining posterior dentition with combination of indirect/direct restorations - followed by implants/crowns #7-10
- 4) Removable partial denture

## IMAGES



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10

## CONCLUSION

In the case outlined above, either the vertical dimension of occlusion had to be opened, or the lower anterior teeth had to be positioned lingually. Restoring the maxillary anteriors to the proper length without opening the VDO would result in a constricted envelope of function and the anterior restorations would be at severe risk of failure. Opening the VDO would involve a significant amount of additional dentistry in the posterior maxillary and mandibular arch. In this case, orthodontics is a great option to gain the desired result.

## REFERENCES

1. Dawson, PJ. *Evaluation, Diagnosis and Treatment of Occlusal Problems*. 2nd ed. St. Louis, Mo: Mosby; 1989:369-370.
2. Peck, Fred. Treating the Constricted Envelope of Function. *Inside Dental Technology*. April 2017. Volume 8. Issue 4