CBCT single scan with intraorally placed radiopaque complete denture for computer designing of subperiosteal implants

Introduction

Maxillary alveolar ridge atrophy presents a clinical challenge for successful fabrication and stability of a complete denture. Extreme resorption of the maxillary alveolar ridge usually requires additional surgical procedures. Treatment with patient specific subperiosteal implants (PSSI) is the method of choice. Before designing PSSI we have to know the position of the bone buttresses where the implant will be fixed to the maxilla and the thickness of soft tissues in order to optimise implant prosthodontic treatment.

With a CBCT scan of the patient's midface, intraoral soft tissues and the inserted patient's complete denture we obtained a high quality outset for computer assisted design and manufacture of PSSI model.

Case Description

To make the denture visible and soft tissues delineated on CBTC scan, additional radiopaque acrylic resin denture was produced with the use of barium sulphate powder. Small radiopaque acrylic resin plates with four different concentrations of barium sulphate (10, 20, 40 and 60 %) were made and their radiopacity visually evaluated using a CBCT scan. The most favourably visualised plate was selected (10% of barium sulphate), which presented our standard barium sulphate concentration in manufacturing acrylic resindenture duplicate for a single CBCT scan.

After a conventional complete denture was fabricated a barium sulphate containing duplicate was made. A maxillofacial CBCT single scan of the patient with intraorally placed radiopaque complete denture duplicate was performed and used for segmentation and PSSI design.

Discussion

This approach has advantages over current (dual scan) method, including improved efficiency, faster times, and most importantly accuracy in three dimensional visualisation of the bone, soft tissues, denture and interjaw relationship. Once the digital model based on CBCT single scan is created, the clinician can design PSSI by determining placement, size, shape, direction of fixation screws for the implant, and attachment elements for the prosthesis.