Oral Surgery for the General Dentist
Michael Steinle, DMD
Oral and Maxillofacial Surgery
Oral Surgery
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• No Animals were injured in the creation of this presentation.
• Only a few Residents were injured in the creation of this presentation.
• Oral Surgeons have a dry sense of humor.
Introduction

- **Extractions**
  - Simple
  - Surgical
  - Boney
- **Preprosthetic surgery**
- **Implants**
Evaluation

- CC, H&P
- Bone & Soft Tissue
- Treatment Plan
  - Extractions, Endo, Perio, etc.
  - Restorations
  - Conventional vs. implant prosthesis
Extractions
Indications for dental extractions

- Severe caries
- Pulpal necrosis
- Periodontal disease
- Orthodontic Rx
- Malposed teeth
- Cracked teeth
- Prosthodontic Rx
- Impacted teeth
- Supernumerary teeth
- Pathology
- Pre-radiation therapy
- Pain
Indications for dental extractions

- Severe caries
- Pulpal necrosis
- Periodontal disease
- Orthodontic Rx
- Malposed teeth
- Cracked teeth
- Little Green Man Living in My Tooth
- Prosthodontic Rx
- Impacted teeth
- Supernumerary teeth
- Pathology
- Pre-radiation therapy
- Pain
Boney Impactions
Indications to remove impactions

- Prevention of:
  - Periodontal disease
  - Caries
  - Pericoronitis
  - Root resorption of adjacent teeth
  - Odontogenic cysts and tumors
  - Jaw fractures
- Orthodontic treatment
- Jaw pain of unexplained origin
Classification of impacted teeth

• Pell and Gregory Classification
  – Relationship to anterior boarder of ramus
    • Class 1, normal position in from of ramus
    • Class 2, ½ the crown is within ramus
    • Class 3, entire crown is embedded within the ramus
  – Relationship to occlusal plane
    • Class A, tooth at the same plane as other molars
    • Class B, occlusal plane of third molar is between the occlusal plane and the cervical line of the second molar
    • Class C, third molar is below the cervical line of the second molar
Classification of impacted teeth

- Based on angulation
  - Mesioangular
  - Horizontal
  - Vertical
  - Distoangular
Mesioangular impaction

Pell and Gregory Class 2/B

Pell and Gregory Class 1/C
Horizontal impaction

Pell and Gregory Class 2/B

Pell and Gregory Class 2/C
Vertical impaction

Pell and Gregory Class 2/B
Distoangular impaction

Pell and Gregory Class 3/B  Pell and Gregory Class 2/B
Surgical principles

• Exposure
  – You have to be able to see, suction, and complete the surgery
    • Envelope flaps are common, often with a releasing incision
    • Base of the flap must be wider than the apex
    • Keep incisions lateral in the posterior mandible
Surgical principles

• Bone removal
  – Often needed for a less traumatic extraction
• Tooth sectioning
• Irrigation
• Closure of the flap
Partial Boney Impactions
Complications

• Mucosal injury
  – Laceration, tear, pucture
• Oral-antral communication
• Dental complications
• Jaw fracture
• Nerve injury
• Infections
Complications
Conventional Preprosthetics
Techniques

- Simple Alveoloplasty
- Intraseptal Alveoloplasty
- Tuberosity Reduction
- Torus removal
- Exostosis removal
- Frenectomy
Simple Alveoloplasty
Intraseptal Alveoloplasty
Tuberosity Reduction

Soft Tissue

Bone
Tori Removal
Frenectomy
Increasing Denture Stability

• Floor of Mouth lowering
  – Release of the Mylohyoid and genioglossus muscles from their insertion sites
  – Minimum of 15 mm of alveolus height
  – Associated with Skin grafting procedure
  – Supra-periosteal dissection (era on the side of excess tissue removal)
  – Skin graft secured by means of direct suturing or by stent
Floor of Mouth Lowering
Floor of Mouth Lowering
Floor of Mouth Lowering

**Figure 24–22.** Note that retraction exposes the mylohyoid muscle after the mucosa has been completely incised.

**Figure 24–23.** The heavy line on the lingual side indicates the initial incision to allow the first phase of the lingual dissection. The dashed line indicates the completion of the incision to allow the remaining lingual dissection.
Floor of Mouth Lowering

**Figure 24-24.** An instrument such as curved Kelly forceps placed beneath the fibers of the mylohyoid muscle facilitates dissection of the muscle from the mandible.

**Figure 24-25.** The index finger is used to bluntly dissect any remaining soft tissue attachments in the posterior area of the lingual dissection.

**Figure 24-26.** Note the layer of fat that usually separates the genioglossus muscles from the geniohyoid muscles. Resorption usually takes place when parts of the genioglossus are severed.
Floor of Mouth Lowering

**Figure 24–29.** Both ends of the suture are passed through the eye of the awl runtime 1.5 inches and then released from the hemostat.

**Figure 24–30.** The awl is withdrawn adjacent to the mandible.
Floor of Mouth Lowering

Figure 24-33. Diagrammatic representation of the suture before it is tied.
Floor of Mouth Lowering

Figure 24–35. The most distal submandibular suture penetrates the buccal mucosa at the angle made by the buccal and lateral incisions.

Figure 24–36. Final appearance of a submandibular suture when tied.
Floor of Mouth Lowering

Figure 24-40. The suture is passed through the labiobuccal mucosa 3 mm from the incised edge and the exposed periosteum is engaged as inferiorly as possible. Then the suture is passed through the skin graft within 2 to 3 mm of the inferior margin.

Figure 24-41. Critical to the proper adaptation of the graft inferiorly, the assistant must stretch the skin distally with gentle finger pressure as each suture is passed and tied.
Floor of Mouth Lowering

**Figure 24-42.** With finger tension maintained on the graft in a lingual and inferior direction, the suture is placed through the graft, through crestal tissue, and then back out through the graft.

**Figure 24-43.** Excessive skin is carefully trimmed lingual to the superior suture line. The free margin of the excessive tissue is grasped under light tension and excised with a small scissors.
Floor of Mouth Lowering

Figure 24-44. A. With a marked concavity in the anatomy of the mandible's buccal surface, there may be poor adaptation of the graft to the periosteum (tenting). B. Sutures are placed through the skin and periosteum in the area of the concavity to more effectively adapt the skin to its recipient bed.

Figure 24-45. In order to prevent blood or serum accumulation under the skin, several small stab incisions are made along the midportion of the graft.
Floor of Mouth Lowering
Increasing Denture Stability

• Vestibuloplasty
  – Submucosal
  – Kazanjian
  – Lip Switch

• Ridge Augmentation
  – Hydroxyapatite (HA)
  – Bone Grafting
Submucosal Vestibuloplasty
Submucosal Vestibuloplasty
Kazanjian Vestibuloplasty
Lip Switch vestibuloplasty
Hydroxyapatite (HA) Particles

- Ca$_{10}$(PO$_4$)$_6$(OH)$_2$
- Poor substitute for cancellous bone
- Becomes migratory and unstable
Implant Preprosthetics

*Bone Grafting
Bone Grafting for Implants
Overview

• Terminology
• Patient Evaluation
• Timing & need for Bone Grafting
• Types of Grafts & Materials
• Surgical Principles
• Complications
• Alternatives
Introduction

• Backward planning
  – Planned prosthesis determines implant placement

• Alveolar atrophy

• Wide diameter implants
Terminology

- Osteoconductive
- Osteoinductive
- Osteogenic

- Autogenous
- Allogeneic
- Alloplastic
- Xenograft
Osteoconduction

• Growth by apposition from the surrounding bone
• Osteoconductive materials are biocompatible and provide a scaffold upon which new bone is formed.
• Presence of bone or differentiated mesenchymal cells is essential.
Osteoinduction

- *Induction* of new bone formation from osteoprogenitor cells (mesenchymal stem cells).
- Influenced by one or more inducing agents that emanate from platelets and the bone matrix. (PDGF, TGFβ, BMP’s)
Osteogenesis

- Growth of bone from viable cells transferred within the graft.
- Autogenous bone is the only graft material available with osteogenic properties.
- New bone is regenerated from endosteal osteoblasts and marrow stem cells transferred with the graft.
Autogenous Source

• Taken from same individual
• Contain numerous osteoprogenitor cells
• Allows for rapid revascularization
• Consideration for harvest site include
  – quantity needed
  – quality required
  – associated morbidity
Allogeneic Source

- Taken from same species but different individual
- Freeze dried banked bone is most common
  - mineralized
  - demineralized
- Fresh frozen bone is an alternative to freeze dried. Has osteoinductive properties.
Alloplastic Source

• Bone substitute.
• Hydroxyapatite is most popular.
• Osteoconductive in nature.
Xenograft Source

• Obtained from different species.
• Bovine bone material very popular (Bio-Oss).
• Used as fillers and spacers (osteocoductive)
Patient Evaluation

- **Restorative Dentist**
  - CC
  - History
    - *Smoking, Systemic disease*
  - Examination
    - *Residual bone evaluation*
  - Treatment options
  - **Diagnostic Wax-up (stent)**
  - Surgical Consult
Bone Height

- Alveolar crest to opposing landmark
  - Radiographs
    - Magnification
- Crown to root ratio
Bone Width

- Buccal to lingual plates
  - Clinical (sometimes radiographs)
- Must *palpate* to evaluate for concavities
Bone Length

- Mesiodistal space
  - Clinical/casts/x-rays (roots)

- Ideally 2mm between adjacent implants and 2-3mm between implants and teeth
Bone Angulation

• Alveolar atrophy may affect the *angulation* at which implants may be placed
  – Evaluate clinically and radiographically

• Parallel to long axis of prosthesis

• Augmentation can correct
When is grafting necessary?

When there is insufficient alveolar bone to support the *appropriate size* implant in the *appropriate position* for the final prosthesis.

**Timing:**
- Before implant placement
- During implant placement
- After implant placement
Before

• Time of extraction
  – Bio-col

• Site preparation
  – Edentulous areas w/ atrophy
  – Timing
During

Immediate implants

Buccal Augmentation

Osteotome technique
Sinus Lift Grafting

- Inadequate posterior maxillary vertical bone height
After

• Esthetics (root eminence)
• Exposed threads  
  – Necessary?
• Treatment of failing implants?
Types of Bone Grafts

- Particulate
  - Advantages
  - Disadvantages

- Block
  - Advantages
  - Disadvantages
Ideal Bone Graft Requirements

- Biocompatibility
- Availability
- Accessibility
- Should provide adequate viable bone and or control or influence bone growth.
  - Osteogenesis
  - Osteoinduction
  - Osteoconduction
Materials

- Autogenous
- Allogeneic
- Alloplastic
Materials

- Autogenous Bone
  - Non-vascular, vascular
  - Osteoconductive, osteoinductive, osteogenic
  - Intraoral
    - Ramus, chin, tuberosity
    - Other
  - Iliac Crest
    - Anterior, posterior
  - Tibia
  - Rib
Materials

• Allogeneic
  – Osteoconductive, +/- osteoinductive
  – Cadaver bone
    • Fresh frozen or irradiated
    • Freeze dried bone allograft (FDBA)
    • Demineralized freeze dried bone allograft (DFDBA)
      – Questionable osteoinductivity
Materials

• Alloplasts
  – Bone substitutes
  – *Osteoconductive* only
  – Synthetic or natural sources
    • Synthetic: hydroxyapatite (HA)
    • Natural sources include xenografts (Bio-Oss, etc) and calcium carbonate from coral (Interpore 200, BioCoral)
  – Bioactive glass ceramics
    • Calcium, phosphorous, silicon, sodium (Perioglas, etc)
Surgical Keys for Successful Grafts...

- Patient environmental factors controlled
  - Absence of infection, systemic disease controlled
- Selection of appropriate technique
- Preparation of recipient site
- Atraumatic Harvest
- Quick transfer to vascularized tissue
- Tension-free wound closure
- Protection from contamination
Surgical Keys for Successful Grafts…

- Graft immobilization
- Space maintenance
- Barrier membranes
- Healing time
- Growth factors
Bone Grafting Techniques
Advances in Tissue Engineering

- Resorbable membranes and hardware
- Platelet rich plasma (PRP)
- Recombinant growth factors (rhBMP-2)
Platelet Rich Plasma

- **Definition**: a concentration of autologous platelets greater than the peripheral blood concentration, suspended in a solution of autologous plasma.
- Easily accessible source of growth factors to support bone and soft tissue healing.
- When activated with CaCl & Thrombin it congeals to provide superior graft handling.
Platelet Poor Plasma

Platelet Rich Plasma

RBC Component
How PRP Works

• PRP mixed w/ bone
• Activated w/ thrombin & CaCl
  • CaCl nullifies effect of citrate anticoagulant
  • Fibrinigen in PRP crosslinks to form fibrin network
• Graft solidified
  • easier handling
• Platelets degranulate
  • releases growth factors
Human Mesenchymal Stem Cells in Bone Marrow

* Adapted from Tissue Engineering, p. 76
Indications for PRP

• Elderly Patients (markedly fewer stem cells)
• Previously Irradiated Tissues (RTI)
• Systemic disease
  • DM, PVD, osteoporosis
• Smoking & ETOH abuse
• Multiply operated sites
  • cleft palate, previously failed treatment
• Earlier Implant placement & loading*
  * no clinical data to substantiate at present
Harvest Technology
• 50-55 cc blood
• 5-10cc PRP
• FDA approved
• First Office based sys
• Sterile “peel packs”
• $7,900 retail + disp

*Photos from Harvesttech.com
PRP added after bone mill to cancellous graft

* Photos from www.plateletrich.com
PRP Membranes

* Photos from [www.plateletrich.com](http://www.plateletrich.com)
Clinical Situations
Insufficient Width

Congenitally missing laterals
Complications

- Wound dehiscence
- Resorption
- Failure
- Paresthesia
- Infection
- Donor site morbidity
Alternatives to Bone Grafting

- Conventional Fixed/Removable
- Implant overdenture or fixed hybrid
- Osteotome technique
- Shorter/wider implants
- Distraction Osteogenesis
- Ridge-split technique
- Nerve lateralization
Implant Case
"GREAT PRESENTATION. I HAVEN’T SLEPT THAT WELL IN WEEKS."

Beware the Monkeys

careerbuilder.com
A better job awaits.
I HAVE THE BODY OF A GOD.

(UNFORTUNATELY, IT'S BUDDHA.)
Questions?