

Management of deformity inducing osteochondroma of the temporomandibular joint with an Australian made prosthesis and a compensatory sagittal split osteotomy: a case report.

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Abstract

Maxillofacial osteochondromas are considered benign neoplasms, and compared with their extracranial variant are relatively rare. When they involve the mandibular condyle they can induce significant facial deformity, malocclusion, and various temporomandibular joint symptoms. Complete excision is considered the standard of care, but can lead to a reduction in the height of the ipsilateral mandible with resultant complications. In such cases, reconstruction is usually warranted and may be approached in various ways. This case report demonstrates a straightforward, accurate and reproducible approach to reconstructing the TMJ, facial profile and occlusion following resection of a large TMJ osteochondroma, without the need for concomitant orthodontics. Maxillofacial osteochondromas are considered benign neoplasms, and compared with their extracranial variant are relatively rare. When they involve the mandibular condyle they can induce significant facial deformity, malocclusion, and various temporomandibular joint symptoms. Complete excision is considered the standard of care, but can lead to a reduction in the height of the ipsilateral mandible with resultant complications. In such cases, reconstruction is usually warranted and may be approached in various ways. This case report demonstrates a straightforward, accurate and reproducible approach to reconstructing the TMJ, facial profile and occlusion following resection of a large TMJ osteochondroma, without the need for concomitant orthodontics. No authors had any declared conflicts of interest.

Introduction

Osteochondroma of the temporomandibular joint (TMJ) is a relatively uncommon occurrence. Surgical treatment approaches vary from simple lesion excision in isolation, to resection and reconstruction by various means. Goals of treatment vary depending on factors such as the patient's medical and dental condition, the extent of the disease process, its influence on the function of the joint, the occlusion, and the facial contours. The pathology, patient evaluation and surgical management of osteochondroma of the TMJ is discussed. Medical and dental practitioners should consider osteochondroma as a differential diagnosis in adults presenting with TMJ dysfunction, particularly in the setting of a new facial asymmetry and/or occlusal changes.

Case Description

A 46 year old Caucasian male presented with the complaint of a "shifting bite," which he felt had been progressively worsening for eighteen months. Clinical examination revealed a lower facial asymmetry with chinpoint deviation to the right and elongation of the left lower border of mandible. (see Figures 1. and 2.) Maximum inter-incisal opening was forty-five millimetres, with a painless audible click on opening, and a gradual deviation to the right. Protrusive movements were within normal limits. The occlusion was open on the left side and in cross-bite on the right side. general anaesthetic and the condyle was accessed and resected via a pre-auricular approach. A custom 3D printed TMJ total joint replacement was used to reconstruct the condyle-ramus unit via pre-auricular and submandibular access. The occlusion was determined with a 3D printed occlusal splint and the contralateral sagittal split osteotomy was performed and fixed with conventional hardware. The resected specimen was sent for histopathological assessment and confirmed the diagnosis of osteochondroma. The patient was discharged from hospital on the day following surgery and maintained an uneventful postoperative course. At the three-month review, he was asymptomatic, with a stable normal occlusion, (Figure 8.) normal diet, normal facial appearance and maximum inter-incisal opening of thirty-five millimetres.

Discussion

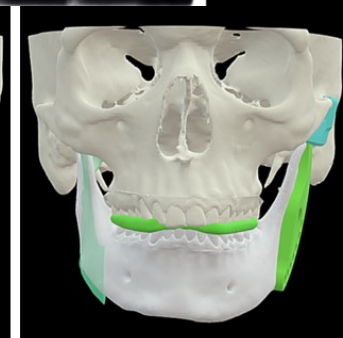
Osteochondroma is defined by the WHO Classification of Head and Neck Tumours as "a cartilage-capped bony projection arising on the external surface of bone, continuous with underlying bone". Categorisation as a benign neoplasm rather than a reactive lesion is favoured. The term is synonymous with "osteochondromatous exostosis". (8) Osteochondroma is one of the most common lesions of the axial skeleton but is much rarer in the maxillofacial skeleton, thought due to the fact it occurs at sites of endochondral ossification, which are limited in this region. Presentation is usually in the fourth to fifth decades of life, later than extra-cranial sites. (8) In the maxillofacial literature, anatomical sites include the skull base, maxillary sinuses, zygoma, and condylar and coronoid processes of the mandible. (8) The cause of osteochondroma is unknown. With osteochondroma involving the TMJ, patients often present with facial asymmetry and malocclusion caused by lesional lengthening of the involved hemimandible. As with the case described above, lengthening of the ipsilateral mandible will often cause deviation of the chin to the contralateral side, with an expected dental midline shift. Imaging reveals a lobulated bony outgrowth in continuity with the cortex and medulla of the bone of origin, with a thin cartilaginous cap (although the cap is not always visible). Complete excision of the lesion is deemed necessary to prevent recurrence and progression of facial and dental changes, and to manage any associated TMJ symptoms. However, to achieve an ideal outcome, TMJ reconstruction is usually sought. The two most common modalities include the autogenous costochondral graft, and the alloplastic total joint replacement. High-level evidence now exists to support the alloplastic total joint replacement as the gold standard for adults requiring reconstruction following benign tumour condylar resection. Advantages include the avoidance of a donor site, earlier return to function and improved quality of life. Virtual surgical planning and 3D printing capabilities further allows reduced healthcare expenditure and reduces prosthesis wait time, and allows more accurate 3D reconstruction. This case report demonstrates a straightforward, accurate, reproducible method for reconstructing the TMJ, facial profile and occlusion following resection of a tumour in a patient with facial deformity and malocclusion, without the need for orthodontic treatment.



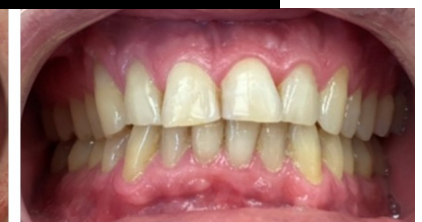
Figures 1. 2. Frontal and worm's eye clinical photographs of the patient at initial presentation demonstrate mandibular asymmetry from enlargement of the left condyle.



Figures 3. 4. OPG & 3D reconstructed CT mandible demonstrating large exophytic left condylar lesion.



Figures 5, 6. Frontal view 3D reconstructions demonstrating pre- & post-occlusal restitution & resultant torquing of right condyle requiring compensatory sagittal split osteotomy.



Figures 7, 8. Frontal view centric occlusion pre- and post-condylar resection & reconstruction with alloplastic TMJ total joint reconstruction.

References

1. A custom-made temporomandibular joint prosthesis for fabrication by selective laser melting: Finite element analysis. Xu, Xiangliang, et al. 2017, Medical Engineering & Physics, Vol. 46, pp. 1-11. ISSN: 1350-4533.
2. Christensen vs Biomet Microfixation alloplastic TMJ implant: Are there improvements? A numerical study. Ramos, António and Mesnard, Mesnard. 2015, Journal of Cranio-Maxillofacial Surgery, Vol. 43, pp. 1398-1403. ISSN: 1010-5182.
3. Reconstruction of Acquired Temporomandibular Joint Defects. Vega, Luis G., González-García, Raúl and Louis, Patrick J. 2013, Oral and Maxillofacial Surgery Clinics of North America, Vol. 25, pp. 251-269. Maxillofacial Reconstruction. ISSN: 1042-3699.
4. Twenty-year follow-up study on a patient-fitted temporomandibular joint prosthesis: the Techmedica/TMJ Concepts device. Wolford, Larry M., et al. 5, United States : s.n., 5 2015, Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, Vol. 73, pp. 952-60.
5. Subjective and objective outcomes in patients reconstructed with a custom-fitted alloplastic temporomandibular joint prosthesis. Mercuri, L. G. 12, United States : s.n., 12 1999, Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, Vol. 57, pp. 1427-30.
6. Custom CAD/CAM total temporomandibular joint reconstruction system: preliminary multicenter report. Mercuri, L. G., et al. 2, United States : s.n., 2 1995, Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, Vol. 53, pp. 106-15; discussion 115-6.
7. Fourteen-year follow-up of a patient-fitted total temporomandibular joint reconstruction system. Mercuri, Louis G., Edibam, Naushad R. and Giobbie-Hurder, Anita. 6, United States : s.n., 6 2007, Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, Vol. 65, pp. 1140-8.
8. WHO Classification of Head and Neck Tumours (4th Edition). Lyon : International Agency for Research on Cancer, 2017.
9. Benign tumours of the bone: A review. Hakim, David N., et al. 2015, Journal of Bone Oncology, Vol. 4, pp. 37-41. ISSN: 2212-1374.