



STUDY OF THE FORCES EXERCISED BY CPAP MASK ON THE FACIAL BONE AND POTENTIAL EFFECTS ON GROWING PATIENTS

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Background

Obstructive sleep apnea (OSA) is a breathing disorder characterized by repeated episodes of prolonged upper airway obstruction and/or intermittent complete obstruction that disrupts normal sleep patterns

Continuous Positive Airway Pressure (CPAP) is a respiratory ventilation method used in the treatment of sleep apnea.

Objectives

The craniofacial features of OSA children have always been an area of interest in orthodontics. Understanding which CPAP mask reduces the pressure on the maxilla according to the patient's facial typology at the same pressure flow. Provide guidelines for choosing the CPAP mask and provide suggestions for developing more functional designs.

Methodologies

The project will be developed starting from the scanning of patient faces. Then teeth scan with intraoral scanner will be performed. Skull, dental arches and soft tissues of the face will be digitally combined. 3D scanning of existing CPAP masks will be performed. Finally, a finite element analysis (FEA) will be performed by applying the different masks to the different patients with different connection strengths, and the effects will be analyzed as variable outcomes. During the laboratory phase, the respective 18 heads will be created through 3D printing, to which the CPAP templates will be applied. A CPAP machine will be applied to create the airflow. Contact pressure sensors will be applied to the edges of the CPAP mask to record the distribution of forces. With the Instron instrumentation the different compressive forces of the CPAP mask on the heads connected to the CPAP machine will be applied according to different pressures. This phase will be used for the in-vitro validation of the FEM model before proceeding with the in-vivo validation.