

IMPLEMENTATION OF A MULTIVIBRATIONAL MEDICAL DEVICE TO ASSIST THE REMOVAL OF TEETH AND ROOTS

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ABSTRACT: The current practice of tooth extraction is performed using rigid instruments in a process involving high mechanical strength and thus a painful postoperative for patients.

In this sense, this work presents the stages of design and development of an instrument capable of acting in the most critical stage of tooth extraction process, the luxation phase, with the induction of vibration at high frequencies, so it is expected to decrease the force required to perform the extraction as well as the damage caused by the currently used procedure.

The instrument used by the professional dentist in luxation phase is the dental elevator. So, it was selected and purchased a standard straight elevator to perform the operations necessary for the development of the vibrating elevator.

Vibration induction was performed by a system with a piezoelectric actuator. The placement of the whole vibration system was designed to reduce the number of operations to perform to the original instrument as well as maintain the most of his ergonomic shape. Thus, the system was placed inside of the instrument handle to fulfill the aims above.

The vibration system behavior was also study through simulation in COMSOL Multiphysics and a theoretical simulation. Through tests it was intended to provide an environment similar to a tooth extraction procedure, using a pig's head as model to which was perform the process of luxation and extraction of teeth of his jaw with the device developed and with or without its vibration system. During the tests, it was difficult to understand the influence of the vibration system in the process. However, tests had great difficulty once the model has significant anatomical differences comparing to Human teeth and roots.

However, it is estimated that this vibration can assist the depth penetration of the device between the tooth and the alveolar bone allowing the easier placement of the instrument and an easier lifting of the tooth. The oscillation in this region may also lead to its elevation. These facts indicate that the process is being facilitated, reducing the force applied and the duration of the process when using vibration.

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