



A Qualitative and Quantitative Comparison of CAD/CAM and Plaster-Casted TLSOs: A Case Study

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INTRODUCTION

Manual plaster casting has been the preferred method of shape capture for prosthetists and orthotists (Sankar et al., 2007). With the introduction of Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM), questions have been raised of this procedure's efficacy of treatment when compared to the well-established manual method for the fabrication of TLSOs. In those studies which compared the manual method to CAD/CAM, little definition is given to the casting or scanning procedures, or to the amount and location of modifications which occurred. Furthermore, most are lacking in qualitative or quantitative outcome measures.

Most often studies will state that modifications to plaster molds were made in the "conventional manner," without any definition as to what this involves (Raschke et al., 1990; Wong et al., 2005). Reproducibility of these studies can be called into question as there can be different conventional modifications between practitioners. In those studies that compared CAD/CAM to plaster casted TLSOs, there is an unaddressed confounding variable that could have drastic effects on the results. Sankar et al. (2007) did not define these, and found no significant difference between in-orthosis curve corrections for Adolescent Idiopathic Scoliosis.

It is the purpose of this study to determine which fabrication method is more comfortable for patients between the CAD/CAM and plaster casting methods for the fabrication of TLSOs by comparing patient preference in comfort and measurements in circumferences and Medial-Lateral (ML) width at the chest, waist, and ASIS levels.

METHOD

Subjects: One anticipated male or female subject, between the ages of 21 and 30, with no diagnosed medical condition or spinal deformity. Preferred weight is under 180 pounds and height under 6 feet.

Apparatus: Two questionnaires; A measuring tape; ML gauge.

Procedures: At evaluation prior to casting of the subject, the baseline ML and circumference measurements are to be taken at the xiphoid, waist, and Anterior Superior Iliac Spine (ASIS) levels. During casting and scanning, the subject should be standing in an erect posture, knees slightly flexed, and hands holding stands for support on either side. The negative models from both methods will be aligned the same way. The same specific amounts of build-ups and reductions will be applied on the CAD/CAM

and plaster models. The subject will be randomly assigned to wear one of the orthoses for 12 hours a day, for 5 days, and then complete Questionnaire 1. After a one week break, the subject will then wear the second orthosis for the same time period. Upon completion, the subject will fill out Questionnaire 1 again. The comprehensive Questionnaire 2 will be completed as well.

Data Analysis: The answers to the two questionnaires will be analyzed to determine which is most comfortable. Tests for significant differences between baseline measurements and the two TLSOs will be measured for comparative statistical analysis at the same locations as baseline.

RESULTS

Due to the change in venue of our program at our school, completion of this study should be by December 2015.

DISCUSSION

The results could reveal that the CAD/CAM modifications are less comfortable than the plaster method or vice versa, or that there is no difference between the methods. We anticipate our results will give qualitative and quantitative data on which casting method produced the most comfortable TLSO through the elimination of a possible confounding variable unaddressed by previous studies.

CLINICAL APPLICATIONS

Through the comparisons, the results may show which of these methods has more or less comfort, or no difference between them. Clinicians will be able to better choose within their current environment between these two methods for providing TLSOs to their patients. Furthermore, defining these techniques enhances the understanding of a growing area of the orthotics field allowing for positive effects on future patient outcomes.

REFERENCES

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