

Intro to OMFS

Dentoalveolar surgery

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|--|---|
| <ul style="list-style-type: none"> - Basic – GP able <ul style="list-style-type: none"> o Extraction of erupted o Minor preprosthetic surgeries | <ul style="list-style-type: none"> - Advanced – OMFS specialist <ul style="list-style-type: none"> o Surgical extraction impacted teeth o Advanced preprosthetic surgeries |
| Preprosthetic surgeries <ul style="list-style-type: none"> - Alveoloplasty - Tori removal - Vestibuloplasty – usually increase denture flange - Epulis fissuratum removal - Tuberosity reduction - Sinus augmentation (pre-implant surgeries) | Anesthesia <ul style="list-style-type: none"> - Local - Nitrous oxide - Moderate sedation <ul style="list-style-type: none"> o Requires additional training for the GP - Deep sedation and general anesthesia – specialist <ul style="list-style-type: none"> o Residency in OMFS or dental anesthesia |

Pathology

- Benign – fibroma, dentigerous cyst
- Benign aggressive – OMFS only – ameloblastoma, reconstruction via bone grafting, etc
- Malignant – OMFS oncology subspecialist only – squamous cell carcinoma

Trauma

- Dentoalveolar – related to teeth and surrounding structures
- Craniofacial – trauma to mandible, maxilla/midface (zygoma), orbits, frontal bones/sinus – OMFS only
- Mandibular
- Midface
- Upper facial

Surgeries

| | |
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| Orthognathic – move Mx, Mn, or both <ul style="list-style-type: none"> - Mx – lefort Class I - Mn – bilateral saggital split ramus osteotomy | TMJ <ul style="list-style-type: none"> - Arthroscopy – scope in joint, inject steroids, etc - Arthroplasty - Total joint replacement |
| CLP <ul style="list-style-type: none"> - Cleft lip closure, secondary cleft lip closure - Alveolar/primary palatal cleft closure - Nasal surgeries - Adjunct procedures – orthognathic surgery, implant reconstruction | Cosmetic <ul style="list-style-type: none"> - Blepharoplasty – eye lid surgery - Brow lifting - Botox/fillers - Face/neck lifting - Rhinoplasty – nose job |

Scope of OMFS for the general dentist is not defined by state law, but influenced by these factors:

1. Desire to perform surgery
2. Training and experience with complex procedures
3. Skill level
4. Specialist availability in surrounding area

Basic Medical Assessment

Chief Complaint

- Why the patient is here, establishes the patient's priorities
- Record verbatim in record

HPI – History of present illness

- First appearance, changes in appearance/symptoms, constitutional symptoms (systemic symptoms)

MHx

- Important to know severity of conditions and level of control with all medications
- Severity/Control – medications/behavior control, # of meds, triggers, relief, number of hospitalizations
 - o Current problems being treated/existing conditions
 - o Past hospitalizations, serious injuries/illnesses
 - o Medications, allergies (why type of allergic reaction?)
 - o Use of recreational drugs, tobacco, and ^OH (dosing, duration, etc)
- Diabetes
 - Type I – absolute deficiency, prone to ketosis, caused by many things (genetics, environment, immune, infection, etc)
 - Type II – resistance/inadequate secretion, temporary ketosis, likely obese patients
 - o A1C – average glycemia control over past 6-8 weeks (RBC bound, so ~ 120 days)
 - Correlates to disease state and complications
 - <5.5% = excellent control, <6% = good control, >6% = poor control, >7.5% = uncontrolled
 - Blood glucose <120 at any random time = normal

PSHx

- Evaluates patient overall health, underlying bleeding disorders, and anesthesia problems

Review of Systems

- General, cardiovascular, pulmonary, GI, neurological, endocrine, hepatic, renal, hematologic, musculoskeletal
- Ascertain info about the patient not included in the MHx (drugs may guide you)
- Verify current status/symptoms of patient with a known medical condition

Physical Exam

- o Inspection, palpation, percussion, auscultation
- Vitals – BP (130/80), pulse (60-100), breathing, weight, height
 - o Normal body temp = 98.6F
- Head/neck exam
 - o HEENT – head, ears, eyes, nose, throat
 - Normal opening = 35-55mm
 - o Intraoral – evaluate for masses/lesions, focus on problem area last
 - o Radiographic exam
- Airway exam
- Systemic exam – cardiovascular and pulmonary

Assessment

- ASA PS
 - o 1 = normal healthy
 - o 2 = mild systemic/significant health risk factor
 - o 3 = severe systemic disease not incapacitating
 - o 4 = moribund, not expected to survive operation
 - o 5 = not expected to survive 24H even with treatment
- Caries active/inactive, which teeth
- Perio diagnosis
- Infections, etc (abscess, cellulitis, etc)

Plan

- Concisely state anesthesia plan and procedure
- Medical consults are okay for comprehensive assessment and to get lab info, but are NOT for seeking permission to treat; doctors know nothing of how dental procedures work
 - o Always document medical consults. Preferable to have a paper copy instead of verifying through phone call, but not always practical

Surgical Extractions

Increased Risk/Difficulty

- Long and thin roots, dilacerations, divergence, hypercementosis
- Reduced PDL – difficult luxation
- Endo treated – brittle, may be ankylosed
- Bruxism, dense/sclerotic bone, exostoses – hard to see where tooth ends, even surgically
- IAC, proximal teeth, maxillary sinus – don't increase extraction difficulty, but increase post op complications
- Acute infection – difficult anesthesia
- Patient medical history, behavior

Principles of Extractions

- Surgical diagnosis/rationale for extractions
 - o Unrestorable is NOT a diagnosis –include WHY (extensive caries, perio compromised, etc) – sometimes, a good rationale can replace a diagnosis
- Informed consent
- Patient management
- Proper technique – soft tissue and hard tissue management
 - o Soft tissue – release gingival cuff, release papilla (don't crush it when placing elevator)
 - o Expand alveolus – slow isometric evaluation, rupture PDL, loosen tooth
 - Elevation/expansion is the most important
 - o Extraction – forceps (type dependent on tooth location)
 - If not removable, go back and elevate or consider going surgical
- Post-op management

Extraction Procedure

- #9 periosteal elevator, sometimes place a flap
 - o Flaps provide access for/to – visualization, bone removal, sectioning, pathology
 - Envelop – with or w/o releasing incisions for greater apical access
 - Most common type of flap for extractions, usually full thickness (may be partial at times)
 - o Should be 4 teeth long, shorter if using a releasing incision (release should be AT LEAST 1 tooth away from extraction site)
 - o Broad based for blood supply
 - o Use #12 or #15 blade
- Elevate – 90° to tooth axis
 - o Turn so occlusal side of elevator twists towards the tooth to be extracted
 - o Turning other way is a common mistake – would elevate the proximal tooth
- Use forceps – beaks act as a wedge to expand the socket, apply apical pressure first to expand socket, then pull
 - o #150 – Mx
 - o #151 – Mn
 - o #23 (cowhorn) – Mn molars (beaks into furcation)
 - o #1 – Mx anteriors

- Elevating roots
 - o Exposure → elevation → delivery
 - o Can use regular dental elevators, luxators, or root tip picks
 - o Roots usually break obliquely, so elevate at most coronal portion
- Be aware of end requirement, try to limit bone removal (especially for FPD or implant cases)

Surgical Techniques

- Section the crown/roots
- Avoid excessive force
- Remove crown before extraction
- Use Kryers elevators (east/west elevators) – they are side specific

Sutures/Wound Healing

- Resorbable – gut/chromic, polyglycolic acid, polyglactin
- Non-resorbable – silk, nylon, polyester, polypropylene
- Angle the suture at 90° to full flap thickness so it doesn't tear through the flap
- Irrigate flaps – be cautious for foreign material, necrotic tissue, ischemia, wound tension, other patient factors

Impacted 3rd Molars

- Failure of eruption
 - o Inflammation/infection of contiguous soft tissues
 - o Damage to adjacent teeth
 - o Hygiene problems
 - o Destruction of bone
 - o Neoplastic or cystic lesion
 - o Asymptomatic sequelae
- Pathology
 - o Pericoronitis – most common indication for 3rd molar removal
 - Stage 1 – inflammation limited to pericoronal area
 - Removal of 3rd molar, excise operculum, irrigation and antibiotics
 - Stage 2 – extends to contiguous mucoperiosteum (trismus likely)
 - Removal of 3rd molar, excise operculum, irrigation and antibiotics
 - Stage 3 – inflammation extends into adjacent spaces/facial plane, stimulates systemic response
 - May need to be hospitalized, stage 3 rare for Mx 3rd molars
 - o Destruction of osseous tissues
 - o Damage to 2nd molars
 - o Involvement of cysts/tumors
 - o Dentition crowding
- Classification
 - o Angulation – relative to alveolus
 - Mesioangular
 - Distoangular
 - Vertical
- Removal of 3rd molars after 25y/o, higher chance of osseous pathology remaining after tooth extraction
- Cysts/tumors may have devastating impact before becoming symptomatic

- Treatments

- Observation – risk of removal outweighs benefits
 - Completely submerged in bone, asymptomatic, no existing pathology
 - Annual/biannual recall
- Removal
 - >25y/o = bigger inflammatory response, greater risk of nerve injury, increased trauma, prolonged recovery
 - Prefer to remove when roots 1/3 to 2/3 formed
 - Surgical removal less likely to cause IAN damage
 - Sectioning of crown/root less likely to perforate sinus/intrude into infratemporal fossa
 - Large follicles may indicate increased risk of pathology
- Factors to consider
 - Diagnosis
 - Difficulty in removal
 - Risks of procedure
 - Patient age
 - Systemic diseases
- Factors that increase Risk and Difficulty
 - Distoangular, vertical impactions
 - Distoangular angulation hardest to remove, but 3rd molars in function are harder
 - Long, thin roots
 - Want the roots to be between 1/3 – 2/3 formed, easier to remove
 - Very immature teeth are difficult to remove, may fracture or leave behind tooth bud
 - Dilacerations, divergent roots
 - Reduced PDL in older patients
 - Dense, sclerotic bone in older patients
 - 3rd molars in function cause dense bone, hardest to remove
 - Proximity to structures
 - IAC
 - If you can see both cortices, tooth is buccal or lingual to IAC
 - If there's a deflection in IAN, or loss of cortices, higher risk of nerve damage
 - 2nd molar
 - Mx sinus
 - Tooth displaced into infratemporal fossa, near coronoid, may limit opening
 - Acute infection
 - Large follicle indicates possible impending or present pathology

Hell and Gregory Classifications

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|------------------------|--|
| 1. Anterior to ramus | a. Occlusally in line with 2 nd molar |
| 2. Half in ramus | b. Above cervical |
| 3. Completely in ramus | c. Below cervical |

Principles of Surgery

- Develop diagnosis
 - o Collect accurate and relevant data
 - o Do not accept incomplete/poor data
- Develop differential diagnosis
 - o Differential diagnosis must be tested to determine which is most likely
 - History of present illness
 - Clinical exam
 - Radiographs
 - Adjunctive tests
 - o Always aspirate a lesion before resecting – check if it is vascular, never resect a vascular lesion

Basics Principles of Surgery

- Aseptic technique
- Tissue handling
- Tissue debridement
- Dead space management
- Hemostasis

Basic Necessities of Surgery

- Visibility – good lighting, adequate suction
- Tissue management
 - o Incision principles
 - Sharp blade
 - Continuous stroke perpendicular to epithelial surface
 - Anatomy – avoid vital structures
 - Wound margins made over healthy bone
 - o Flap Design
 - Narrower at base
 - Length should not exceed 2x width
 - Use axial blood supply
 - Handle tissue properly – eliminate excessive tension, extend envelop or use releasing incisions
 - Envelop or sulcular flaps should be 4 teeth long, or 3 teeth with a releasing flap
 - Releasing incisions should be 2mm into unattached mucosa
 - Use semilunar incisions for accessing apical region of a tooth

- Hemostasis – preserve O₂ carrying capacity, improve surgical field visibility, prevent hematomas
 - Decontaminate wound – remove foreign material and nonviable tissue
 - Management of dead space – area remains devoid of tissue after closure
 - Eliminate dead space to prevent hematoma – suture tissue planes, pressure dressing, or place drain
 - Drain can be removed when <30cc/24h fluid is draining
 - Promote hemostasis via pressure, thermal coagulation, ligation, or drugs
 - Ligation – suturing
 - Plain gut – lasts 7-10 days, resorbed within 70 days
 - Chromic gut – lasts 10-14 days, can be used in infective tissue
 - Vicryl – lasts 14 days, resorbed in 56-70 days, causes minimal inflammation
 - Silk – non-resorbable, lasts 1 year, resorbs after 2 years, causes major inflammation
 - Suture Size – 5-0 for oral cavity, 6-0 for skin, 2-0 for large flaps
 - Larger number = smaller diameter
 - Suture Technique
 - Chromic, Vicryl, and Silk require 3 throws
 - Nylon requires 5 throws
 - Interrupted stitch – good for long, linear incisions
 - Running stitch – removes some tension off wound, don't want to tie it too tight
 - Running locking stitch
- Aseptic technique

Post-Op Considerations

- Edema – inflammatory process, accumulation of fluid in interstitial space from lymphatic block
 - Amount of tissue damage
 - Quantity of CT in injured region

Basics of Wound Healing

- Cutaneous Healing
 - Phase I – inflammatory (0-5 days)
 - Erythema, pain, edema, heat, loss of function (SHaRP)
 - Don't work for at least 2 days post-op – don't increase BP, allow wound healing time
 - Absorption of plasma proteins and platelet aggregation
 - Clotting cascade activation
 - Cytokine release
 - Phase II – proliferative (3-18 days)
 - Neovascularization – proliferating capillaries
 - Differentiation, proliferation, activation of cells
 - FIKes – fibroblasts, immune cells (macrophages), keratinocytes, endothelial cells
 - Phase III – maturation (>21 days)
 - Remodeling of CT matrix – replace random orientation with parallel collagen fibers
 - Resists tensile forces, improves wound strength
 - Wound contracts via specialized fibroblasts
 - Wound strength never reaches pre-injury levels (at best, 80-85%)
 - Elastin is NOT replaced – tissue loses flexibility

- Primary Intention – clean incised wound, minimal scarring
- Secondary intention – separated wound edges, contamination, extensive tissue loss
 - o Greater inflammation and granulation tissue, healing is slow and can give large scarring
- Extraction Site Healing – by secondary intention
 - o Weeks 1-2 = inflammation, granulation tissue formation, osteoclast proliferation, cortical bone resorption, osteoid deposition initiation
 - o Weeks 3-4 = re-epithelialization completed, cortical bone still resorbing, mature bone replaces osteoid
 - Affected by – vascular supply, contamination, necrotic tissue, wound tension/mobility, systemics

Nerve Injury/Repair

- o Wallerian degeneration – nerve distal to injury degenerates, leaving empty sheath behind
 - Nerve proximal to injury degenerates to cell body, may regenerate may if sheath not damaged
- Seddon's classification
 - o Neurapraxia – no major damage, no wallerian degeneration, complete recovery in 4 weeks
 - Sunderland class I
 - o Axontomesis – damaged axon, wallerian degeneration, partial recovery in months
 - Sunderland class II, III, IV
 - o Nerotomesis – damaged axons and sheath, wallerian degeneration, poor/no recover in 3 months, if any
 - Sunderland class V
- Microneurosurgery Indications
 - o Observed nerve severance
 - o Total anesthesia
 - o Dysethesia
 - o Parasthesia without improvement in 3 months
- Nerve Repair
 - o Nerve begins to bud along nerve sheath (from cell body)
 - o Rate = 1mm/day
 - o If nerve pathway unobstructed, function may return
 - o If nerve pathway is obstructed, may for neuroma
 - Disorganized bundle of nerve tissue, can cause dysethesia (painful/unpleasant feeling)

Basic Preprosthetic Surgery

Ideal Edentulous Ridge

- Adequate width and height
- Attached mucosa under denture
- Adequate ridge relationships
- Ideal path of draw
- No undercuts/bony obstructions
- Adequate buccal and lingual sulci
- Absence of redundant tissue
- No obstructing frenums/scar tissue
- No displacing muscle attachments
- Adequate saliva

Surgical Preparations

- Removal of teeth/roots
- Removal of undercuts/interferences
 - o Alveoloplasty
 - Simple – usually at time of extractions or secondary after extractions and bone healing
 - Flap to access ridge, smooth surface, leave keratinized mucosa if possible
 - Intraseptal – in Mx anterior, removal of significant undercuts in lateral areas of Mx
 - Preserves alveolar height, MUST keep periosteal attachment for bloodflow
 - Radical – associated with BRONJ or excessive Mx height, keeps basilar bone
 - o Tuberosity reduction – soft or hard tissue
 - Use a PAN to determine if there is excessive hard or soft tissue
 -
- Removal of bony prominences
 - o Tori/exostosis removal
 - Indications – chronic irritation, inability to construct prosthesis, opposing undercuts, horizontal/vertical problems
 - Use LA to balloon surrounding tissue, raise a flap (easier after ballooning tissue)
 - Remove tori – surgical drill and fissure bur, osteotome and mallet, combination
 - Assure dry field, inspect bone and smooth before closing
 - For palate, use dual Y flapping, beware of greater palatine artery
 - Potential Complications
 - Hematoma, dehiscence into nasal cavity, damage greater palatine artery, soft tissue necrosis
 - o Pre-fabricate palatal split to apply pressure, prevent hematoma

- Soft tissue recontouring (all are suprapariosteal – do NOT touch the bone)
 - o Palatal papillary hyperplasia – from chronic denture irritation
 - Relief denture, provide oral antifungals
 - Large rotary bur, cryosurgery, laser ablation
 - Post-op splint/denture with liner is very helpful
 - o Epulis Fissuratum – heals by secondary intention
 - Helpful to have adjusted denture with soft lining for healing
 - o Vestibuloplasty – heals by secondary intention
 - Denture with extended flanges, blocks healing by primary intention
 - Cannot suture edges together, use an acrylic stent to help with tissue healing
 - o Frenum repositioning/removal
 - Z-plasty – length can be gained depending on degree of angles
 - o Keratinized tissue augmentation
 - Skin grafting
 - Alloplastic augmentation
- Jaw alignment (orthognathic surgery)
- Dental Implants – preprosthetic surgery in support of implant prosthetics

Basic Implant Surgery

- Team approach = surgical-prosthetic consult must be done prior to placing implants
 - o Adequate bone and soft tissue
 - o Number, type, location of implants
 - o Surgical sequence – immediate, one stage, two stage, etc
 - o Healing time
 - o Final prosthetic design

Clinical Assessment

- Assess patient CC and expectations
- Review all restorative options – risks and benefits
- Select option that meets functional and esthetic requirements

Patient Evaluation/Medical History

- There are no absolute contraindications for implant reconstruction
- Impact of systemic conditions on osseointegration
 - o IDDM, smoking, >60y/o, head/neck radiation, postmenopausal estrogen therapy, etc
 - Patients with well controlled IDDM over a long period still at increased risk
- Patient history (habits) – bruxism, etc

History of Implant Site – factors affecting hard/soft tissue

- Traumatic injuries
- Failed endo procedures
- Perio disease

Clinical Exam

- Occlusion
- Bone height, width
- Soft tissues – keratinized, frenal attachments, etc
- Dental disease – caries, perio
- Esthetic factors – smile line
 - o One of the most influencing factors in Mx anterior prosthetic restorations
 - o If no gingiva shows, soft tissue quality/quantity/contours are less important
 - o Patient counseling on treatment expectations is critical
- Interarch clearance
- Interdental space
 - o Pay attention to both coronal and interradicular spaces
- Other structures – position of Mx sinux, nasal floor, IAC
 - o Posterior Mn – implant length ≥ 10 mm, diameter as large as possible (better emergence profile, hygiene)

- Radiographic exam
 - o PA – 14% distortion
 - Acceptable for some regions, like #7
 - o PAN – 23% distortion
 - Good for IDing where IAC is comparative to implant placement location
 - o Site specific tomograms
 - o CAT scans/CBCT - 1.8% distortion
 - For CBCT – unique circumstances: cleft palate, after ablative surgery, significant trauma patient
 - Against CBCT – expensive, excess radiation, NOT standard of care, usually adds no additional info if thorough exam is done

Osseointegration

- Histological definition – direct connection between living bone and load bearing endosseous implants at the light microscopic level
- >90% success rate
- 4 influencing factors
 - o Biocompatible material
 - o Implanted adapted to prepared site
 - o Atraumatic surgery
 - Kind and gentle technique
 - Slow drill speeds
 - Irrigation
 - o Undisturbed healing process
 - Provide chlorhexidine rinse, analgesics, \pm antibiotics
 - Peridex before surgical procedure and after placement for several days is useful

Implant Sequencing

- If preparation needed
 - o Soft tissues taken care of first
 - o Bone augmentation/ridge modification
 - o Placement of implants – usually 4-5 months after hard tissue procedures
 - Implant site commonly prepared with sequentially enlarging drills until desired size achieved
- Immediate implant – placed at time of extraction, usually for single rooted teeth
- One Stage – implant and healing abutment placed at same time
- Two Stage – primary closure obtained at time of first surgery, then uncovered and healing abutment placed after osseointegration

Expansion Techniques – Summer's Osteotomes

- Ridge expansion technique – requires 3-4mm of alveolar ridge width (2-3mm bone surrounding implant is ideal)
 - o 1.6mm pilot hole
 - o Sequenced tapered osteotomes – ridge expansion/displacement instead of bone removal
 - o Final drill coincident with final implant size (sometimes not needed)
- Sinus floor elevation – 8-9mm alveolar bone height needed to place a 13mm implant
 - o Drill 1.6mm pilot hole
 - o Summer's osteotome #1-4
 - Sinus floor microfractured superiorly
 - Floor elevated 4-5mm
 - May backfill with bone allograft/alloplast
 - o Final drill coincident with final implant size

Stage II Surgical Pre-Operative Considerations

- Usually 3-6 months after Stage I
- Usually done under LA
- Amount of keratinized tissue dictates technique
 - o Lots of keratinized tissue – may use tissue punch or laser
 - o Sparse keratinized tissue – use flap technique
- Take a radiograph to ensure complete abutment seating – possible tissue impingement causing open margin

Post-Op Care

Prevention

- Pre-operative assessment
- Treatment planning – allows anticipation of complications, altering procedures to minimize them
- Operator skill level
- Thorough medical/surgical/family history, allergies, medications
- Radiographs – recent and diagnostic
- Surgical and patient management plan
- Thorough informed consent/patient expectations
- Basic surgical principles – exposure, bone removal, sectioning, finesse, asepsis, careful tissue handling, hemostasis, wound irrigation
- Clear post-op instructions – oral and written provided both pre and post-operatively
- After hours contact info

Normal Post-Operative Course

- Mild bleeding/oozing
 - o Gauze stained pink – change gauze every 20-30min (frequent changing disturbs clot)
 - o Minimal blood in saliva – lots of saliva with little blood looks like lots of blood
- Pain commensurate with procedure and patient factors (very individually variable)
 - o Usually 2-4 days of pain meds for dentoalveolar procedures
 - o NSAIDs (help with edema), steroid if really needed – prescription anti-inflammatory may help with pain
- Edema commensurate with procedure
- Mild bruising – old ladies and young girls bruise more
- Poor technique and patient factors may alter post-op course – recognition of problem is vital
 - o Poor tissue handling
 - o Immunocompromised
 - o Coagulation disorders – if concerned about coumadin patient, see them 24h post-op
 - o Anxiety
- Sometimes, problems occur regardless of best technique and factors, but most problems come from poor assessment and overlooking details
- Patient management – communication of injury and after care (do not hide), follow up re-evaluation of healing

Soft Tissue Injuries

- o Usually result of “tunnel vision” (surgical inattention)
- Mucoperiosteal flap tearing – inadequate envelop flap size and excessive retractor force
 - o Prevention – proper flap design, proper releasing incision placement
 - o Treatment – hemostasis, irrigation, primary closure [if possible]
- Puncture wounds – uncontrolled/excessive force, instrument slippage (elevator), no finger rest
 - o Treatment – hemostasis, irrigation, delayed healing [by secondary intention]
- Stretch/bur abrasions – improperly placed bur guard, bur too long, hand piece too hot (lip/cheek burn)
 - o Treatment – primary closure [if possible], home care: keep clean and moist with petroleum or antibiotic gel for 5-10 days while healing by secondary intention
- Lips – if damage goes beyond vermillion, will scar
- Tongue, floor of mouth

Complications of Tooth Extractions

- Non-retrievable root
 - Long, curved, divergent roots
 - Dense bone
 - Poor visualization
 - Uninfected root tips (<2-3mm) can be left in bone with minimal complications
 - Root tip near structure that may be damaged
 - No periapical pathology
 - Risks outweigh benefits of removal
 - Destructive surgical removal
 - Inform patient
- Root Displacement
 - Soft tissues
 - Fascial spaces (including submandibular space)
 - Chest (aspiration)
 - GI tract (swallowing)
 - Mx sinus – radiographically document, attempt suction with irrigation
 - Take sinus precautions
 - Decongestants
 - Antibiotics
 - Refer to OMFS for removal – Caldwell-Luc (lateral anstromy) access
 - Lateral opening is less likely to form a fistula than an intraoral opening
 - Adjacent bone/cancellous
 - IAC – verify radiographically
 - If fragment can be visualized, carefully remove bone, then remove fragment
 - Requires good lighting and suction
 - If not visualized, consider secondary removal later
 - Consider leaving behind (uninfected root tip protocol)

Oroantral Communications

- Try to close immediately (best change at closure)
- MUST advance flaps and get primary closure
- Antibiotics, decongestants
- Sinus precautions – no nose blowing, spitting, or smoking. Sneeze with mouth open
- Recovery
 - Requires disease free sinus
 - Primary closure – coverage with vascularized tissue
 - Tension free closure
 - Non-smoking patient
 - Compliant patient following sinus precautions

Damage to Adjacent Teeth

- Recognize large restorations on proximal teeth – warn patient
 - Do not elevate against these teeth
 - Consider sectioning instead of elevating – avoid elevator completely if possible
- Always use a throat screen when extracting teeth – blocks swallowing/aspirating

Extraction of Wrong Teeth

- Easy mistake
- Verify the treatment plan
- Count teeth – beware in the mixed dentition
- Verify tooth with assistant AND patient
- Have RECENT radiographs mounted, and viewed/interpreted correctly
- Be wary of duplicate radiographs (may have been duplicated backwards!)

Osseous Injury

- Alveolar process/buccal plate fracture
 - o Be patient – need to expand bone without excessive force
 - o Surgical removal of teeth
- Maxillary tuberosity fracture
 - o Use careful elevation
 - o Be aware of the lone standing terminal molar – it's VERY strongly anchored to bone
 - o Attempt to maintain tuberosity placement if still attached to periosteum
 - If soft tissue tears into/from soft palate, recovery is very painful during healing process

Nerve Injury

- Document, use objective testing, if doesn't begin to heal within a few weeks, refer to surgery for repair
- Mn nerve (CN V₃) – inferior alveolar, lingual, mental
 - o Typically more at risk of injury during Mn 3rd molar extraction (as opposed to other teeth)
 - o IAN is polyfascicular – >10 nerve fascicles in the nerve fiber
- Seddon's and Sunderland's nerve injury classification
 - o Lingual nerve injury – surgery within 1-3 months
 - o IAN injury – surgery within 3-6 months

Clinical Evaluation

- Objective testing
 - o Level A – static 2point discrimination, brush stroke directional discrimination
 - Normal Level A = normal, abnormal = proceed to level B
 - o Level B – contact detection
 - Normal level B = mild abnormality, abnormal = proceed to level C
 - o Level C – pinprick nociception, thermal discrimination
- Bleeding
 - o Could be intraoperative or postoperative
 - o Check patient hemostasis before discharge
 - o Consider – systemic factors, pharmacologic factors
 - o First line – pressure, then more pressure
 - Mechanical hemostatic agents – gauze, surgical foam, etc
 - Suturing
 - Physiologic hemostatic agents – collagen (activates coagulation), tannic acid (in black tea)
 - Electrocautery

Post-Operative

- Infection – rare in healthy patients with no pre-operative infection
 - o Pre-operative antibiotic prophylaxis NOT standard of care
 - o Many times will need to be drained
 - o Usually late complication – unlikely within 72hours post-op
 - Subperiosteal abscess common after 3-4 weeks (especially after flap reflection for Mn 3rd molar)
- Edema/Ecchymosis/Trismus
 - o Minimize edema with NSAIDs, head elevation, ice during first 24h
 - o May worsen up to 3 days post-op
 - o Sometimes expected (not necessarily a complication)
- Analgesia
 - o NSAIDs – acetaminophen for those who can't take NSAIDs
 - o Opioid analgesics if surgical or prolonged procedure
- Instructions
 - o Soft diet for 1-4 days, advance as tolerated
 - o Cool foods until sensation returns
 - o Straws ARE okay in most instances (contrary to popular belief) unless there is an oral-antral (OA) hole
- Hygiene
 - o Soft bristle toothbrush
 - o Routine to resume postop day 1, but avoid direct contact with surgical area
 - o Warm salt water rinses after meals, irrigate area if possible
- After Hours Contact – if you do surgical procedures, you MUST:
 - o Know how to handle complications
 - o Be prepared to handle after hours:
 - Does NOT mean telling patient to go to ER unless life threatening
 - Does NOT mean telling patient to call someone else
 - Okay to ask for help if you need it AFTER evaluating patient

Biopsy Principles

Indications

- Lesion persists for >2weeks with no apparent etiologic basis
- Inflammatory lesion that does not respond to treatment after 10-14 days, including irritant removal
- Persistent hyperkeratotic changes on surface tissue
- Any persistent tumescence, either visible or beneath relatively normal tissue
- Inflammatory changes of unknown cause persisting for long periods of time
- Lesions that interfere with local function
- Bone lesions not specifically IDed by clinical and/or radiographic findings
- Any lesion with characteristics of malignancy

Biopsy

- Removal of normal tissue from living being for diagnostic testing
 - o Cytology – examination of individual cells, unreliable
 - o Aspiration – syringe/needle sample removal of tissue/fluid for histologic/chemical/microbiologic analysis
 - Accuracy = 84-97%
 - Sensitivity = 54-95%
 - Specificity = 86-100%
 - Efficacy well established, safe, well tolerated, first line for all parotid gland lesions
 - Nature of aspirate gives info on lesion
 - All bony lesions should be aspirated to ensure they're not vascular before incisions are made
 - Used primarily for deep lesions or bone lesions
- o Incisional – sample only representative of lesion, some may require many samples
 - Good if suspect lesion is malignant – leaves behind borders/margins for easy ID and removal if lesion is malignant
 - Need to incise into basement membrane for reference, or cannot be properly diagnosed
- o Excisional – removal of entire lesion with cuff of normal tissue
 - Sometimes may constitute definitive treatment
 - Prefer for benign lesions, ≥ 1 cm diameter
 - Need 5mm cuff of normal tissue all around lesion

Suspicion of Malignancy

- o Cancer can be asymptomatic for years
- Erythroplakia – lesion totally red or speckled red/white spots
- Ulceration – lesion ulcerated or presents as an ulcer
- Duration – has persisted more than 2 weeks
- Induration – lesion and surrounding tissue firm to touch
- Fixation – lesion feels attached to adjacent structures

Soft Tissue Biopsy

- Every dentist should be competent in this
- Simple, painless if done properly
- Entire oral mucosa amenable to biopsy
- Anesthesia
 - LA block preferred – infiltration may distort specimen
 - Use a field infiltration technique if block not possible, but demarcate lesion first
- Tissue stabilization – biopsies often on mobile tissues, which need to be stabilized for accurate incisions
 - Finger stabilization
 - Retraction sutures
 - Towel clips
 - Chalazion retractors
- Hemostasis
 - Gauze used to maintain clean surgical field
 - Suction only for significant hemorrhaging – may lose specimen in suction
- Tissue handling
 - Any and all tissue removed should be sent to pathologist
 - Should be undamaged – crushed/macerated tissue may be undiagnostic
 - Forceps should not be reapplied to specimen; applied once only is best
- ID of margins
 - When suspecting malignancy, margin of specimen should be marked with a suture – orient specimen for pathologist
 - Pathologist can determine if further margin control is needed
 - Lesion orientation must be diagramed in pathology data sheet
- Specimen Care
 - Immediately placed in 10% formalin solution
 - Tissue must be completely submersed in solution
- Surgical Closure
 - Primary closure of elliptic wound is preferred
 - Each anatomic layer must be approximated
 - Periosteum, muscle, mucosa
 - Mucosa is undermined by placing scissors into submucosal layer and spreading scissor tips
 - Should be done along all wound edges
 - Mucosa now free to be mobilized for a tension free primary closure
 - Attached mucosa can be allowed to heal secondarily
 - Periodontal packs or surgical stents can be used as a dressing

Pathology Request Form

- Radiographs may be useful – consider submitted in report
- Pathologist will return report to you
- If reported diagnosis differs from clinical findings, investigate further
- The patient is YOURS, not the pathologist
 - o Submitting doctor's responsibility to give final diagnosis, inform patient in timely manner, arrange proper follow ups (surgery, observation, consults, etc)
- Inform patient there is a separate bill submitted to the pathologist
 - o Short statement explaining fees you should give patient outlining pathologist's fees
 - o Review request form, demonstrate how to submit to pathologist

Oral Pathologists

- Specialists in reviewing head/neck specimens
- General pathologists may have limited experience in oral specimens
- It is dentist's responsibility to submit to the correct lab

Basic Surgical Management of Pathology

Intrabony Lesions of the Jaws

Treatment Options

- Enucleation with or without curettage
 - o Scoop out bony lesion
 - o Curettage – scraping walls of bony cyst to ensure complete removal of cyst lining
- Enucleation with peripheral ostectomy
 - o Peripheral ostectomy – removing bone from lesion periphery – may be accomplished with rotary instruments, chisels, curettes, etc
- Marsupialization with or without enucleation
 - o Opening lesion, keeping it open to allow the lesion to decompress
 - May be used to totally eradicate lesion, or to shrink lesion to allow for less aggressive removal
 - May be used when cyst removal may lead to pathological fracture of the jaw, or if MHx does not allow for a complex procedure – less invasive, relieves fluid pressure, allows area to be filled in by healing tissue before full removal
- Resection: marginal, partial, complete
 - o Marginal – removing a part of the Mn, but preserving continuity of the bone
 - o Segmental – removing part of the Mn and disrupting continuity of the bone
- Medical non-surgical management

Unilocular Radiolucencies

- Dentigerous cyst
 - o Asymptomatic, associated with crown of an unerupted tooth (usually 3rd molar)
 - o Usually ages 10-30y/o, but not reliable
 - o Histology – 2-4 cuboidal cell epithelial lining
 - o Treatment – enucleate and remove offending tooth, marsupialization if lesion is large
- Keratinizing Odontogenic Tumor (may appear multilocular)
 - o Usually 30-40y/o, Caucasian/male predilection
 - o Usually posterior Mn
 - o Histology – parakeratinized epithelium, 6-8 cells thick, palisading basal layer, lack of rete ridges
 - o Recurrence – satellite cysts, parakeratin
 - o Treatment
 - Enucleation with peripheral ostectomy with or without Carnoy's solution
 - Carnoy's solution – fixative of residual cyst/epithelial rests, decreases recurrence
 - Marsupialization
 - Bony perforations require excision of adjacent soft tissue layers
 - Teeth extractions may be necessary
 - Cryotherapy – up to 1cm depth penetration, destroys lining cells, leaves inorganic bone matrix (40% reduction in bone strength)
 - Laser Nd-YAG – risk of permanent nerve damage

- Consider Nevoid Basal Cell Syndrome (Gorlin's syndrome)
 - Autosomal dominant – variable penetration and expressivity
 - Multiple KOTs, basal cell carcinoma, developmental abnormalities of skeletal bifid rib, dyskeratosis (palmar/plantar pitting)
 - KOTs are often multifocal, undergo continuous development and recurrences (daughter cysts, satellite lesions)
- Ameloblastoma (may appear multilocular)
- Traumatic bone cavity (scalloped appearance)

Multilocular Radiolucencies in the Posterior Mn

- Ameloblastoma
 - 95% Mn, 5% Mx
 - 30-40y/o patients, predilection for anterior Mx, Mn
 - Follicular, plexiform, acanthomatous, granular cell, basal cell, desmoplastic
 - Treatment – all ameloblastomas are treated the same clinically, resection with 1cm margins
 - 14% recurrence
 - Enucleation/curettage = 55-90% recurrence
 - Variants (rare)
 - Peripheral – from soft tissue
 - 60% Mn, 40% Mx tuberosity
 - 40-50y/o
 - Local excision (including periosteum) – 19% recurrence
 - Malignant
 - Mn, most metastases are intrapleural
 - 30-40y/o
 - Wide resection with radiation (usually fatal)
- OKC (especially when large)
- Myxoma
 - Rare
 - Spindle, stellate cells in loose mucinous and fibrillar matrix
 - Tumor replaces cancellous bone, infiltrates
 - Treatment – resection with 1.0-1.5cm margins, high recurrence of 10-30%
- Central giant cell lesions
 - 75% before 30y/o, female predilection
 - Anterior Mn to first molar, may cross midline
 - Aggressive vs nonaggressive
 - Larger in presentation, painful, rapid growth, root resorption, cortical perforation, younger patients, higher recurrence (75% vs 11% nonaggressive form)
 - Very few, minor histological differences

- Other lesions with giant cells
 - Brown tumor (hyperparathyroidism)
 - Primary – gland problem, increased Ca^{++} , decreased phosphates in serum
 - Secondary – kidney problem, decreased Ca^{++} , increased phosphates in serum
 - Cherubism – autosomal dominant, bilateral, Mx involvement
 - Aneurysmal bone cyst – rare, posterior Mn, large blood filled sacks with areas resembling CGCG
- Treatment – curettage with or without peripheral ostectomy, resection for aggressive forms
 - Steroid injections to shrink lesions
 - Interferon and calcitonin treatments
 - Check calcium levels normal ionized = 4.5-5.6mg/dL, in plasma = 9-10.5mg/dL
- Calcifying epithelial odontogenic tumors (pindborg tumors)
 - Uncommon
 - Most often 30-50y/o
 - Posterior Mn, frequently has calcifications, often associated with impacted tooth
 - Histology – polyhedral epithelial cells in a fibrous stroma; Liesegang ring calcifications in hyaline material
 - Treatment – marginal resection, usually recurs if curettage only
- Vascular lesions: hemangioma, AV malformation
 - Central hemangioma
 - Usually 10-20y/o, female predilection
 - 2x more common in Mn than Mx
 - Can be asymptomatic, but usually causes swelling and pain
 - Bruit, thrill
 - Most are multilocular, but may be unilocular, have sunburst and honeycombed appearance
 - Treatment – embolization or sclerosing agent with enucleation/resection within 48h
 - High flow = have atriovenous connection, can be pulsatile, can palpate or hear with a stethoscope
 - Low flow = has venous-venous (or just capillary) connection
- Multiple myeloma – malignancy of plasma cells
 - Relatively rare, 2x more common in males, median age 70y/o, 2x more often in African Americans
 - Typically
 - Multicentric – multiple bones at same time
 - Monoclonal – single malignant cell producing one immunoglobulin component, usually M-protein by SPEP/UPEP
 - Bence-Jones protein – Ig light chain products
 - Symptoms = bone pain, anemia, thrombocytopenia, neutropenia, renal failure, amyloidosis, “punched out lesions”, 30% in Mn
- Metastatic cancer

Radiolucent Lesions in Kids (<12y/o)

- Dentigerous cyst
- OKC
- Myxoma
- Central giant cell lesion
- Ameloblastic fibroma
 - o Usually diagnosed in those under 20y/o, slight predilection for males, mostly posterior Mn
 - o Unilocular or multilocular, 50% associated with unerupted tooth
 - o Histology – cell rich mesenchymal tissue with ameloblastic epithelium as chords or islands – no microcysts
 - o Treatment – enucleation with curettage
- Ameloblastic /fibro-odontoma
 - o Ages 8-11, anterior Mx, posterior Mn
 - o Radiolucent lesion with central radiopaque areas
 - o Histology – epithelial connective component resembling ameloblastic fibroma with a mineralized component similar to complex odontoma
 - o Treatment – conservative, enucleation and thorough curettage (similar to ameloblastic fibroma)
- Cherubism
 - o Hereditary, onset in children, multiple quadrants (bilateral)
 - o Normal bone replaced by CGCG in kids/young adults, then replaced by fibrous tissue >20y/o
 - o Aplasia/ectopic impacted teeth
 - o Grading:
 - 1° – bilateral lower molar region up to coronoid process
 - 2° – 1° including tuberosities
 - 3° – extensive Mx and Mn involvement
 - o Treatment – biopsies to confirm, removal of ectopically erupted teeth, cosmetic recontouring
 - Lesion is self-limiting, doesn't need to be removed. Management is of impacted teeth and asymmetries/malformations
- Adenomatoid odontogenic tumor
 - o Rare, 10-20y/o, 2/3 female predilection
 - o Painless swelling, anterior Mx, often associated with unerupted tooth (looks like dentigerous cyst)
 - o Unilocular, foci with calcifications
 - o Histology – columnar/cuboidal epithelium forming tubular structures; nuclei polarized away from lumen, foci of calcifications, has a well-defined capsule
 - o Treatment – enucleation without recurrence

Fibrous Lesions

- Ossifying fibroma
 - o Uncommon in juveniles, but if discovered has 50% recurrence in kids/adolescents
 - o Usually 20-50y/o, female predilection, usually in Mn
 - o Well demarcated, uni or multilocular
 - o Treatment – enucleation as one (or several) pieces, usually does not recur

- Odontoma
 - o Hamartoma – overgrowth of mature normal cells and tissues in area where tissue normally found
 - o Usually <20y/o, predilection for Mx
 - o Compound = looks like teeth
 - o Complex = looks really messy
 - o Frequently are unerupted teeth
 - o Treatment = local excision
- Fibrous dysplasia
 - o Ground-glass appearance, indistinct borders (confluent with surrounding bone)
 - o Usually in kids/young adults, predilection for Mx
 - o Albright's syndrome – polyostotic, café au lait spots, precocious puberty
 - o Histology – irregular woven bony trabeculae (looks like Chinese characters) in connective tissue
 - o Treatment – recontour with skeletal maturity, regrowth/residual deformity = 68%
 - Osteotomies or resect/reconstruct
- Osteoma
 - o Young adults
 - o Benign tumors of mature compact or cancellous bone
 - o Gardner syndrome
 - Autosomal dominant, familial colorectal polyps
 - Multiple osteomas – often in Mn angles, noted during puberty BEFORE colorectal polyps
 - Major signs – bony exostoses and colorectal polyps
 - Epidermoid cysts, fibromas
 - Treatment – prophylactic colectomy, removal of osteomas for cosmetics

Gingival Lesions

- Peripheral giant cell lesion
- Peripheral ossifying fibroma
- Pyogenic granuloma
- Peripheral ameloblastoma
- Squamous cell carcinoma

Salivary Gland Lesions

- Diverse histopathology
- Relatively uncommon
 - o 2% of head/neck neoplasms, occurs in 1:100,000, 60% female, 40% male
- Distribution in major glands (smaller gland = higher chance it is malignant)
 - o Parotid – 80%, benign = 80%, malignant = 20%
 - o Submandibular – 15%, benign = 50%, malignant = 50%
 - o Sublingual – 5%, benign = 40%, malignant = 60%
- Mucous escape phenomenon
 - o Mucocele – more prevalent in minor salivary glands (most common in lower lip)
 - Removal of offending salivary gland, and surrounding ones
 - o Pseudocyst – no epithelial lining
 - o Plunging ranula – through the mylohyoid muscle
 - Removal of cyst and associated sublingual salivary gland tissue

- Sialolithiasis
 - Treatment depends on symptom severity, duration, location, and avoiding injury to the gland
 - Sialolithotomy – anterior stones
 - Submandibular gland removal – when stone is intraparenchymal or in proximal duct
 - Lithotripsy, endoscopic surgery options
- Pleomorphic adenoma
 - Most common
 - 70% of parotid gland tumors
 - 50% of submandibular tumors
 - 40-60y/o, female predilection 3x that of males
 - Myoepithelial cells of the ITC
 - Slow growing (1-5mm/y)
 - Gross pathology – smooth, demarcated, solid, myxoid stroma
 - Histology – myoepithelial, no true capsule, tumor pseudopods
 - Treatment – surgical excision with a rim of normal tissue
 - Parotidectomy/facial nerve preservation
 - Submandibular gland excision
 - Avoid enucleation and tumor spills
 - Recurrences are rare (5%), usually multifocal
 - Malignant degeneration – carcinoma ex pleomorphic adenoma
 - 1.5% fatal in 5 years
 - 10% fatal in 15 years
 - Universally fatal

Odontogenic Infections

Maxillofacial Infections

- Majority of maxillofacial infections in healthy adults are odontogenic in nature
- Most are minor and, if recognized early, easily treated and successful
 - o Some can become life threatening
- Understanding microflora characteristics and pathophysiology of the disease and the host is crucial to proper treatment

Signs of infection

- Same as for classic inflammation – ShaRP
- Progression of infections
 - o Host nidus
 - o Microflora (gram +^{ve} and –^{ve})
 - o Cellulitis can become abscessed (aerobic to anaerobic)
 - o Spread to adjacent areas (through the fascial planes)

Etiology from Non-odontogenic sources

- Necrotic bone (ORN, BRONJ, etc)
- Post-op
- Sinus-infection
- Insect/animal bites
- Folliculitis
- Foreign bodies
- Fungal infections
- Superinfection from systemic infectious diseases (TB, syphilis, etc)

Microbiology

- Polymicrobial
- Mixed aerobic/anaerobic
- Aerobic (cellulitis) – 25% of odontogenic infections
- Anaerobic (abscess) – 75% of odontogenic infections

Progression

- Aerobic to anaerobic status
- Gram +^{ve} organisms transition to gram –^{ve}
- Cellulitis to abscess
- Formation of pus
 - o Fever higher than 101.5F is VERY bad
- Role of muscle attachments in pain and spread
- Spread through the path of least resistance (fascial planes, thin bone layers, etc)
 - o Infections are tooth specific, so consider thickness of bone by the apex and the relationships of perforations between the bone and muscle attachments
 - Fascial spaces – potential spaces, bounded by muscle attachments and bone, can spread to secondary neck spaces

- Basic Spaces
 - Vestibular, buccal, palatal, sublingual, submandibular, maxillary, canine, submental spaces
- Secondary Spaces
 - Pterygomandibular – from submandibular, between medial surface of Mn and lateral surface of medial pterygoid
 - Masseteric – from buccal, between lateral Mn and masseter
 - Superficial and Deep temporal
 - Masticator – from all of the above spaces, causes trismus
- Cervical Fascial Spaces
 - Lateral pharyngeal – between medial pterygoid and superior constrictor, deviated uvula
 - Retropharyngeal – posterior to superior constrictor, airway obstruction and spread to the mediastinum
 - Prevertebral – thorax and mediastinum

Cellulitis vs Abscess

| Characteristic | Cellulitis | Abscess |
|-------------------------|---------------------|--------------------|
| - Duration | Acute | Chronic |
| - Pain | Severe/generalized | Localized |
| - Size | Large | Small |
| - Localization | Diffuse | Well circumscribed |
| - Palpation | Doughy to indurated | Fluctuant |
| - Pus | No | Yes |
| - Degree of seriousness | Greater | Less |
| - Bacteria | Aerobic | Anaerobic |

Assessment

| | |
|---|--|
| <ul style="list-style-type: none"> - History - Onset/duration/rapidity - Previous treatment - Medically compromised | <ul style="list-style-type: none"> - Physical exam - Vital signs – temperature, heart rate, BP, etc - Abscess vs cellulitis - Radiographs - Labs – CBC, CRP |
|---|--|

Treatment of Odontogenic Infections

- Removal of source – endo, extraction, etc
- Incision and drainage
 - To establish drainage for purulent material
 - Incision point at height of swelling, subperiosteal dissection to access bone, copious irrigation
 - May consider an antibiotic flush
 - Drain placement – keeps wound from closing, prevents reaccumulation of pus
 - Changes anaerobic nature of environment
- Antibiotics (in some cases)
- Re-evaluation
 - Should be done within 24h of I&D, should be until certain of treatment outcome

Antibiotics

| Indications | Contraindications |
|---|---|
| <ul style="list-style-type: none"> - Rapidly progressing swelling - Diffuse swelling - Compromised host defense - Involvement of fascial spaces - Severe periocoronitis - Osteomyelitis | <ul style="list-style-type: none"> - Chronic well-localized abscess - Minor vestibular abscess - Dry socket (localized alveolar osteitis) - Mild periocoronitis |

- Considerations
 - o Usually bactericidal
 - o Therapeutic doseing
 - o IV vs oral
 - o Compliance/course completion
- Effective Oral Antibiotics
 - o Penicillin – drug of choice if not allergic
 - o Clindamycin – not bacteriocidal, good for persistent infections
 - o Cephalosporins – good for skin infections, but not for dentoalveolar infections
 - o Amoxicillin/clavulonic acid
 - o Metronidazole
- Compromised Host Defenses
 - Uncontrolled metabolic conditions
 - End stage renal, uremia, ^OH abuse, malnutrition, poorly controlled diabetes
 - Suppressing diseases
 - Leukemia, lymphoma, malignant tumors, HIV
 - Suppressing Drugs
 - Cancer chemotherapy, immunosuppressive drugs
 - o Should culture all immunosuppressed patients, or patients who are not recovering, as an uncommon [bacterial] infection could be present
 - Indications for culture and antibiotic sensitivity testing
 - Rapidly spreading infections
 - Non-responsive infections
 - Recurrent infections
 - Compromised host defenses
 - Osteomyelitis
 - Suspected actinomycosis infection

Reasons for Treatment Failure

- Inadequate surgery, depressed host defenses, foreign body
- Antibiotic selection – non-compliance, drug doesn't reach site, low dosage, wrong bacterial diagnosis, wrong antibiotic

Specialist Referral Criteria

- Rapidly progressive infection, difficulty breathing/swallowing, deep fascial plane involvement
- Fever >101F, severe trismus, toxic appearance, compromised host defense

Medical/Legal Considerations

Why It Matters

- Risk of being sued is comparatively high
- Risk can be significantly reduced by specific behavior practices
- Losses can be overwhelming – economic and reputation damages
- OMS procedures are most likely to generate lawsuits
- Informed consent and record keeping are obligatory for state dental licensure (complaints to board of dentistry)

Common OMS Lawsuits

- Highest number and risk of lawsuits
 - o Wrongful extraction
 - o Permanent numbness/paresthesia to tongue or lip (lip is more common)
 - o Infections
 - o Displacement of tooth/tooth fragments
- Surgical removal of teeth
 - o Paresthesia/anesthesia
 - o Mandibular fracture
 - o Wrongful extraction
 - o Infections
- Implants
 - o Inability to restore, or implant failure
 - o Paresthesia/anesthesia
 - o Failure to offer implants as a treatment alternative
- Failure to Diagnose
 - o Malignant vs benign lesions
- Infections
 - o Sepsis
 - o Osteomyelitis
 - o Infections following procedure
 - o Brain abscess
- Endodontics
 - o Surgical access for apical procedures
 - o Paresthesia associated with endodontic treatment
 - Over instrumentation
 - Use of filling materials
 - o Bacterial endocarditis

Documentation

- Review of MHx questionnaire, verbal MHx review, changes in medical health/medications
- Planned procedures, risks, complications
- Potential adjunctive procedures, costs
- Post-op expectations, complications
- Anxiety and pain control – NO₂, moderate sedation, general anesthesia

What Attorney's Look For

- Charting – most important medicolegal document, should document all risks/benefits/alternatives
- Reasonable medical certainty that standard of care was broken
 - o Expectation that care is delivered to standard of a reasonable and prudent practitioner
 - o No true regional/local standards
 - o Held to standard of a specialist
- Informed consent (secondary to standard of care)
 - o Before starting any procedure, patient must be informed of procedure, expected outcomes, risks associated (and incidence of occurrence), alternative procedures, and expectations of no treatment
 - o Written, oral (officer personnel discussions, direct consult between patient and doctor), videotapes
 - Barriers – making patient fearful, time consuming, patient thinking you are asking for them to sign a waiver or release
 - o Is not always necessary – emergencies when patient is unable to consent, when patient declines (must be documented), and for therapeutic privilege situations
 - o Protects clinician as it provides some documentation that proves to some degree that some interaction took place where potential risks were presented to the patient, and patient acknowledged risks and agreed to be treated
- Risk reduction
 - o Do not make promises of results
 - o Do not neglect informed consent
 - o Do not perform procedures you don't routinely perform – refer when appropriate
 - o Do not criticize other clinician's work
 - o Keep good documentation and notes
 - List alternatives to recommended treatments, option of no treatment, and any increased risks
- Patient abandonment
 - o Usually linked to non-compliance
 - o Patient must be informed of consequences
 - o Sending letter via certified mail or registered mail with a return receipt for documentation

Practice Tips

- Communicate with the patient – good rapport is the MOST important part of a doctor/patient relationship
- Document, in as much detail as possible, patient's informed consent decisions
- Have the patient sign the waiver form, have a witness present
- Do your own consent consultation rather than delegating the task
- Informed consent is a method of helping the patient, not just a legal document
- Use common terms for easier communication
- Be forthright without causing undue patient concern
- Fill discuss risks, benefits, alternatives with patient rather than relying on the form
- Know your state's statutes and regulations regarding informed consent

Summary

- Although likelihood of getting sued is small, one should be prepared
- Preparation consists of excellent records, informed consent, and patient care
- Always notify your malpractice insurance carrier if risk of lawsuit is even remotely apparent

Dentoalveolar Trauma

Injuries

- Occur frequently
 - o Falls
 - o MVCs
 - o Sports injuries
 - o Altercations
 - o Child abuse
 - o Playground accidents
- Occur in association with other injuries
 - o Soft tissue injuries, etc
 - o Maxillofacial injuries, head injuries, etc

Management

- History – who, when, where, how (associated injuries, loss of consciousness?)
 - o Medical history
- Clinical exam
 - o Head/neck exam
 - Facial/mandibular asymmetries
 - Contusions, abrasions, lacerations – location/near anatomic structures, depth, contamination
 - o Pain on palpation
 - o Cranial nerve damage – VII, V_{1,2,3}
- Oral Exam
 - o Hematomas, lacerations, gingival tears
 - o Occlusion, individual teeth, fractures, mobility
 - If mobility present – defined by individual tooth, segment of teeth, or jaw fracture
 - o Pain on percussion
- Radiographic examination
 - o PAs and occlusal films
 - Crown fracture depth, root fractures (requires 2-3 angles), alveolar fracture, tooth displacement
 - o Panoramic radiography
 - Evaluation of mandibular and alveolar fractures
 - o Soft tissue radiographs – requires kVp adjustment
 - Tooth fragments in soft tissues
 - o CT Scan
 - Evaluate for mandibular and midface fractures
 - Rule out cranial injury

- Classification/diagnosis
 - Root fractures
 - Apical – best prognosis, reduce and rigidly splint 3 months
 - Vertical root fracture – unrestorable
 - Concussion – injury to supporting structures without displacement or tooth mobility
 - Sign = blood in sulcus
 - Symptom = tooth sensitive to percussion and palpation
 - Subluxation – injury to tooth supporting structures resulting in slight mobility of tooth
 - No displacement noted
 - Luxation – tooth displacement
 - Intrusion – worst prognosis, extensive injury to PDL and pulpal tissues
 - Antibiotic prophylaxis
 - Immature teeth – spontaneous eruption
 - Extract if contacting follicle of succedaneous tooth
 - Lateral cephalogram to evaluate relationship of primary tooth to succedaneous tooth bud
 - Mature teeth – orthodontic extrusion over 2-3 weeks
 - May require 2-3 month post-eruption splinting
 - Apically mature teeth require RCT within 3 weeks
 - Extrusion – both PDL and pulpal neurovascular tissues are violated, only gingival tissues retain the tooth
 - Reduce, semi-rigidly splint for 2-3 weeks, RCT tooth within 3 weeks
 - Lateral displacement – labial, lingual, lateral into edentulous area
 - Reduce and splint 2-3 weeks, RCT tooth within 3 weeks
 - Avulsion – complete displacement of tooth from socket
 - Best prognosis if treated within 30min, if patient is young, if apex is not fully formed
 - Reduce and semi-rigid splint for 10 days, RCT ASAP
 - Consider – patient age, tooth age, storage medium, time since trauma/avulsion
 - Rigid splinting for >10days increases possibility of resorption
 - Semi-rigid splint allows some PDL movement – less chance of resorption
 - Very poor prognosis after 2h since avulsion
- Treatment
 - Reduce = place back into spot
 - Flexible splint = use wire and composite
 - Rigid splint = band with composite
 - Endo – earlier endo is better for all luxated/avulsed teeth

Bone Damage

- Alveolar Process Fracture – alveolar bone surrounding injured teeth is fractured, causing mobility of alveolus
 - Reposition bony segment, splint 4-6 weeks
 - Treat individual teeth depending on injury, RCT depending on associated tooth injury
 - Antibiotic prophylaxis (1 week amox, clinda if patient is allergic to amox)
- Lacerations
 - Irrigate and debride, clean of foreign bodies
 - Close from inside to outside
 - Mucosal layer – irrigate and prep for sterile technique
 - Muscle layer
 - Subcutaneous layer
 - Skin
 - Antibiotic prophylaxis
-