

**Design and manufacture of a patient-specific surgical device for sagittal split  
osteotomy**

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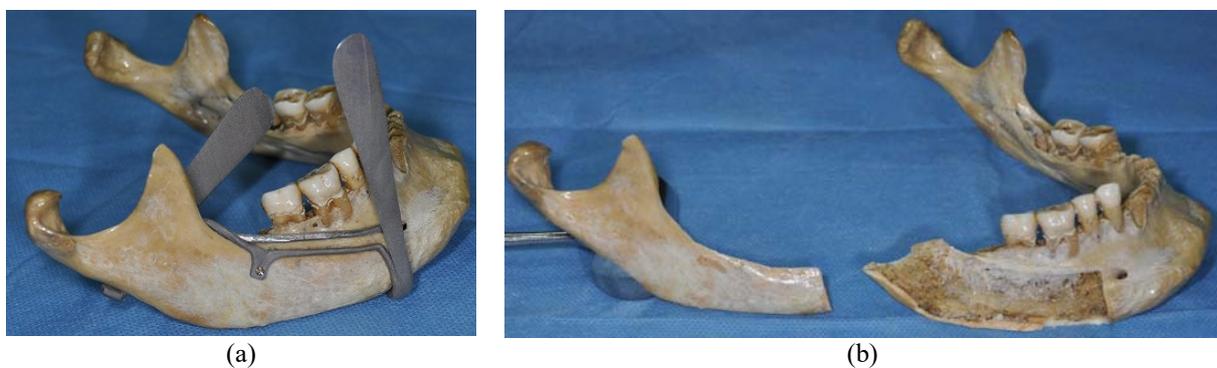
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## Abstract

Sagittal split osteotomy (SSO) is one of the most preferred procedures in maxillofacial surgery to correct the malpositions of the jaw bone due to dentofacial deformities. During the SSO operation, complications can be induced mainly due to the sharp rotary tools used for the osteotomy of the mandible. In this study, to decrease the SSO complications, a computer-assisted, patient-specific SSO guide and soft tissue retractor was designed and manufactured (Cansiz et al, 2014). First, computed tomography (CT) images of a human cadaveric mandible were digitally converted into a three dimensional (3D) model. Then, a 3D model of the device was designed onto the surface of the mandible model according to the osteotomy line and geometric dimensions of the mandible. 3D model of the product was manufactured by metal laser sintering technique. After manufacture of the device, SSO operation was tested on the cadaveric mandible whose CT data was used for 3D modeling. Split parts of the mandible were examined and it was confirmed that there is not any deformation on the areas need to be protected such as mental and mandibular foramens. Since it has not been applied to a patient during a real SSO operation yet, it is not possible to give definitive conclusions. However, it is expected that this device will be used to ensure that the osteotomy, which is planned in the computer-aided preoperative preparations, is applied correctly in the operation. The use of this device may shorten the operation duration and time need for the general anesthesia which results in less time for the exposure to the bacterial contamination. It is also expected to reduce the complications and corticosteroid need given for the edema control.

**Key words:** Sagittal split osteotomy, patient-specific device, 3D modeling, laser sintering.

**Reference:** Cansiz, E., Arslan, Y.Z., Turan, F., Atalay, B., Design and production of computer-assisted, patient-specific sagittal split osteotomy guide and soft tissue retractor, Journal of Medical and Biological Engineering, (in press).



**Figure.** Sagittal split osteotomy test on the cadaveric mandible using the device. (a) Positioning and fixation of the device, (b) sagittally split mandible.