Virtual method to compare treatment options to assist maxillofacial surgery planning and decision making process for implant and screw placement

Type: Article

Abstract:

The paper explores a biomodelling method comprising of several visual and virtual reality methods to assess different surgical procedures using the computer. A computer tomography (CT) medical scan of a patient was obtained and was converted into a three dimensional virtual biomodel. This mandible biomodel was then subjected to graphical post-processing to split it into two portions mimicking actual surgery to correct jaw deformity. In such cases, screws and/or implants are used in various positions to link the two parts of the mandible. In this evaluation all possible configurations of a 5 holes L-plate implant (Synthes) were computed to evaluate the various surgical approaches. The nine configurations were ordered on stability of treatment based on the least amount of movement between the two bone parts upon receiving a virtual force of 500N simulating a jaw bite. Although the best treatment method was highlighted for this particular case but other factors such as bone thickness need to be incorporated in order to further substantiate this option. This system could be used in future by maxillofacial surgeons as a pre-surgical planning tool to decide which of the various available configurations would be suitable for a given patient based on the patients' medical scan data. Such results would also pave the way for Evidence based Medicine practice (EBP) where the decision for a particular treatment approach would be guided and strengthened by data from virtual simulation studies of the outcome of the surgery.

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