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Clinical application of individualized 3D-Printed templates in the treatment of Condylar Osteochondroma

Wen Ma

Kunming Medical University, China

Background: Osteochondroma (OC) is one of the most common benign tumors of the long bones, but it rarely occurs in the maxillofacial skeleton. However, mandibular condylar OC often leads to severe facial deformity in affected patients, including facial asymmetry, deviation of the chin and malocclusion. This study aimed to explore the clinical application of individualized 3D-printed templates to accurately and effectively treat condylar OC. **Methods:** A total of 8 patients with mandibular condylar OC were treated from July 2015 to August 2021. The enrolled patients (5 women and 3 men) had a median age of 27 years (range: 21–32 years). All patients exhibited symptoms of facial asymmetry and occlusal disorders preoperatively. The digital software used to virtually design the process consisted of three-dimensional reconstruction, 3D-cephalometry analysis, virtual surgery, individualized templates and postoperative facial soft-tissue prediction. A set of 3D-printed templates (DOS and DOT) were used in all cases to stabilize the occlusion and guide the osteotomy. Then, pre- and post-operative complications, mouth opening, clinical signs and the accuracy of the CT imaging analysis were all evaluated. All the measurement data were presented as means \pm SD; Bonferroni and Tamhane T2 multiple comparison tests were used to examine the differences between the groups. **Results:** All patients healed uneventfully. None of the patients exhibited facial nerve injury at follow-up. In comparing the condylar segments with T0p and T1, the average deviation of the condylar segments was 0.5796 mm, indicating that the post-operative reconstructed condyles showed a high degree of similarity to the reconstruction results of the virtual surgical plan. **Conclusions:** Individualized 3D-printed templates simplified surgical procedures and improved surgical accuracy, proving to be an effective method for the treatment of patients with slight asymmetric deformities secondary to condylar OC.

Recent publications

1. Ma, W.; Niu, S.; Wang, L.; Peng, C.; Fu, S.; Zhang, C.; Cui, Q.; Wang, S.; Li, M.; Xu, Y. Clinical Application of Individualized 3D-Printed Templates in the Treatment of Condylar Osteochondroma. *Healthcare* 2022, 10, 2163.
2. Wang L#, Ma W#, Fu S, Zhang C, Cui Q, Peng C, Li M*; Design and manufacture of dental-supported surgical guide for genioplasty. *Journal of Dental Sciences*. 2021;16(1):417-423.
3. W. Ma; L.D. Wang; Y. Liang□M. Li*□Application of a digital guide in the removal of foreign body from the maxillofacial region. *British Journal of Oral and Maxillofacial Surgery*. 2019;57(7):708-709.

Biography

Ma Wen is an oral and maxillofacial surgeon from KunMing medical university in China and the research areas include application of biomedical materials, digital technology in stomatology. The treatment is the combination of digital methods and medical ways which contains removal foreign body, TMJ ankyloses and orthognathic surgery. From these years, the digital technology is improving in oral and maxillofacial surgery which help surgeons shorten operation time and improve surgical accuracy. We hope that our work can help other doctors in the future.

drmwawen@163.com