Mandibular reconstruction after the resection of an ossifying fibroma

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A case of ossifying fibroma involving the mandible is presented. The treatment of this lesion and the feasibility of immediate reconstruction to restore aesthetics and function are discussed.

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Key words: Fibroma; Mandible

Introduction

A case of ossifying fibroma involving the mandibular ramus and condylar region is presented with particular reference to the reconstruction of the temporomandibular joint and the inferior alveolar nerve.

Case report

A 19-year-old Chinese man was referred to the Oral Surgery and Dental Unit, Tuen Mun Hospital, Hong Kong, for the management of a hard, painless swelling of the right ramus of the mandible. The patient had been aware of the swelling for approximately one year but had not sought treatment.

The patient was in excellent health and his medical history did not reveal any cause for the swelling. A clinical examination showed facial asymmetry with the right side being larger than the left (Fig 1). A firm, non-tender mass over the right ascending ramus of the mandible was present and the overlying oral mucosa was clinically normal. The interincisal mouth opening was 40 mm but lateral movement of the mandible was limited. There was no sensory disturbance associated with the right inferior alveolar and lingual nerves and regional lymph nodes were not palpable.

A panoramic radiograph revealed a well-circumscribed radiolucent lesion that extended from the right mandibular second molar to the right condylar region and occupied the whole of the coronoid process

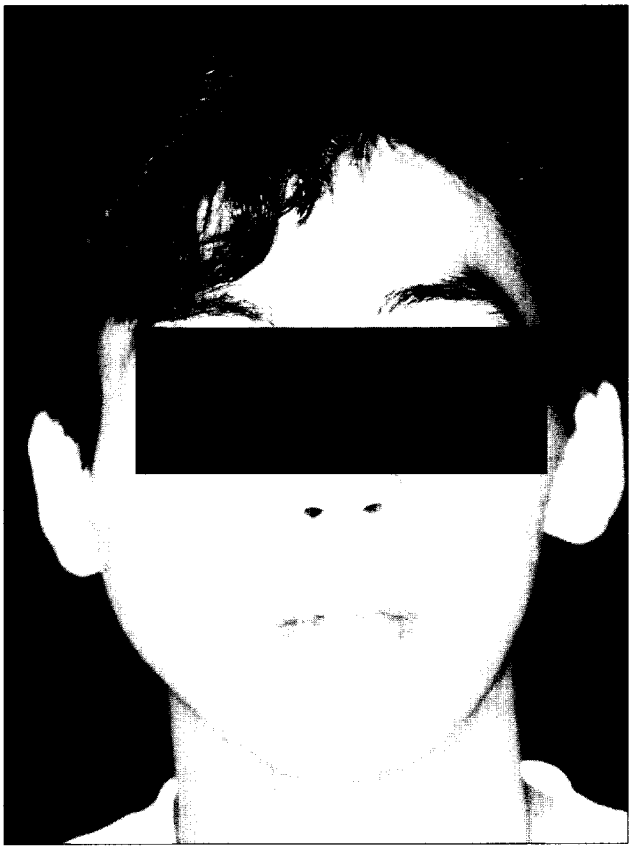

Fig 1. The patient on initial presentation, showing facial swelling caused by the lesion in the right mandible

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Fig 2. Panoramic radiograph showing the lesion occupying the right ramus of the mandible

(Fig 2). The right mandibular third molar was displaced anteriorly (Fig 2). Computed tomography showed an expansile lesion in the right mandibular ramus. The content was heterogeneous in nature, with mixed bone and soft tissue densities. No soft tissue extension or periosteal reaction could be seen. Close proximity of the mass to the right temporomandibular joint was observed but the head of the condyle appeared to not be involved. A needle aspiration of the lesion was non-productive. A biopsy specimen with a portion of the thin outer cortex at the retromolar region was obtained under local anaesthesia and a diagnosis of ossifying fibroma was reported.

The lesion was excised by a segmental resection of the mandible that included the right condyle. Access to the tumour was gained through the submandibular, preauricular, and intraoral approaches. The specimen included a portion of the inferior alveolar nerve. The right greater auricular nerve was harvested through the same submandibular incision and was grafted to the resected nerve ends of the inferior alveolar nerve with 8-0 epineural sutures. The resected mandible was reconstructed with a costochondral graft from the sixth rib and a cortico-cancellous bone block from the anterior iliac crest. Rigid fixation was accomplished using a titanium miniplate and wire osteosynthesis. Intermaxillary fixation was maintained for six weeks and the postoperative course was uneventful.

Sensation at the nerve graft donor site recovered three months postoperatively. At the one-year review examination, the patient reported no subjective difference in sensation between the right and left lower lip. An adequate and stable restoration of the facial contour was achieved. The maximum

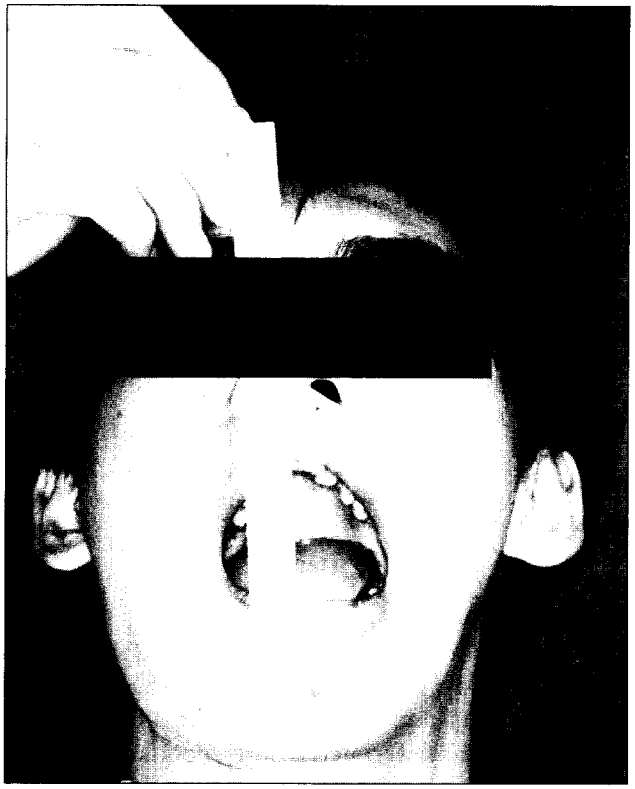

Fig 3a. Frontal view of the patient one year after operation showing adequate facial symmetry and mouth opening

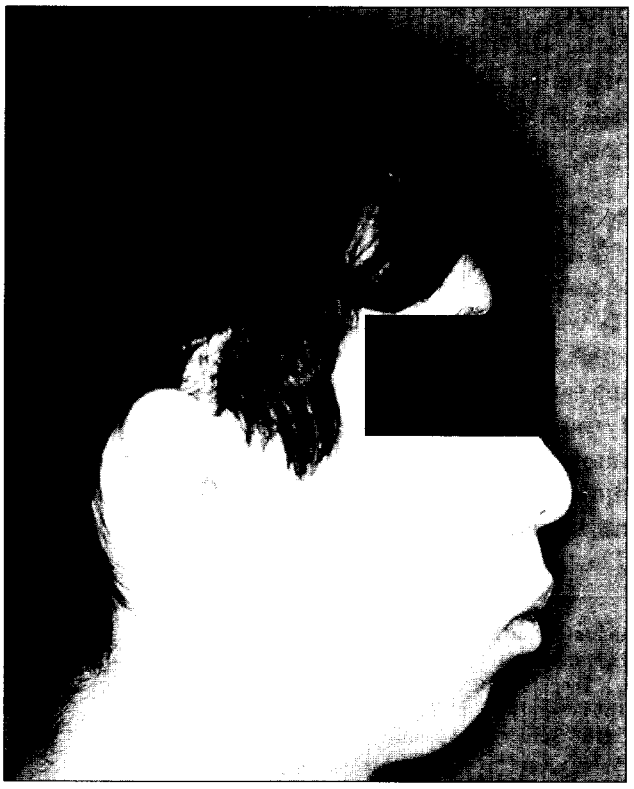

Fig 3b. Right profile view of the patient one year after operation

interincisal opening was 40 mm (Figs 3a and 3b). Radiographic examination showed survival of the bone graft (Fig 4). Further rehabilitation plans include the construction of a removable lower denture.

Histopathology

A gross examination of the resected specimen showed that the mandibular ramus had been expanded by a bony mass. The overlying cortical bone was thinned but intact. Microscopy showed a well-defined lesion composed of trabeculae of irregularly-arranged, mineralised, woven bone rimmed by osteoblasts in a cellular fibroblastic stroma (Fig 5). Mitoses were present but scanty. Osteoclast-like giant cells were found scattered in the stroma. These features are consistent with those of an ossifying fibroma.

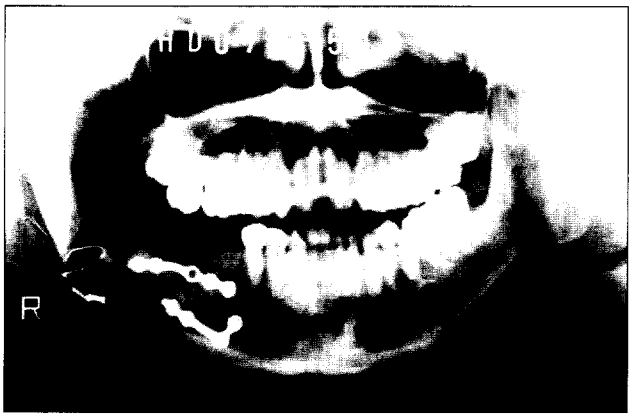

Fig 4. Panoramic radiograph showing survival of the bone graft one year after operation

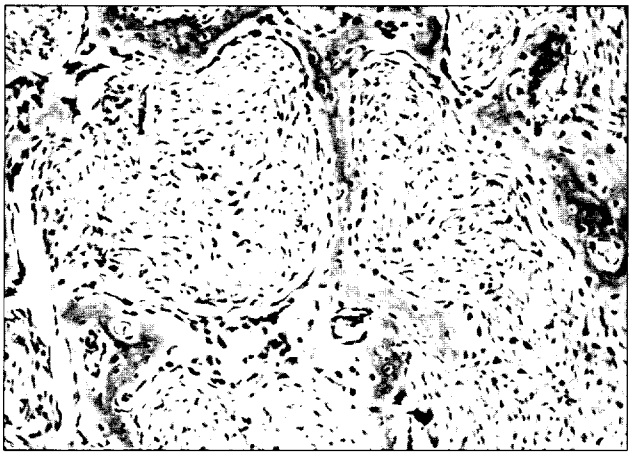

Fig 5. Histopathology revealed trabeculae of irregularly-mineralised bone in a cellular fibroblastic stroma (H&E, x 128)

Discussion

Ossifying fibroma is classified as a cemento-ossifying fibroma in the 1992 WHO classification of odontogenic tumours and is regarded as an osteogenic neoplasm.[1] It is also generally classified as a type of fibro-osseous lesion of the jaws. These are defined as demarcated, or rarely, encapsulated neoplasms that consist of fibrous tissue containing varying amounts of mineralised material that resemble bone and/or cementum.

A comprehensive review of the lesion was published by Eversole et al in their report on 64 cases.[2] Ossifying fibromas occur over a wide age range. The majority of cases are encountered in the third and fourth decades of life. There is a female predilection, with a female to male ratio of approximately 5:1. The mandible is more commonly involved than is the maxilla, and the premolar-molar region is the commonest site. Small lesions are often symptomless. Large lesions result in painless swelling of the involved bone which may cause obvious facial asymmetry. The radiographic appearance depends on the location and the amount of calcified tissue present. Varying degrees of radio-opacities and radiolucencies may be present. The fibroma tends to be well-demarcated. Large lesions often demonstrate a "downward bowing" of the inferior border of the mandible.[3]

The circumscribed nature of the lesion permits complete local enucleation or curettage of small lesions. Large lesions that have destroyed a considerable amount of bone may require segmental resection and reconstruction.

The juvenile ossifying fibroma is a variant distinguished from the larger group of ossifying fibromas on the basis of patient age, common site of involvement, and clinical behaviour. It is most commonly seen in patients younger than 15 years, with the orbital, frontal bones, and the paranasal sinuses being the common sites of involvement in the jaw bones. Histologically, the juvenile ossifying fibroma consists of a cell-rich fibrous tissue that contains bands of cellular osteoid without osteoblastic rimming together with trabeculae of woven bone.

The recurrence rate of the common type of ossifying fibroma after treatment is negligible. For the juvenile or aggressive variant of the lesion, recurrence rates of 30% to 58% are reported.[4]

Mandibular reconstruction after resection is essential for the restoration of function and cosmesis. Other-

wise, the patient will be crippled with a loss of significant function in mastication, the ability to swallow, and speech. An important part of the reconstruction is the use of removable or implant-supported dental prostheses.

Alloplastic and autogenous grafts or combinations of both are used widely in mandibular reconstruction. Bony reconstruction of the mandible requires the transplantation of viable bone from a suitable donor site to the remaining parts of the mandible. Current practice involves the transplantation of autogenous bone as the primary bone graft material. Three types of graft material are possible—corticocancellous blocks, free vascularised bone, and particulate cancellous bone.

In this case, we selected the corticocancellous block method and harvested the bone graft from the medial surface of the anterior ilium.[5] Bone-graft harvesting from the ilium for maxillofacial reconstruction is generally not associated with any significant morbidity. The use of corticocancellous block bone for jaw bone reconstruction has been reported extensively. However, in terms of the biology of bone grafting and healing, this may not be the most ideal method in the long term compared with the use of particulate cancellous bone because of the smaller numbers of marrow mesenchymal cells and viable osteoblasts present. This results in a deficiency of the replacement phase of the remodelling cycle and unpredictable (often significant) resorption of bone. Further rehabilitation using dentures or implants is rendered impossible if significant resorption occurs.

Better methods of mandibular reconstruction include the use of microvascular-free bone transplant and particulate cancellous bone supported by allogenic or alloplastic crib.[6] Microvascular-free bone transplant carries its own blood supply, viable osteogenic cells, and periosteum. Hence, a bone graft with reliable long term function can be achieved. Its major drawback is difficulty in restoring the original bone dimension and contour of the mandible. The use of particulate cancellous bone supported by a crib framework of allogenic bone carries the dual advantages of reliable bone graft survival and ability to restore the form and morphology of the mandible. The allogenic bone crib undergoes resorption and becomes incorporated into the bone graft.

We combined the block bone graft with an autogenous rib graft to reconstruct the condyle of the mandible. Resection of the condylar head was necessary in this case, despite apparent uninvolvement by the tumour, because the stump left after resection would have been too small for fixation.

Reconstruction of the condylar part of the mandible can be accomplished by using alloplastic or autogenous grafts. The use of alloplastic temporomandibular joints (prosthetic condyle or temporomandibular joint [TMJ]) has been fraught with difficulties. A recent literature review reports that none of the TMJ prostheses in use give satisfactory wear to enable reasonable longevity of function.[7] One of the most reliable autogenous graft materials for condylar reconstruction is the costochondral graft.[8,9] In terms of size and physical nature, this graft is similar to the human mandibular condyle. Technically, the graft is easy to harvest and has low accompanying morbidity. It fits well onto the ramus of the mandible with simple fixation. The bony portion restores the ramus of the mandible while the cartilagenous portion restores the articulation with the glenoid fossa. In this case, reconstruction of the articular disc was not necessary as it was not involved by the tumour.

In order to remove the tumour en bloc, the inferior alveolar nerve had to be sacrificed. The greater auricular nerve provides a convenient nerve graft for reconstruction of the inferior alveolar nerve because it can be harvested via the same submandibular incision. The size of the nerve is large enough to be handled without the use of a surgical microscope. The donor site morbidity is low and sensation can be regained by collateral supply. The greater auricular nerve, however, has a significantly smaller mean fascicle number and cross-sectional area. An epineurial suturing technique is therefore more desirable.[10] The length of the nerve graft is limited, compared with the sural nerve graft, especially in patients with a short neck.

Acknowledgements

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References

1. Kramer IR, Pindborg JJ, Shear M. Histological typing of odontogenic tumours. WHO International histological classification of tumours. 2nd ed. Berlin: Springer-Verlag, 1992.
2. Eversole LR, Leider AS, Nelson K. Ossifying fibroma: a clinicopathologic study of 64 cases. Oral Surg Oral Med Oral Pathol 1985;60:505-11.

3. Waldron CA. Fibro-osseous lesions of the jaws. J Oral Maxillofac Surg 1993;51:828-35.
4. Waldron CA. Bone pathology. In: Neville BW, Damm DD, Allen CM, Bouquot JE, editors. Oral and maxillofacial pathology. Philadelphia: WB Saunders, 1995: 443-92.
5. Keller EE, Triplett WW. Iliac bone grafting: review of 160 consecutive cases. J Oral Maxillofac Surg 1987;45:11-4.
6. Marx RE. The science and art of reconstructing the jaws and temporomandibular joints. In: Bell WH, editor. Modern practice in orthognathic and reconstructive surgery. Philadelphia: WB Saunders, 1992:1148-531.
7. van Loon JP, de Bont LG, Boering G. Evaluation of temporomandibular joint prosthesis: review of the literature from 1946 to 1994 and implications for future prosthesis designs. J Oral Maxillofac Surg 1995;53:984-96.
8. Linqvist C, Jokinen J, Paukku R, Tasanen A. Adaptation of autogenous costochondral grafts used for temporomandibular joint reconstruction: a long term clinical and radio-logic follow-up. J Oral Maxillofac Surg 1988;46:465-70.
9. Perrott DH, Umeda H, Kaban LB. Costochondral graft construction/reconstruction of the ramus/condyle unit: long-term follow-up. J Oral Maxillofac Surg 1994; 23:321-8.
10. Svane TJ, Wolford LM, Brammer JP, Jones DL. Comparison of the human inferior alveolar and greater auricular nerve characteristics [abstract]. J Oral Maxillofac Surg 1988;46:M5.