

Interesting Cases in Pediatric Plastic Surgery

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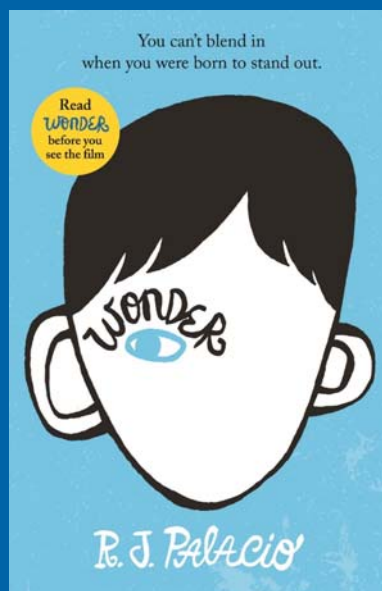
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Pediatric Plastic Surgery

What do we do?



Origins of Plastic Surgery

plastic

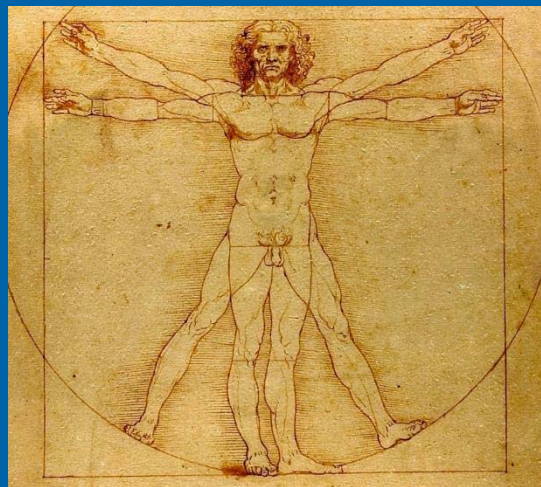
adjective \ plas·tic \ 'pla-stik\

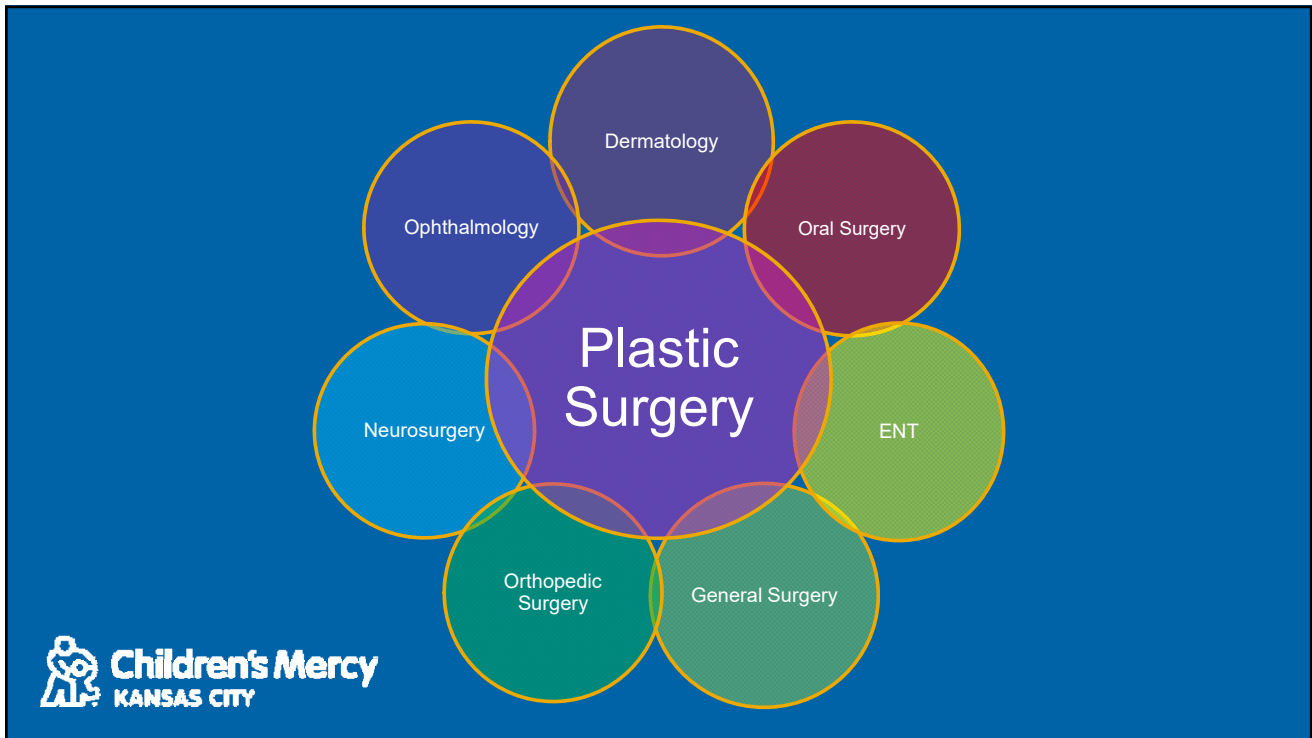
derives from the **Greek** πλαστικός (*plastikos*) meaning
"capable of being shaped or molded"



What is Plastic Surgery?

- The whole body
- Every tissue type
- All ages
- Marriage of form and function





Plastic Surgery Statistics

2015 Statistics American Society of Plastic Surgeons

- 5.8 million reconstructive procedures

Top 5 Reconstructive Procedures

1. Tumor removal 4.5 million
2. Laceration repair 253,000
3. Maxillofacial Surgery 200,000
4. Scar Revisions 179,000
5. Hand Surgery 130,000

Top 5 Cosmetic Surgery Procedures

1. Breast augmentation 279,000
2. Liposuction 225,000
3. Rhinoplasty 218,000
4. Eyelid surgery 204,000
5. Tummy Tuck 128,000

Plastic Surgery Statistics

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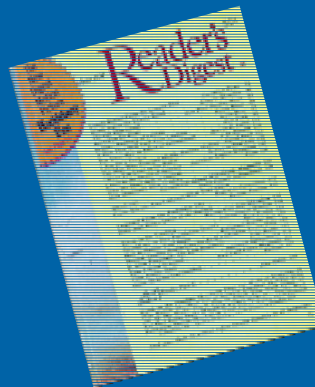
Top 5 Cosmetic Surgery Procedures

1. Breast augmentation 279,000
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3. Rhinoplasty 218,000
4. Eyelid surgery 204,000
5. Tummy Tuck 128,000

Congenital Deformities: 30,000 (0.5%)

Pediatric Plastic Surgery

Weird moles
Funny bumps
Cuts
Scars
“Deformities”



Pediatric Plastic Surgery

- Cleft lip and palate
- Vascular anomalies
- Congenital nevi
- Skin lesions
- Skin masses
- Facial trauma
- Scars and keloids
- Complex Wounds
- Pressure ulcers
- Nasal deformities
- Auricular deformities
- Facial palsy
- Breast anomalies
- Mammary hyperplasia
- Gynecomastia
- Burns
- Myelomeningocele
- Lacerations
- Pediatric microsurgery
- Congenital hand anomalies
- Hand and wrist trauma
- Deformational plagiocephaly
- Craniosynostosis
- Craniofacial anomalies
- Jaw deformities
- Speech abnormalities



Pediatric Plastic Surgery

- Cleft lip and palate
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Skin Lesions/Masses/Tumors

- Congenital melanocytic nevi
- Acquired nevi
- Spitz nevi
- Sebaceous nevi
- Dermoids
- Pilomatrixomas
- Epidermal inclusion cysts
- Thyroglossal duct cyst
- Branchial cleft cysts
- Neurofibromas
- Lipomas
- Cutis aplasia
- Juvenile xanthogranuloma
- Dermatofibromas



- What is the most likely diagnosis?



Congenital Melanocytic Nevus

Small: <1.5cm

Medium: 1.5-20cm

Large/Giant: >20cm



Congenital Melanocytic Nevus

Small/Medium Lesion

- Observation
- Surveillance
- Growth rate
- Low risk
- Change over time
- Biopsy for local changes

Large/Giant Lesions

- Malignant Melanoma
- Increased risk 5-10%
- Change over time
- Screening MRI
- Neurocutaneous melanosis
 - Hydrocephalus, DD, seizures, CN palsies, tethered cord

Congenital Melanocytic Nevus

Removal?

- Change in appearance
- Unexpected growth
- Unsightly appearance
- Difficult to monitor location
- Anxiety over risk

Surgical Options

- Primary excision
- Staged excision
- Tissue expansion
- Laser
- Phenol



Lesion Excision



- Too large for single-stage excision
- Serial excision to remove all of lesion, restore form
- Minimize final scar with normal function of neck
- Improved healing between stages

Lesion Excision



Stage 2 excision



Stage 3 excision

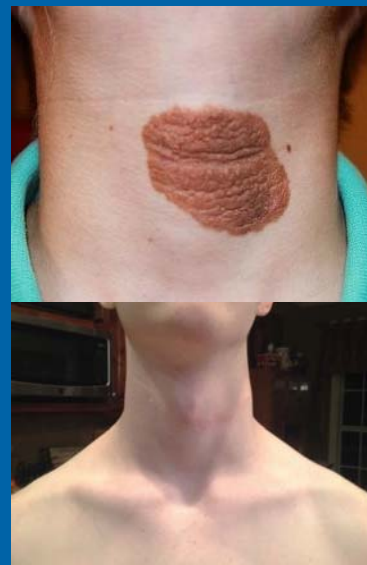
Lesion Excision



Stage 2 excision



Stage 3 excision



Congenital Melanocytic Nevus



Tissue Expansion



- What is the most likely diagnosis?



Spitz Nevus

- Pink, red, or brown in color
- Macular or papular
- Typically benign
- Histological differentiation from melanoma difficult
- Can be found in regional lymph nodes
- Complete Excision



- What is the most likely diagnosis?



Nevus Sebaceous

- Yellow or salmon colored patch
- Scalp or face
- Raised and verrucous in puberty
- Typically benign
- ~10% lifetime risk of malignancy
- Benign tumor growth
- Complete Excision

Linear Nevus Sebaceous Syndrome

- Large linear nevus sebaceous of face, scalp, or neck
- Intellectual disability
- Seizures
- Hemimegalencephaly
- Urogenital anomalies
- Eye abnormalities
- Heart defects
- Increased cancer risk



Cutis Aplasia Congenita

- Usually present as patch of alopecia
- 70% occur on scalp
- Congenital defects in skin
- Can involve deeper layers down to dura
- Treat conservatively



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Cutis Aplasia Congenita



- What is the most likely diagnosis?



Dermoid Cyst

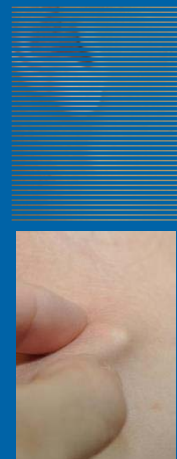
- Mobile subcutaneous tumors
- Contain dermis, epidermis, sebaceous glands, hair
- Risk infection
- Sites embryologic fusion
 - Brow/periorbital dermoid
 - Nasal
 - Temporal/skull
- Complete Excision

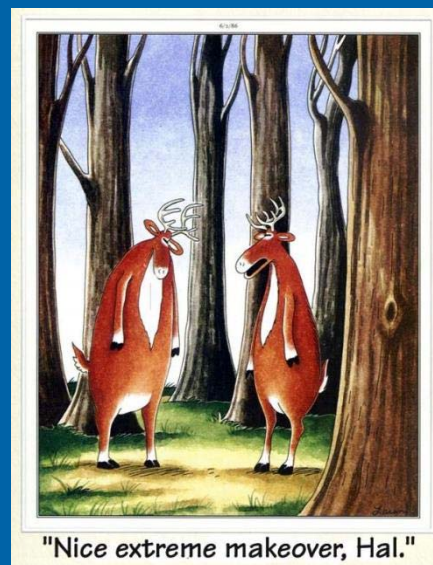
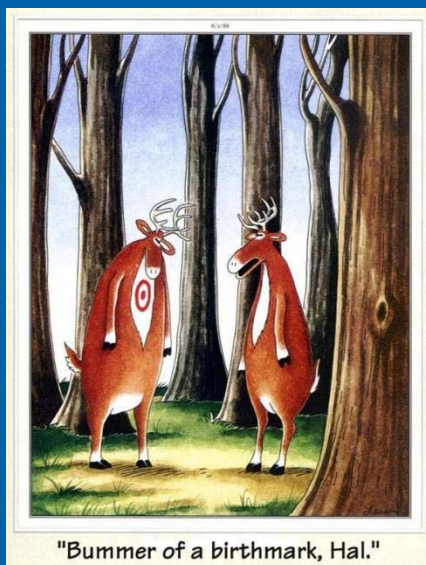
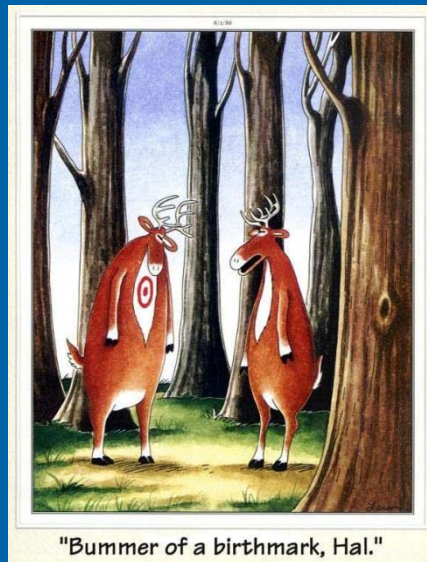


- What is the most likely diagnosis?

Pilomatrixoma

- “Benign calcifying epithelioma of Malherbe”
- Benign tumor of hair follicle
- Most common during childhood
- Oblong in shape
- “teeter-totter” sign
- Skin with bluish tinge
- Extrude calcium
- Complete Excision





Vascular Malformations

- Capillary
- Arterial
- Venous
- Lymphatic
- Arteriovenous
- Venolymphatic
- Other combinations



- What is the most likely diagnosis?



Infantile Hemangioma

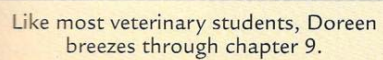
- Most common benign tumor of infancy
- Benign capillary lesion
- 3:1 females:males
- Common in premature infants
- 60% head and neck
- 20% have more than one

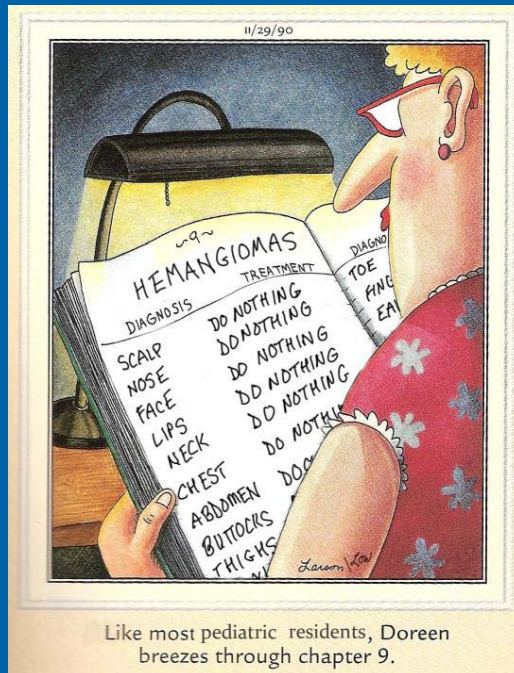
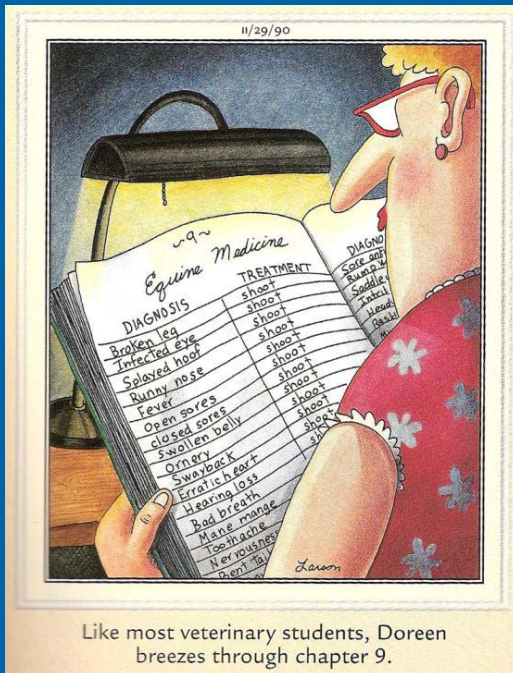


Infantile Hemangioma

- Not present at birth
- Gets bigger, not smaller
- Grows faster than child
- Proliferates for 6-12 months
- Involutates over 5-10 years
- 70% regress adequately







Infantile Hemangiomas

Infantile Hemangioma

Contraindications to Conservative Management

- Airway obstruction
- Visual axis obstruction
- Excessive blood loss
- High output cardiac failure
- Severe disfigurement



Infantile Hemangiomas

Confusion can occur:

- Visceral hemangiomas
- RICH
- NICH
- Reticular hemanigomas
- PWS vs hemangioma



Infantile Hemangiomas

Confusion can occur:

- Visceral hemangiomas
- RICH
- NICH
- Reticular hemanigomas
- PWS vs hemangioma



birth



1 month



1 year

Infantile Hemangiomas

Confusion can occur:

- Visceral hemangiomas
- RICH
- NICH
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- PWS vs hemangioma



Infantile Hemangiomas

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Infantile Hemangiomas

Confusion can occur:

- Visceral hemangiomas
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1 month

Infantile Hemangiomas

Confusion can occur:

- Visceral hemangiomas
- RICH
- NICH
- Reticular hemangiomas
- PWS vs hemangioma

1 month

2 months



Infantile Hemnangiomas

- Early hemangiomas
- What to do?



Treatment Options

- Observation only
- Laser
- Timolol
- Propranolol
- Topical steroid
- Intralesional steroid
- Oral steroid (prednisolone)
- Excision



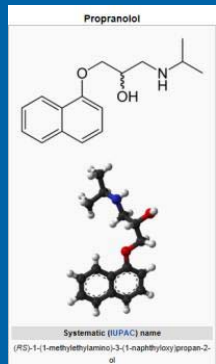
Treatment Options

Beta blocker therapy



Treatment Options

Beta blocker therapy



Mechanisms of action

- Vasoconstriction (blocks vasodilator response to β -adrenergic stimulation)
- Decreased expression of VEGF and bFGF
- Increased capillary endothelial cell apoptosis

Treatment Options

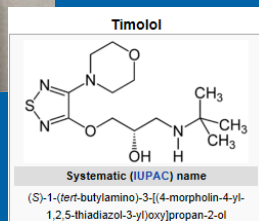
Beta blocker therapy

Potential adverse effects

- Bradycardia <80 bpm
- Hypotension <70 mm HG
- Hypoglycemia <70 mg/dl
- Bronchospasm
- Hypothermia

Treatment Options

Topical beta blocker therapy



- Twice daily application
- Can taper as tolerated
- Can combine with laser therapy



1 month

7 months



"Isn't there something you can do with lasers?"

Treatment Options

- “...a sophisticated heat beam which we called a ‘laser’...”

Treatment Options

Laser Photocoagulation

- Pulsed yellow dye laser
- Absorbed by oxyhemoglobin
- 1-2 mm penetration
- Eye protection mandatory

Treatment Options

Laser Photocoagulation

- Early, flat hemangiomas do best
- Rebound growth common
- May require multiple laser treatments every 2-4 weeks
- Can be combined with steroid therapy



Treatment Options

Laser Photocoagulation

- Ulcerated hemangiomas
- May markedly relieve pain in 24-48 hours
- May accelerate healing



Treatment Options

Surgical Management

- Emergency intervention
- During proliferative phase
- Prior to complete involution
- After complete involution



Excessive bleeding of an ulcerated hemangioma

Treatment Options

Surgical Management

- Emergency intervention
- During proliferative phase
- Prior to complete involution
- After complete involution



Anatomic distortion from mass effect

Treatment Options

Surgical Management

- Emergency intervention
- During proliferative phase
- Prior to complete involution
- After complete involution



Treatment Options

Surgical Management

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Treatment Options

Surgical Management

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Vascular Malformations

- Capillary
- Arterial
- Venous
- Lymphatic
- Arteriovenous
- Venolymphatic
- Other combinations



Port Wine Stains

- Capillary vascular malformation
- Significant hypertrophy
- V I distribution common
- Associated with Sturge-Weber syndrome



Port Wine Stains

Laser photocoagulation

- 595nm Pulsed yellow dye laser
- Multiple treatments needed
- Face, neck, chest
- Less effective on extremities
- *Never 100% clearance*



Port Wine Stains

Laser photocoagulation

- 595nm Pulsed yellow dye laser
- Multiple treatments needed
- Face, neck, chest
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Venous Malformations

- Conservative therapy most often
- Compression garment
- Sclerotherapy
- Laser therapy
- Surgical debulking



Lymphatic Malformations

- Called “cystic hygromas” in the neck
- May have small or large cysts
- Often unresectable
- Palliative sclerotherapy or surgical debulking



Spider Angiomas

- Telangiectasia
- “spider-like” network
- Acquired VM
- Arteriolar dilatation
- Solitary in children
- Conservative observation versus laser



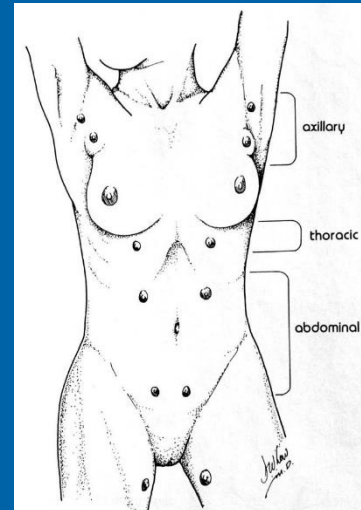
Pyogenic Granulomas

- Lobular capillary hemangioma
- Common, reactive proliferation
- Benign lesions
- Rapid growth
- Very friable, profuse bleeding
- Multiple trips to ER
- Can fall off and regrow
- Excision, laser, cautery



Polythelia

- Presence of supernumerary nipples or nipple-areola complexes
- Most common anomaly of the pediatric breast
 - Up to 6% of population
- Incomplete involution of the milk line



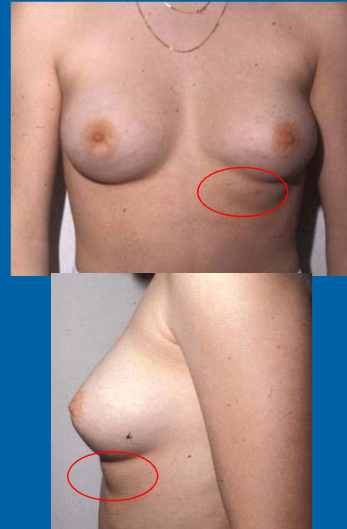
Polythelia

- Males and females
- May be associated with renal anomalies
- Some familial cases
- Cancerous degeneration possible
- Most commonly inframammary
- Can also occur on the breast itself



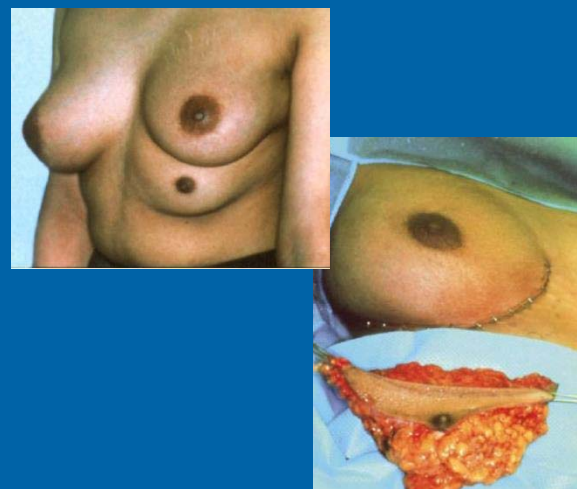
Polymastia

- Presence of accessory glandular tissue
- May occur anywhere along the embryonic milk line
- Often becomes noticeable during puberty, pregnancy, or lactation
- Cancerous degeneration possible



Polymastia

- Treatment requires resection of the accessory glandular tissue
- Close follow-up needed
- Possibility of developing cancer in any retained breast tissue



Macromastia

- Breast development begins with onset of puberty, but reach excessive size
 - Growth disproportional to remainder of the body
- Possible end-organ hypersensitivity to normal gonadal hormone levels
- Wide variability in size, shape, symmetry
- Can be familial



Macromastia

- Promotes physical symptoms
 - Neck and/or back pain
 - Shoulder grooving
 - Nerve Impingement
 - Inframammary intertrigo
- Often severe psychosocial distress
- Limits physical activity >> obesity



Macromastia

- Weight of breast tissue causes descent of tissue
- Areolar malposition
- Striae
- Weight loss will not promote adequate retraction of excess skin



Macromastia

- Treatment focuses on
 - Weight loss
 - Physical therapy
 - Surgical breast reduction
- Timing Important
 - Completion of breast growth
 - Increased need for secondary surgery



Macromastia

- Adolescents under-report their problems/concerns
- Providers avoid examination
- Breast cancer/tumors uncommon but risk not zero
- Breast nodules/masses need workup by dedicated breast surgeon



Macromastia

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Gynecomastia

- Affects up to 65% of adolescent males
- Peak incidence age 14
- Typically bilateral
- Disk of rubbery tissue beneath nipple
- Tenderness
- Psychosocial distress



Gynecomastia

- Probable transient elevation of estradiol to testosterone ratio
- Ductal and stromal cell proliferation
- Less commonly from hormone secreting tumor, medications, syndrome



Gynecomastia

- Most cases begin to resolve in 12-18 months
- Beyond 18 months:
 - Fibrosis and hyalinization occur
 - Less likely to undergo spontaneous resolution
 - More likely surgery will be required



Gynecomastia

Evaluation Includes:

- Complete history
- Rule out endocrine abnormality
- Testicular exam
- Degree of enlargement
- Degree of skin redundancy



Gynecomastia

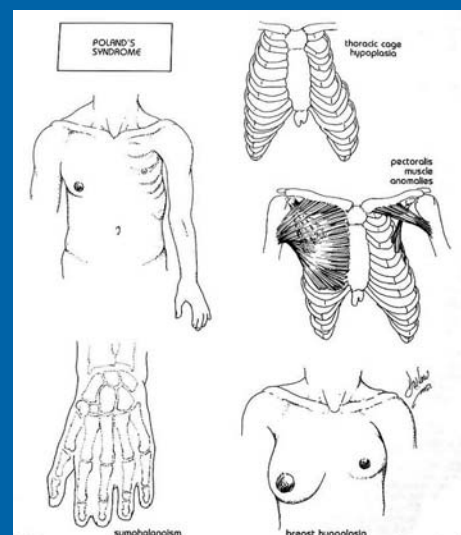
Treatment Options:

- Reassurance, observation
- Encourage weight loss and exercise
- Drug therapy
- Management of contributing factors
- Surgery
 - Direct excision +/- Liposuction



Poland Syndrome

- Incidence: 1 in 20,000-30,000
- Absence of pectoralis major and minor muscle
- Brachysyndactyly
- Chest wall hypoplasia
- Aplasia ribs II-IV
- Breast and nipple hypoplasia



Poland Syndrome

- Unilateral, rarely bilateral
- Sporadic, rarely familial
- 3:1 Male to female ratio
- Widely variable presentation
- Interruption subclavian artery blood flow 6th week
- Associated renal anomalies



Poland Syndrome

Surgical Indications:

- Chest wall depression
- Inadequate protection of mediastinum
- Paradoxical movement of chest
- Aplasia/hypoplasia of breast
- Cosmetic defects



Anterior Thoracic Hypoplasia

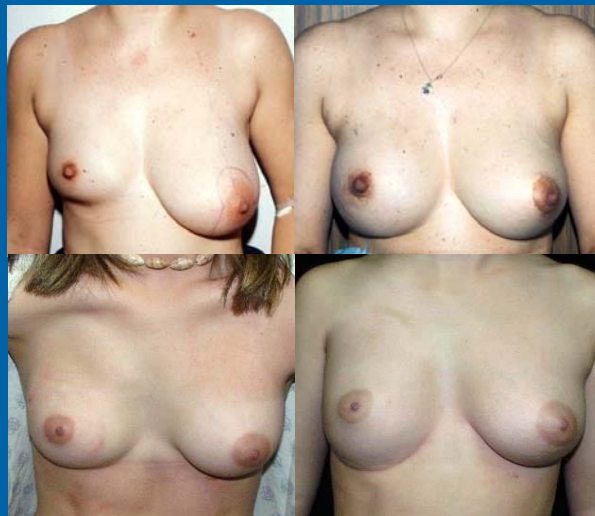
- Appears similar to Poland Syndrome
- Chest wall hypoplasia
- Variable breast hypoplasia
- Nipple malposition
- Pectoralis muscles intact
- ? Variant Poland's



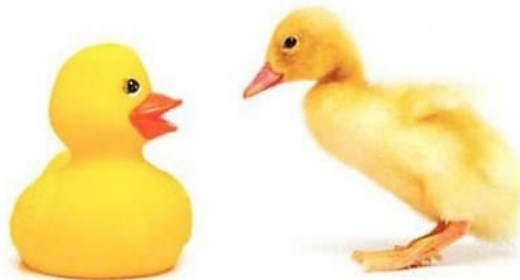
Breast Hypoplasia

Surgical Management:

- Symmetry
- Chest wall balance
- Nipple position
- Reduction/Lift
- Expansion/Implant
- Fat grafting
- Muscle flap



I got plastic surgery done



Pediatric Facial Trauma

- Facial volume is smaller relative to cranium in children vs adults
- Thicker soft-tissue over bones



Pediatric Facial Trauma

- Pediatric bones have greater elasticity
- Lack of developed sinuses in young children
- Un-erupted teeth strengthen the maxilla and mandible
- Greenstick and minimally displaced fractures



Soft Tissue Injuries

- Open versus closed injuries
- Abrasions
- Lacerations
- Avulsions
- Amputations
- Impaled objects/Foreign bodies
- Burns



Soft Tissue Injuries



Wound Examination

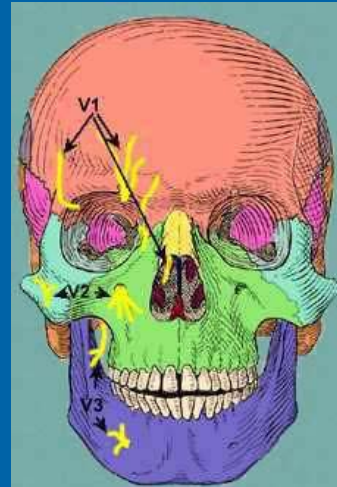
- Location
- Wound size and depth
- Characteristics of wound
 - straight versus irregular
 - missing tissue
- Contamination
- Exposed structures
 - cartilage, bone



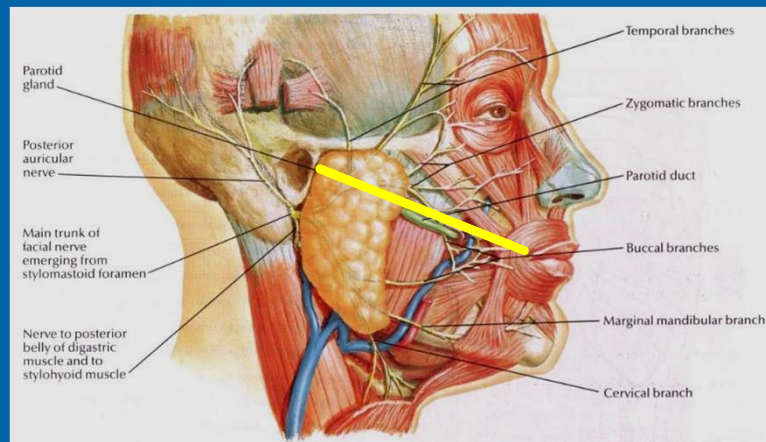
Wound Examination

Trigeminal Nerve

- V1: Supraorbital notch
- V2: Infraorbital foramen
- V3: Mental foramen



Wound Examination



Wound Examination

Possible frontal nerve or
supraorbital nerve injury



Possible mental
nerve injury

Initial Management

- Keep wounds covered and moist with saline
- Irrigation
- Antibiotics
 - Animal or human bites
 - Contaminated wound
 - Delayed closure
 - Exposed cartilage
 - Open fracture
- Radiographic evaluation?



Fundamentals of Repair

- Restore normal form and function
- Minimize scarring
- Optimize primary healing
- Debridement of all nonviable tissue and debris
- Precise approximation of skin edges
- Closure without tension



Fundamentals of Repair

- Anatomic alignment of laceration
- Use facial landmarks when available
 - Hair, vermillion, creases/wrinkles
- Use irregularities in wound



Animal Bites

- Dog Bites
- Caged Animal Bites
- Spider Bites



Animal Bites



Animal Bites



Animal Bites



Animal Bites



Animal Bites

Dog Bite Musts

- Consider potential blood loss
- Thorough exploration of all wounds
- Suspect crush and deep puncture injury
- Wash, wash, wash, wash, wash, wash
 - Antibiotics
- Close the wounds, avoid braided suture, need for late revision



Severe Dog Bite Injury to Face

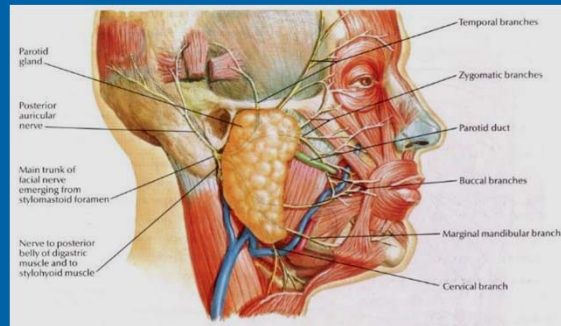
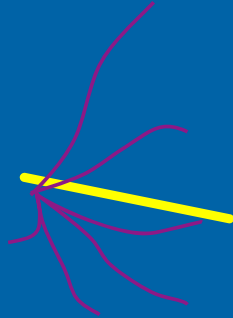


Severe Dog Bite Injury to Face

- Blood loss
- Pain
- Contamination
- Intraoral involvement?
- Airway compromise?
- Fractures?
- Other Injured structures?



Severe Dogbite Injury to Face



Severe Dog Bite Injury to Face

- What do we do?
 - Intubated
 - OR for exploration and repair



- Restore normal form and function
- Minimize scarring
- Optimize primary healing

Severe Dog Bite Injury to Face



Severe Dog Bite Injury to Face

1 week after injury

9 months after injury



Severe Dog Bite Injury to Face



Abrasions

Traumatic Tattooing

- Pigmented foreign particles imbedded into dermis
- Explosive tattooing
- Clean with non-destructive agents
- Large, deep abrasions may require skin grafts



Abrasions

- Viscous lidocaine or LET
- Surgical scrub brush
- Sterile toothbrush
- Side of scalpel blade
- Antibiotic ointment and Adaptic gauze or Xeroform
- Do not ignore embedded particles



Wound Dehiscence

- 2 days s/p repair with continuous stitch
- Re-repair?
- Heal secondarily?



Wound Dehiscence

- Higher risk for infection
- Scarring worse
- Do not reclose infected wound!!
- Clean wound:
 - ≤ 24 hours on the face
 - ≤ 6 hours on trunk/extremity



Wound Dehiscence

- Higher risk for infection
- Scarring worse
- Do not reclose infected wound!!
- Clean wound:
 - ≤ 24 hours on the face
 - ≤ 6 hours on trunk/extremity



Wound Dehiscence

- Open wound from shrapnel injury
- 5 days old
- Clean wound
- Antibiotic ointment or Xeroform
- Delayed revision



Wound Care and Scarring

- “Scarless healing” in 1st trimester only
- Spectrum of scarring
 - fine line
 - hypertrophic scar
 - keloid



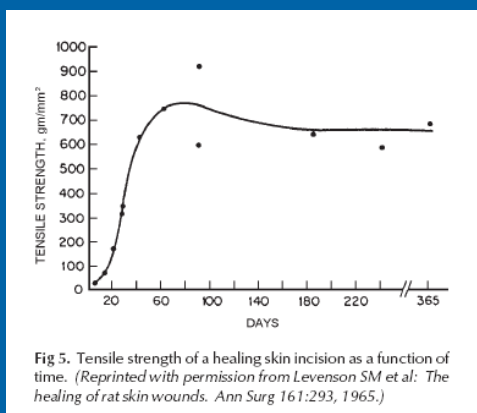
Wound Care and Scarring

Factors that affect scarring

- The Patient
- The Wound
 - Pattern of injury
 - Infection
 - Foreign material
 - Excessive tension
 - Wound dehiscence



Wound Care and Scarring



- Wound strength 20% of normal at 3 weeks
- 70% of normal at 6 weeks
- Healed scar 75-80% normal
- Continued collagen remodeling up to one year



Wound Care and Scarring

- Creams and lotions
- Silicone gel sheeting
- Massage
- Pressure therapy
- Steroid injection
- Laser
- Ultrasound
- Surgical revision



Wound Care and Scarring

- “Greaseless scar cream”
- Cepalin (Allium Cepa)
 - Onion extract
 - Antibacterial property
- Rub into scars 3x daily
- 6-8 weeks new scars
- 6 months for old scars
- \$20-35
- Pediatric and SPF formulas



Wound Care and Scarring

- Liquid
- Silicone, cortisone, Vitamin E
- Paints on scar
- Dries to thin film
- Apply BID for 2-4 months
- Not recommended <2yrs
- \$30



Wound Care and Scarring

- Gel-filled capsules
- Can penetrate skin
- Tocopherol thought to affect collagen formation
- Appropriate dosing unknown
- 33% incidence of rash



Wound Care and Scarring

- Silicone sheeting
- Worn over scar
- Silicone penetration?
- Microenvironment changes
- Increases moisture
- Poor compliance



Wound Care and Scarring

Instructions to parents:

- Your child will have a scar
- Scars look their worst between 2-8 weeks
- Scars will initially be raised and red
- Takes one year for a scar to mature
- Stay out of the sun
- Options for scar treatment...

Wound Care and Scarring

- Wait until wound is healed – 2 weeks
- Avoid swimming/hot tubs/contact sports
- Sunscreen a must for up to one year
- Massage therapy
- Scar tape
- Scar remedy of choice
- Tincture of time
- Keloid prone patients are special



**MAY YOUR AGE
NEVER OUTPACE
ADVANCES IN
PLASTIC SURGERY.**

Thank You!

