INTRODUCTION

- A group of tumors which are characterized by the following clinical features;
  1. Slow rate of growth,
  2. Painless lesions
  3. Locally aggressive and infiltration of the jaw bones,
  4. Loosening and displacement of related teeth,
  5. Later → ulceration of the oral mucosa,
  6. Perforation of the periosteum & invasion of the soft tissues is very late,
Aggressive Jaw Tumors

1- Ameloblastoma, → the commonest Tr.
2- Variants of ameloblastoma
   a. Ameloblastic Fibro-odontome,
   b. Odonto-Ameloblastoma.
   c. Desmoplastic Ameloblastoma
   d. Malignant ameloblastoma
3- Odontogenic Myxoma,
4- Fibro-myxoma
5- Giant Cell Tumors of the Jaw
6- High Flow Vascular Malformations of the Jaw

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**CLINICAL MATERIALS**

- **Year**  
  - 1996: 12  
  - 1997: 10  
  - 1998: 15  
  - 1999: 11  
  - 2000: 12  
  - 2001: 11  
  - 2002: 11  
  - 2003: 10  
  - 2004: 13  
  - 2005: 15  
  
  Total: 120

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**CLINICAL MATERIALS, cont.**

- **Type of Tumor**  
  1. Mandibular Ameloblastoma: 40  
  2. Maxillary Ameloblastoma: 4  
  3. Ameloblastoma with malignant Changes: 3  
  4. Odontogenic Recurrent Keratocyst: 18  
  5. Odontogenic Myxoma: 13  
  6. Myxofibroma: 6  
  7. High-Flow Vascular Malformation: 10  
  8. Giant Cell Tumor: 10  
  9. Aneurysmal Bone Cyst: 5  
  10. Juvenile Aggressive Fibrous Dysplasia: 4  
  11. Osteoblastoma of Condyle: 2  
  12. Aggressive cementifying odontogenic Fibroma: 2  
  13. Neuroectodermal Tr. Of Infancy: 2  
  14. Gorlin Cyst with ameloblastic Changes: 1  

Total: 120
RADIOLOGICAL FEATURES

1- Usually appear as multilocular radiolucent lesions of varying sizes with ill-defined borders.
2- Usually cause expansion of the jaw bones in all directional i.e. three dimensional expansion.
3- The neurovascular bundle is usually displaced near the lower border of the mandible.
4- The related teeth may show migration & loosening, root resorption to a variable extent.
5- The tumors destroy the spongiosa first, which may not be apparent radiologically.
6- They may perforate and erode the cortical plates and then invade the adjacent soft tissues.

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SURGICAL TREATMENT Of Aggressive Jaw Tumors

• The treatment of choice is:
  1. Surgical Resection with safety margins;
     at least one dental unit or 1cm beyond the radiographic borders.
  2. Immediate Reconstruction:
     A- Non-vascularised bone graft
     B- Vascularised composite Flaps.
  3. Oral and Dental Rehabilitation;
     A- Removable; Obturator or Partial Denture.
     B- Fixed; Osseo-integrated Dental Implants.

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SURGICAL RESECTION

1. Resection of the tumor with safety margins; till anatomic barrier; e.g. dental unit or 1-1.5 cm beyond the apparent radiographic borders.

2. Subperiosteal dissection is usually performed, except in the following situations; where it should be supra-periosteal:
   1. If there is cortical thinning,
   2. If there is cortical perforations,
   3. Gross soft tissues involvement,
   4. Recurrent lesions, either single or multiple recurrences,
   5. Risks of malignant transformation.

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SURGICAL RESECTION, cont.

1- Closure of the oral wound, in a water-tight manner without any tension and in good co-apitation.

2- The oral wound is closed in two layers; mucosal and anther re-enforcing sub-mucosal layer to support the first layer.

3. Special attention is given to the regions at the bony ends, where the sutures are suspended on the remaining teeth to avoid disruption.

4- Decortication of the mandibular ends to expose the spongiosa using large rose-head burs.

5- Putting the jaws in maxillo-mandibular fixation.

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SURGICAL RESECTION, cont.

6- Application of the reconstruction plate, adapting it and fixing it to the mandibular ends by mini screws, or wires.

7- Insertion of the split ribs, one by one, spanning the defect vertically and horizontally, with slight under building.

8- Application of additional screws, or transfixing wires to strengthen the bundle and hold it tightly.

9- Closure of the wounds with suction drainage.

10- Release of maxillo-mandibular fixation, if there is rigid internal fixation.

Surgical Technique of Split Rib Bundle bone Graft

Extent of Resection of aggressive Jaw Lesion with safety Margins all around.

Decortication of both mandibular ends to expose spongiosa
Types of mandibular defects

- Hemimandibular defect
- Hemimandibular defect sparing the condyle
- Lateral segmental defect, notice coronoidectomy?????
- Median Segmental defect
- Near-Total Mandinular defect

SPLIT RIB BUNDLE BONE GRAFT

Insertion of the first split

Insertion of the second split

Insertion of the third split

Insertion of the fourth split
METHODS OF RECONSTRUCTION

A- Time of Reconstruction:
1. Immediate       2. Delayed.

B- Technique of reconstruction:
1. Free Non-vascularized Bone Graft:
   a. Split Rib Bundle Rib.
   b. Cortico-cancellous bone graft,
   c. Cancellous bone chips carried on trays (metallic, titanium, wire reinforced-silicon, dacron-urethane, or chromium cobalt)

2. Free Vascularised Composite Grafts (Soft Tissues & Bones):
   a. Free Radial Composite Graft,
   b. Free Fibular composite graft,
   c. Free Iliac composite Graft,
   d. Free Scapular Graft.
Surgical Technique of SRBBG ; Step by step Demonstration

Panoramic X-ray of Ameloblastoma, Notice the extent of resection with safety margins, at least one dental unit.

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The Patient in hyper-extended position. The continuous line represents the lower border of the mandible, while the interrupted line represents the skin incision, three cm below to protect the mandibular branch of the facial nerve.

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An extended submandibular skin incision down to the level of platysma muscle.

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Then, incising the platysma muscle at the lower edge of skin incision, Why?????

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Elevation of the skin flap deep to the capsule of the submandibular gland, Why ?????
The tumor is exposed by subperiosteal dissection. Resection of the mandible at the posterior end of the lesion leaving safety margin, 1.5 cm.

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Resection of the tumor at the anterior end in a step fashion osteotomy

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After resection of the tumor

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Closure of the intra-oral wound completed.

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Obtaining four splits from two ribs

Splitting of ribs by fine osteotome and manual pressure

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Decortication of the mandibular ends using rose-head burs exposing the spongiosa, helps intake of the graft.

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Application and adaptation of two mini reconstruction plates.

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After insertion of splits and fixing them by screws and transfixing wires.  

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A heavier reconstruction plate may be used to avoid stress fracture.  

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PATIENTS AND METHODS

- Data collected included: age at diagnosis, sex, microscopic diagnosis, size on panoramic radiograph, presence or absence of soft tissue involvement based on CT scans, number and type of operations, number of recurrences, anatomic and dental reconstruction, length of follow up, and complications & their management.

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METHODS OF RECONSTRUCTION, cont.

<table>
<thead>
<tr>
<th>Technique</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Split Rib Bundle BG</td>
<td>100</td>
</tr>
<tr>
<td>2. Free Radial Forearm Flap</td>
<td>7</td>
</tr>
<tr>
<td>3. Free Fibular Flap</td>
<td>3</td>
</tr>
<tr>
<td>4. Free Iliac Flap</td>
<td>2</td>
</tr>
<tr>
<td>5. Maxillary Obturator</td>
<td>7</td>
</tr>
<tr>
<td>6. No-Reconstruction</td>
<td>1</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

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TIME OF RECONSTRUCTION BY SRBBG

A-Immediate Reconstruction → 90 patients

B-Delayed Reconstruction → 10 patients

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Aswan, Egypt
CLINICAL CASES

- Mandibular Ameloblastoma.
- Maxillary Odontogenic Myxoma.
- Mandibular Giant Cell Tumor.
- High Flow Arterio-Venous Malformation.
- Mandibular Desmoplastic Fibroma.
Four months after plate removal

One year post-operative

Pre-operative

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4 months after plate removal

One year post-surgical

Pre-Surgical

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Ameloblastoma, Lt. Hemimandible.

Four months after plate removal

One year post-operative

Pre-operative

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4 months after plate removal

One year post-resection & reconstruction by SRBBG.
Application of three implant fixtures

Exposure of SRBBG after one and half years, and drilling for implant fixture.

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One and half years post-SRBBG

After insertion of five implant fixtures
A template used to help in insertion of implant fixture sites.

A partial denture is used until osseo-integration.

Maxillary Odontogenic Myxoma

Coronal CT showing the extent of the tumor.

Intra-oral View

Upper jaw myxoma, Lt. side

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Three months post-operative

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6 months post-operative after reconstruction of final obturator

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River Nile, Aswan, Egypt
Different types of reconstruction plates

CENTRAL GIANT CELL TUMOR OF THE MANDIBLE

Giant cell tumor of the anterior region of the mandible
Pre-surgical lat. ceph of the patient

Resected lesion

Harvested fibular musculo-cutaneous flap

Panoramic view one year after surgery with AO reconstruction plate

Six months after plate removal
Dental rehabilitation, one year after surgery

After surgery

Before Surgery
HIGH FLOW ARTERIO-VENOUS MALFORMATION OF THE MANDIBLE

Recurrent high flow vascular malformation of the mandible, Rt side
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After radicale resection and reconstruction by SRBBG
The Patient 17 years after surgery

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DESMOPLASTIC FIBROMA

Desmoplastic fibroma of Lt. side of the mandible resected and reconstructed by SRBBG

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RECURRENT ODONTOGENIC KERATOCYST

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Recurrent Keratocyst of the rt hemimandible

ZYGOMATIC IMPLANTS

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Upper Jaw Recurrent Giant Cell tumor
Tumor resection and Immediate Zygomatic Implants Insertion

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IMMEDIATE RECONSTRUCTION

1. There is sufficient space to allow the tissues to be closed without tension.
2. It is easier to ensure that the graft is inserted in the right tissue plane and that the remaining muscles are appropriately positioned around it.
3. There is also, minimal delay in restoration of appearance and function.
4. It avoids the need for a second operation, and opening in scarred tissues with more potential risk for injury to the mandibular branch of the facial nerve.
**DELAYED RECONSTRUCTION**

This is to be considered in the following situations:

1. If there is much loss of soft tissues, unless this is solved by free composite flap
2. If the primary lesion is potentially malignant???
3. Where post-operative radiotherapy is contemplated, also, a free composite flap can be used.
4. Where it is difficult to achieve perfect hemostasis, as in extensive high flow arterio-venous malformations.

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**COMPLICATIONS OF SRBBG.**

<table>
<thead>
<tr>
<th>Complications</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial loss of graft</td>
<td>6/ 100</td>
</tr>
<tr>
<td>Total loss of graft</td>
<td>2/100</td>
</tr>
<tr>
<td>Over-correction</td>
<td>4/100</td>
</tr>
<tr>
<td>Under-correction</td>
<td>11/100</td>
</tr>
<tr>
<td>Loss of chin configuration</td>
<td>3/100</td>
</tr>
<tr>
<td>Loss of mand. angle configuration</td>
<td>8/100</td>
</tr>
<tr>
<td>Persistent sinuses</td>
<td>9/100</td>
</tr>
<tr>
<td>Flat ridge</td>
<td>13/100</td>
</tr>
<tr>
<td>Paresis of mandibular branch of facial nerve</td>
<td>12/100</td>
</tr>
<tr>
<td>Permanent paralysis of mand. branch of facial nerve</td>
<td>3/100</td>
</tr>
</tbody>
</table>

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ADVANTAGES OF SRBBG

1. Splitting of the ribs has, helps early vascularization, ingrowth of the granulation tissues, resorption of the graft and its replacement by new living bone.

2. Splitting helps proper shaping and contouring of the graft to span the defect without its fracture.

3. The splitted ribs made in the form of a bundle, achieve a proper mesio-distal spanning of the defect, also can build the bucco-lingual thickness as well as the vertical height of the defect, minimizing the need for vestibuloplasty procedures.

ADVANTAGES OF SRBBG, CONT.

4. It obviates the need for internal splints such as trays.

5. It allows the reconstruction of totally edentulous mandible, by incorporating reconstruction plates and screws.

6. The split ribs have an exceptional ability to survive, even if infection occurs, proper treatment in these situation results in saving the graft, with only minimal loss of bone.

7. This technique is simple, fast (3 hours), easy, less expensive, can be performed by genior surgeon, and with few complications.

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DISADVANTAGES OF SRBBG.

1. Unsuitable if there is severe soft tissues defects (either intra-orally or extra-orally).
2. If infection occurs, removal of the reconstruction plates, wires and screws is mandatory.
3. Before insertion of dental implants, also, removal of any hardware is recommended.
4. Also, in totally edentulous patients, it may difficult to maintain the proper inter-arch distance.
5. Partial resorption of the graft may result in flat ridge with difficulties in dental rehabilitations later on.

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Partial flat ridge

Inadequate contour of the angle of the mandible

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Fatigue Fracture of the mini-reconstruction plate (2.3mm thickness)

Stronger and heavier reconstruction plate to avoid fatigue fracture.

Early and severe post-operative infection, ??? How to manage.

Exposure of the graft intra-orally resulting from closure of the wound undertension (bulky graft).

Absent mandibular angle and loss of proper inter-arch distance.

Excessive inter-arch distance → difficult implant restoration.
In the era before rigid fixation, when there is no teeth in way to immobilize the grafted mandible, this patient developed severe osteomyelitis with sequestration of the graft.

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Increased Inter-Arch Space

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Thank You
For Your Attention