

Spontaneous regeneration of mandible in a 14 year old boy after segmental mandibulectomy-a case report

Abstract Reconstruction of mandible is important to provide good functional and cosmetic result after resection of the bony lesions involving large area of the mandible. The purpose of primary reconstruction is to avoid the collapse of maxillo-mandibular alignment due to scarring and fibrosis. Primary reconstruction by micro vascular bone grafting has been considered as the gold standard treatment option^{1,2}. The patients are rehabilitated functionally to minimize the functional disturbances thus the patient's psychological aspects as well as the quality of the life also improve. However local facilities for surgery, surgical morbidities, medically compromised condition of the patient, infection, cost and various other parameters may not often permit this. In this instance, reconstruction plate plays a major role as a preliminary option which avoids all the esthetic and functional deformities and further maintains a reasonable facial contour^{3,4}. Spontaneous bone regeneration in young individuals after segmental resection of mandible has been sporadically reported⁵. This case reports spontaneous regeneration of left side half of the mandible in a 14 year old Indian patient who underwent segmental mandibulectomy preserving the condyle and stabilized with indigenous, stainless steel reconstruction plate for an extensive resection of ameloblastoma.

Report of a case

A 14 year old boy reported to oral and maxillofacial surgery clinics on 19.04.2006 with a 2year history of intermittent mild dull pain with swelling of the left side posterior region of the mandible that gradually increases in size. The boy was apparently healthy with no history of any systemic diseases. Clinical oral examination revealed bucco-lingual expansion of the posterior region of the mandible with irregular margins, extending from left side retromolar region of the mandible till the left side mandibular first molar (Figs. 1 A-B). The lingual expansion was more pronounced. The swelling gave an egg shell crackling on palpation. Lymphadenopathy of the left side submandibular lymph nodes present. No mobility of teeth elicited. Radiographic examination of the mandible revealed radiolucency extending from the left side neck of the condyle to the ipsilateral mandibular 1st molar (Fig.2). A clinical diagnosis of cystic lesion was made.

On 20.04.2006 incision biopsy was performed under local anesthesia. The pathology report came out as plexiform ameloblastoma. Thorough clinical examination and investigations were performed.

Spiral CT of 1mm cut was taken. Using MATERIALISE "MIMICS", CAD based medical software, a virtual 3D model created and a RP (Rapid prototype) model was made to know and understand the extension of the lesion. The surgical simulation was performed in the RP model.

The resection margins were marked on the RP model (Fig. 3.A-B) and an indigenous stainless steel reconstruction plate 2.7mm thickness with 12.7cm in length was bent and adapted to the contour of the mandible after trimming the expanded portion of the lesion. The plate was placed behind the condyle instead of fixing it to the lateral side of condylar region. The surgery was done on 7.6.06. Intra operatively the plate was prefixed to the mandible and the resection was made with 1.5 cm free margin (Fig. 4).

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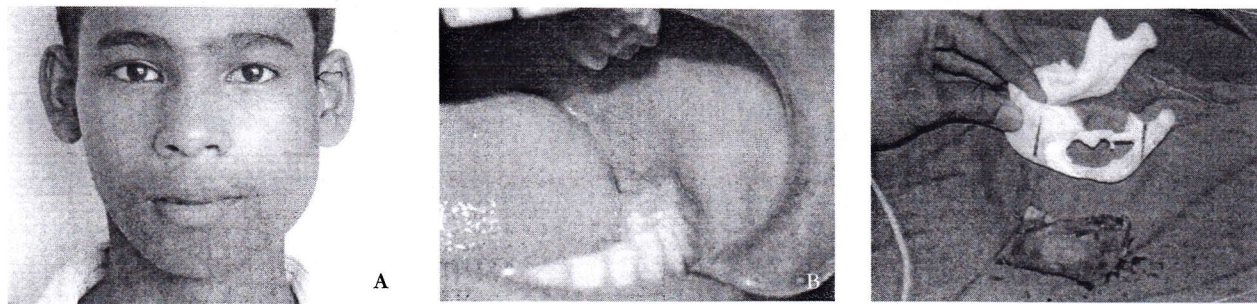


Figure 1: A. Extra oral swelling of the left side mandible. B. Intra oral pre-operative photographs revealing the swelling



Figure 2: Orthopantomogram showing the radiolucent lesion.

Figure 3: Physical RP model with preoperative surgical cut markings and prebent reconstruction plate

Figure 4: A. Intraoperative photo showing the resected specimen. B. Adaption and fixation of prebent reconstruction plate.

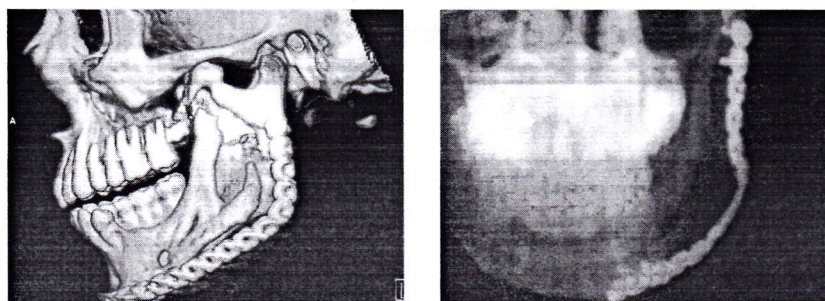


Figure 5: A. Postoperative reconstructed CT. B. Radiograph. Both taken postoperatively after of 18 months showing spontaneous regeneration of the resected part of the mandible.



Figure 6: A. 18 Months postoperative follow up showing the normal symmetry of the face B. Clinical photograph showing normal mouth opening.

Care exercised to preserve the periosteum along the resected mandible. The exact positioning and contour was achieved including condylar stump.

The post operative recovery was uneventful. Next day, radiograph and CT were taken to confirm the position of the reconstruction plate and condyle. The patient

discharged home on 12.6.06 to be followed upon on an out patient basis.

Post operatively radiographs taken on about 2 months later showed some bone regeneration around the reconstruction plate. Further radiographs taken on regular intervals for a period of 18 months (almost) showed

complete regeneration of the hemi mandible (Fig 5.A-B). There was no evidence of recurrence and the healing was complete. The facial contour is very satisfactory with normal mandibular movements (Fig.6.A-B). Further treatment plan is removal of the reconstruction plate, followed by bone grafting to increase the width of the bone for placement of implant prosthesis.

Discussion

New bone formation can take place through the process of osteogenesis osteoinduction and osteoconduction⁶. Periosteum plays a very important role in new bone formation and it is important to preserve it during surgery. There are reports that suggest even irradiated periosteum still has some osteogenic potential. Ruggerio and Donoff reported a case of spontaneous regeneration of the mandible after irradiation⁷.

The case described in this study supports the important role of periosteum in spontaneous regeneration. Spontaneous regeneration of a large portion of the mandible had been reported after subtotal mandibulectomy or hemimandibulectomy⁸. The factors favoring the new bone regeneration are age of the patients, preservation of the periosteum, absence of infection and decreased tension in the bone. Cases of spontaneous regeneration of the mandible reported in the literature are in young individuals with age range from 5 to 11 years⁹. Younger age may play an important factor in spontaneous regeneration due to high cellular activity and availability of abundant osteoprogenitor cells to form bone⁹. It is the author's assumption that the muscle forces act along the central long axis of the condyle, so that placing the reconstruction plate behind the condyle gives more stability for the condyle anatomically than placing laterally. Immediate postoperative CT Radiographs also showed that the condyles were in normal anatomical position as it was preoperatively. Further studies are recommended to prove the author's assumption. It is well known that periosteum is a good source for bone formation. During resection the periosteum should be preserved if it is not involved with the lesion.

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