Congenital Lateral Neck Masses

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Introduction

- Head and Neck masses are commonly seen in children
  - Most common cause of H&N masses in children is lymphadenopathy
  - Second most common cause of H&N masses are congenital lesions
  - Will focus on Lateral Neck Masses
    - Branchial anomalies
    - Vascular malformations/hemangiomas
    - Lymphatic malformations
    - Laryngoceles
    - Teratomas/dermoid cysts
    - SCM tumors of infancy
Branchial Apparatus

- Branchial anomalies result from improper development of the branchial apparatus

- Branchial apparatus develops 2\textsuperscript{nd}-6\textsuperscript{th} week
  - Neck is shaped like a hollow tube with circumferential ridges = Arches (mesoderm)

  - Ridges between arches = Clefts and Pouches
    - Clefts = outside (ectoderm)
    - Pouches = inside (endoderm)
Branchial Apparatus

- Each arch contains
  - Cartilage
  - Cranial nerve
  - Artery
  - Muscle component

- All neural crest origin

- 6 arches, only 5 form structures in humans
  - 1, 2, 3, 4, and 6
  - 5th fails to develop
First Arch: Mandibular Arch

- **Skeletal components**
  - Meckel’s cartilage
    - Framework for mandible
  - Malleus head and neck
  - Incus body and short process

- **Muscles**
  - Muscles of mastication
  - Anterior digastric
  - Mylohyoid
  - Tensor tympani
  - Tensor veli palatini

- **Nerve**
  - CN V (Trigeminal)

- **Artery**
  - Maxillary; external carotid
Second Arch: Hyoid Arch

- **Skeletal components**
  - Reichert’s cartilage
    - Stapes
    - Malleus manubrium
    - Incus long process
    - Styloid process
    - Hyoid bone (lesser horn and upper body)

- **Muscles**
  - Facial expression, buccinator, platysma, stapedius, stylohyoid, posterior digastric

- **Nerve**
  - CN VII (Facial)

- **Artery**
  - Stapedial
Third Arch

- **Skeletal components**
  - Hyoid (greater horn and lower body)

- **Muscles**
  - Stylopharyngeus

- **Nerve**
  - CN IX (Glossopharyngeal)

- **Artery**
  - Common/Internal carotid
Fourth Arch

- **Skeletal components**
  - Thyroid, epiglottic, cuneiform cartilages

- **Muscles**
  - Cricothyroid, inferior constrictors

- **Nerve**
  - Superior laryngeal

- **Artery**
  - Subclavian, aortic arch
6th Arch

- **Skeletal components**
  - Cricoid, arytenoids, corniculate

- **Muscles**
  - All intrinsic muscles of larynx (except cricothyroid)

- **Nerve**
  - Recurrent laryngeal

- **Artery**
  - Pulmonary artery
Branchial Apparatus Anomalies

- Branchial fistula
- Branchial sinuses
- Branchial cysts

- Soft, fluctuant mass
- 17-20% of all excised cervical masses in children
A branchial anomaly and its associated tract typically lies inferior to all the derivatives of its associated arch and superior to all derivatives of the next arch.
First Branchial Cleft Cyst

- 5-25% of branchial anomalies
- Work classification (1972)
  - **Type I**
    - Preauricular mass or sinus
    - Ectoderm only
    - Sinus tract is anterior and medial to the EAC
      - Preauricular region → Lateral to CN VII → Parallels EAC → Ends in EAC or middle ear
  - **Type II**
    - More common than Type I
    - Ectoderm and Mesodermal elements
    - Presents at the angle of mandible or submandibular region
      - Angle of mandible → Lateral or medial to CN VII → Ends in concha or bony-cartilaginous junction of EAC.
First Branchial Cleft Cyst

- Distribution of 1st Branchial clefts
  - Preauricular/parotid
  - Post auricular
  - Angle of the mandible
  - Above the hyoid

- Think: First Branchial anomaly in a child who presents with recurrent otorrhea in the absence of middle ear disease
Second Branchial Cleft Cyst

- Most common branchial cyst (90%)
- Presents as a mass just anterior and medial to the SCM in the neck
  - Sinuses > cysts > fistulas
  - Unilateral Fistulae most common on the right (89%)
  - Bilateral anomalies associated Branchio-oto-renal syndrome
    - Audiogram, renal U/S

- Tract
  - Anterior neck -> Along carotid sheath -> Between external and internal carotid arteries -> superficial to CN IX and XII -> penetrates the middle pharyngeal constrictor and opens into tonsillar fossa
Third Branchial Cleft Cyst

- 2-8% of Branchial Cleft malformation
- Recurrent neck abscesses
  - 89% are found on the left side of the neck
- Closely associated with the thyroid gland
  - Suppurative thyroiditis, first decade of life
- Tract:
  - Lateral neck (mid-lower 1/3 of ant SCM) -> Deep to carotids -> Deep CN IX, superficial to CN XII, Superficial to superior laryngeal nerve -> Pierces thyrohyoid membrane -> Opens into apex of pyriform sinus
Fourth Branchial Cleft Cyst

- Very rare
  - ~ 200 cases reported in the literature
  - Associated with recurrent thyroid abscesses
  - 93.5% are left sided masses

- Theoretical path of tract:
  - Low in neck (anterior to SCM) -> Deep to common carotid -> Loops around aortic arch on the left (subclavian on the right) -> Deep to superior laryngeal nerve -> Superficial to recurrent laryngeal nerve -> Opens into pyriform sinus
Work-up

• **Ultrasound**
  - Round mass with uniform low echogenicity and lack of internal septations
  - Advantages: No radiation, no sedation for children, low cost
  - Not typically ordered alone

• **CT**
  - Homogeneous lesion with low attenuation centrally and a smooth enhancing rim
  - Often part of the work-up
  - More radiation, higher cost, may require sedation (children)

• **MRI**
  - Hypointense on T1 and hyperintense on T2
  - Advantages: No radiation
  - Disadvantages: Sedation for children, very expensive
Work-up

- **Fluroscopic fistulography or CT fistulography**
  - Inject radiopaque dye into the fistula or sinus to delineate the tract
    - First Branchial Anomalies

- **Barium swallow esophagography**
  - Help locate fistula tract in 3\textsuperscript{rd} and 4\textsuperscript{th} Branchial anomalies
  - Must wait 4-6 weeks after an acute infection

- **FNA**
  - Usually only done to r/o malignancy
  - Cholesterol crystals
  - May cause cyst to collapse -> much harder to remove at time of surgery
Treatment

- **Infected cysts**
  - Antibiotics (broad spectrum)
    - 2-4 weeks
  - Abscess
    - FNA to drain
    - Avoid I&D
      - Scarring
  - Once infection clears you should operate
    - Complete surgical excision of the tract and cyst
First Branchial Cleft Anomaly

- **Treatment**
  - **Surgery**
    - Complete surgical excision of tract and cyst
      - Superficial parotidectomy with facial nerve dissection
        - D’Souza et al.
          - 87 cases with FN identification, 21% temporary paralysis, <1% with permanent paralysis
          - 17 cases w/o FN identification, 29% temporary paralysis, 12% with permanent paralysis
  - **Postpone until 2 years of age**
    - Mastoid tip defined
    - Facial nerve larger and deeper
    - Controversy: waiting can lead to more infections → more scar → more difficult surgery
  - **Lacrimal probes can help locate tract**
D’sauza et al (2002): Within the parotid the course of the tract in relation to the facial Nerve is variable. In 158 patients, the FN was found superficial in 47, deep in 25 and between branches in 11 patients, in 75 of these patients the relationship was not clearly stated.
Second Branchial Cleft Anomaly

- **Treatment**
  - **Surgery**
    - Complete surgical excision of cyst and tract
      - Transverse cervical incision
        - Encompassing external sinus opening
      - Second ‘step-laddered’ incision
        - Sinus excision
        - Better exposure to pharynx
      - Methylene Blue
        - Injected externally into the sinus tract
    - Lacrimal probe
      - Fistula excision
    - Retroauricular incision
      - Avoids visible external scarring
Third and Fourth Branchial Cleft Anomaly

**Treatment**

- **Surgery**
  - Perform DL to examine pyriform sinus
    - Fogarty vascular catheter can be placed through the sinus tract
  - Complete excision
  - Must identify the recurrent laryngeal nerve as closely associated to the tract (will be deep to tract)
  - Removal of ipsilateral thyroid lobe is advocated to ensure complete removal of tract
- **Endoscopic cauterization of the pyriform sinus tract**
• Chen et al. Minimally invasive endoscopic electrocauterization alone may be effective as definitive treatment for sinus tracts of the pyriform fossa.
  ○ Nine patients with history of recurrent left neck mass and confirmed pyriform sinus tracts.
    • Sinus tracts were cauterized in 9/9 patients + I&D of neck abscesses to treat acute infection
    • In 7/9 the mucosa surrounding the tract was approximated with 1-2 simple, interrupted sutures
    • 7/9 patients (78%) had no recurrence of left neck mass/swelling in the 1-7 years after the procedure
    • 2/9 continued to have recurrent neck abscesses
      ○ Open excision of sinus tract +/- thyroid lobectomy
Cauterization of Pyriform Sinus
Vascular anomalies

- Mulliken and Glowacki, 1982
  - Vascular anomalies are now classified based on histology, biological behavior and clinical presentation
    - Vascular tumors grow by cellular hyperplasia
      - Hemangiomas (HOI)
      - Congenital hemangiomas (rare)
    - Vascular malformations localized defect in vascular morphogenesis
      - Slow flow vs. fast flow
        - Lymphatic Malformation
        - Venus Malformation
        - Capillary Malformation
        - AVM (fast-flow)
Hemangiomas of Infancy

- Most common tumor of infancy
- Presents shortly after birth
  - Proliferation occurs during the first 9 months of life
  - Involution begins at 18-24 months of life
- Most commonly in
  - Caucasians
  - Females > Male (6:1)
  - Preemies
  - Infants born to mothers with a history of chorionic villus sampling, preclampsia, placenta previa
- 60% occur in the H&N, 25% trunk, 15% extremities
  - Masseter muscle most common region in H&N
- 80% are solitary lesions
Hemangiomas of Infancy

**Pathogenesis**

- 1. Hemangioma endothelial cells arise from disrupted placental tissue embedded in fetal soft tissues during gestation or birth
  - GLUT-1
    - HOI and placental tissue
- 2. Hemangiomas arise from hematopoietic progenitor cells
  - Stem cells or placenta cells
Hemangiomas of Infancy

- **Nomenclature for classifying HOI**
  - **Superficial hemangiomas (capillary)**
    - Cherry red macule or papule
  - **Deep hemangioma (cavernous)**
    - Firm, rubbery subcutaneous mass with bluish skin hue
  - **Compound hemangioma (capillary-cavernous)**
    - Combination

- **Sub-classification**
  - **Focal**
    - Localized, unilocular lesion
    - Growth followed by involution
  - **Segmental**
    - Diffuse-plaque like lesions
Hemangiomas of Infancy

- Diagnosis
  - Clinically
    - History of rapid proliferation, physical exam
  - CT, MRI or Doppler U/S
    - MRI if > 3 cutaneous lesions
      - Visceral, cerebral angiomas
      - Isointense to muscle on T1 and hyperintense on T2
    - CT
      - Well circumscribed lobular mass with high flow, dilated feeding vessels and draining vessels, uniform enhancement
Hemangiomas of Infancy

- **Treatment**
  - **Observation**
    - Involution of 50%, 70% and 90% occurs by age 5, 7, 9
    - 40% will require medical/surgical treatment
      - Bleeding, ulceration, high-output heart failure, airway compromise
  - **Propranolol**
    - Many consider this first line treatment
    - Dosage 2 mg/kg/day x 12 months
      - 90% of patients see results in 1-2 weeks
    - Cardiology clearance is recommended
    - Side effects:
      - Hypoglycemia (take with meals)
      - Lethargy
      - Bronchospasm (avoid in asthmatics/reactive airway)
      - Heart block
      - Hypotension
Hemangiomas of Infancy

- **Prednisone/Prednisolone**
  - 2-5mg/kg/day x 4-12 weeks
    - Side effects: hyperglycemia, growth and adrenal suppression, insomnia, GI

- **Triamcinolone (intralesional)**
  - 3-4mg/kg (max 20 mg) q 6-8 weeks
    - Dermal atrophy

- **Vincristine and Interferon alpha**
  - Massive/life threatening disease/unresponsive to therapy
    - Vincristine (1-1.5 mg/kg/m²)
    - Interferon alpha (30,000,000 IU/m²/day)
    - Side effects: neutropenia, spastic diplegia
Hemangiomas of infancy

- Surgical excision
  - Poor involution -> Fibrofatty skin changes
  - Localized superficial hemangiomas
  - School aged children
    - Psychosocial issues
  - Laser
    - Residual erythema/ telagectasia that remain after involution, ulcerative lesions
    - < 6 months of age can lead to ulceration/scarring
      - Pulsed dye laser (spares superficial epidermis)
      - KTP
      - Nd:YAG
Hemangiomas of Infancy

- **Complications**
  - Airway compromise
  - High-output heart failure (LVH)
  - Ulcerations
  - Ophthalmic complications

- **Associations**
  - **Subglottic hemangiomas**
    - MC site left posterior lateral SG region
    - SGH have 50% coexistent skin lesions
    - 60% of SGH seen in patients with beard distribution of HOI
  - **Kasabach-Merritt Syndrome**
    - Consumptive coagulopathy, thrombocytopenia
      - Low PLTS, low fibrinogen, elevated INR and aPTT
    - Kaposiform hemangioendothelioma (vascular neoplasm)
    - Tufted angioma
  - **PHACE Syndrome**
    - Posterior fossa malformations, *segmental Hemangiomas*, Arterial abnormalities, Coarctation of Aorta, Eye abnormalities
Lymphatic malformation

- The most common slow flow vascular malformation

**Embryology**
- Lymphatic vessels develop as spaces in embryonic tissue or as buddings from primary lymph sacs
- They coalesce to form definitive channels that drain into the venous system
- Failure of lymph spaces to connect to the rest of the lymphatic system results in lymphatic malformations

**Incidence** 2.3/1000 live births
- Males=Females
- 60% are diagnosed in utero by U/S
- 80-90% are diagnosed by age 2
Lymphatic malformation

- **Classification**
  - Histology (outdated terms)
    - Capillary Lymphangiomas
      - Capillary like vasculature
    - Cavernous Lymphangiomas
      - Dilated lymphatic channels
    - Cystic Hygromas
      - Large multilocular cysts
  - Macrocystic (>2cm), Microcystic or mixed (new terms)
  - Location
    - Supramylohyoid
    - Inframylohyoid
Lymphatic Malformation

- **Microcystic**
  - <2cm in diameter
  - Ill-defined margins
  - Invasive
  - Commonly found above the level of the mylohyoid

- **Macrocystic**
  - >2cm in diameter
  - Well defined, circumscribed, encapsulated
  - Commonly found below the level of the mylohyoid
Lymphatic Malformation

- **Presentation**
  - Soft, compressible “doughy”, painless neck mass
  - Commonly in the **posterior triangle**
  - Can be transilluminated
  - Masses enlarge with URIs and regress with resolution of infection
  - Dysphagia, airway compromise, parotid swelling

- **Diagnosis**
  - CT or MRI
    - Multiloculated cysts
    - Hyperintense on T2 and peripheral wall enhancement on T1
  - Pre-natal u/s
  - DL /Bronch
    - LM may extend from the skin to mucosal surfaces of oral cavity, oropharynx
Lymphatic malformation

- **Treatment**
  - **Surgical excision**
    - Microcystic/supra-mylohyoid difficult to excise
      - May need to leave residual lymphatics to avoid damage to CN (hypoglossal, lingual, facial) and major blood vessels
  - **Needle aspiration**
    - Temporizing measure incases where vital structures are compromised
  - **Sclerotherapy**
    - OK 432, bleomycin, ethanol, doxycycline
    - Better response is seen with macrocystic lesions
Lymphatic Malformations

- **OK-432**
  - Lyophilized mixture of group A *Strep pyogenes*
  - Regression is seen in 96% patients with macrocystic lesions
  - Therapeutic response is seen in ~6 weeks
  - Side effects
    - Swelling, erythema, pain, fever x ~5 days
    - Inflammatory reaction can lead to airway compromise
  - Advantages
    - Does not cause fibrosis of neighboring structures
      - Allows for post-sclerosis surgical excision
Lymphatic Malformations

- **Doxycycline**
  - Shiels et al. reported complete cyst ablation in all 17 patients with microcystic lymphangiomas treated with doxycycline
  - Unknown mechanism of action
    - Inflammatory process?
  - Results seen in ~4-6 weeks
  - Side effects/complications
    - Severe pain/discomfort on injection
      - Requires general anesthesia
    - Erythema, edema at injection site
    - Dental staining
Lymphatic Malformations

- **Ethanol**
  - Macrocystic LM
  - Requires the use of drainage catheters
  - Impractical in small children with large lesions
    - Dosage 0.5-1ml/kg
    - Side effects seen at 1 ml/kg
  - Side effects/complications
    - Increased permeability to surrounding structures
      - Skin necrosis, Nerve injury, ischemia
      - Systemic: Hypotension, arrhythmias, seizures, hypoglycemia, death

- **Bleomycin**
  - Chemotherapy agent
  - Side effects
    - Flu-like sx, hair loss, pulmonary fibrosis
Lymphatic malformation

- **Ethibloc**
  - Alcohol (60%) and Zein (corn protein)
  - Produces intravascular thrombosis, necrosis and a fibrotic reaction
    - Emran et al
      - 84% of Macrocystic and 77% Mixed LM
    - Herbreteau et al
      - 70 patients were treated 16 patients (23%) failed treatment
  - **Side effects/Complications**
    - Scars, persistent drainage, salivary fistulas
      - Dubois et al persistent drainage in 10 of 14 patients
Venous Malformations

- The second most common slow-flow vascular anomaly
  - Disordered vasculogenesis
    - Tyrosine kinase receptor (Tie2/TEK) dysfunction
    - upregulation in TGF, FGF
    - Progesterone receptors

- Lesions are present at birth
  - Incidence 1 in 10,000
  - Sporadic > inherited
Venous Malformations

• Presentation
  ○ Lesion is present at birth
    ▪ Grows proportionally with the child
    ▪ Rapid expansion occurs during puberty, pregnancy or trauma
      ○ Progesterone receptors
  ○ Soft, compressible, overlying skin has a bluish hue
  ○ Lesions enlarge with Valsalva maneuver

• Complications
  ○ Pain, thrombosis, phleboliths, emboli
  ○ Intralesional Coagulopathy
    ▪ Elevated D-dimers, Low fibrinogen
    ▪ Disseminated intravascular coagulopathy
      ○ Tx: LMWH
Venous Malformation

- **Diagnosis**
  - MRI
    - Modality of choice
    - Bright on T2
  - U/S
- **Treatment**
  - Surgery + Sclerotherapy
    - Preferred
    - Increased risk for bleeding
    - Preoperative sclerotherapy (24-48 hrs)
      - Decreases intraoperative bleeding
        - Ethanol and Sotradecol (most common)
        - OK 432, bleomycin, doxycycline
  - Laser
    - KTP
    - Nd:YAG
Capillary Malformations

- Consist of dilated capillary like channels
- Occur in approximately 0.3% of children
  - Familial Disease
    - Chromosome 5q
- Present at birth
  - Painless, flat, red or purple cutaneous patches with irregular borders → dark and nodular, local tissue hypertrophy
  - Neck
    - Stork bites
  - Forehead
    - Angel kisses
  - Face, CN V
    - Port-wine stain
      - Sturge-weber syndrome
      - Klippel-Trenaunay syndrome
Capillary Malformation

- **Diagnosis**
  - Clinically
  - MRI

- **Treatment**
  - Pulsed dye laser
    - Multiple treatments
    - Early treatment slows the progression of the disease
  - Surgery
    - Advanced lesions that have become nodular
Arteriovenous Malformations

- Congenital fast-flow vascular lesions composed of anomalous capillary beds shunting blood from arterial system to venous system
- Presents at birth as a slight blush
  - AVM are dormant for many years thus lesions are usually misdiagnosed
- Clinical stages
  - Dormancy
  - Expansion (Puberty and trauma)
  - Destruction/infiltration
  - Heart failure
- Characteristics
  - Palpable warmth, pulse, or thrill
  - Overlying skin may have a well demarcated blush
- Complications
  - Local tissue and bone destruction
  - Massive bleeding
Arteriovenous Malformations

- **Diagnosis**
  - MRA, CTA
    - CTA provides good definition of central nidus, allows for embolization
  - MRI
    - Numerous hypoluent arterial flow voids

- **Treatment**
  - Embolization +/- surgery
    - Ethanol, polyinyl ethanol, ONYX
    - Embolization alone -> high recurrence rates
      - Serial embolizations prevents collateralization of new vessels
    - Surgery
      - Pre-op embolization (24-48 hrs)
        - Helps define surgical margins
        - Decreases blood loss
Thymic cysts

- Third branchial pouch
  - Thymus
  - Inferior Parathyroid glands

- Thymic cysts
  - Rare
  - Male > Female (4:1)
  - Unilateral, painless lateral neck mass, +/- extension to the mediastinum
    - LEFT sided is most common
    - Lower neck or within carotid sheath

- Ectopic cervical thymus
  - Extremely Rare
  - Hyperplasia of tissue is seen with infection or after vaccination
Thymic cyst

- **Diagnosis**
  - **CT, MRI, U/S**
    - Thymic cyst (single cystic lesion) vs. cystic hygroma (multiple large cysts within a mass)
    - Make sure to evaluate for mediastinal thymic tissue
      - r/o ectopic cervical thymus
  
- **Treatment**
  - **Surgical excision**
    - Diagnosis is confirmed with histopathology
      - Hassall corpuscles
        - Thymic tissue
Plunging Ranulas

- **Ranulas**
  - Mucous retention cysts of SLG
  - Present as soft, bluish, swelling in the anterior floor of mouth

- **Plunging Ranula**
  - Extravasation of mucous extending through the mylohyoid into the neck
    - From congenital dehiscence in the mylohyoid muscle itself with part of SLG projecting into it (Gaughran mylohyoid boutonniere)
    - Along the deep lobe of the SMG between the mylohyoid and hypoglossal muscles
Plunging Ranulas

- **Diagnosis**
  - CT or MRI

- **Treatment**
  - Complete surgical excision via a transcervical approach along with excision of SLG
  - Ranulas limited to the FOM may be managed with intraoral marsupilization
Laryngoceles

- An abnormal dilation/herniation of the saccule of the larynx
  - **Internal**- laryngocele lies within the limits of thyroid cartilage
  - **External**- extends cephalad to protrude laterally into the neck through the thyrohyoid membrane
    - Congenital—newborns, infants (rare), children (rare)
    - Acquired—Adolescents/Adults (glass blowers, wind instruments)

- **Presentation**
  - Hoarseness, dyspnea, cough, dysphagia
  - Lateral neck mass is soft and compressible
Laryngoceles

**Diagnosis**
- CT scan will help differentiate Laryngoceles (air filled space) vs saccular cyst (fluid filled)
- Direct laryngoscopy

**Treatment**
- Surgical excision
  - Lateral cervical approach
    - incise thyrohyiod membrane along superior margin of the thyroid cartilage and ligating the base, caution with superior laryngeal nerve
  - internal or smaller lesions- laryngoscopic decompression or laser
Teratomas

- Contain all three germ layers
  - Endoderm, mesoderm, ectoderm
- Occur in 1:4,000 births
  - Develop during 2nd trimester
    - Maternal polyhydramnios
  - 3.5% of all teratomas occur in the H&N
  - Females = Males in H&N,
    - Females > Males (6:1) in other parts of the body
- Teratomas are most commonly found in the nasopharynx followed by the lateral neck
Teratomas

- **Presentation**
  - Firm lateral neck mass

- **Diagnosis**
  - CT, MRI
    - Intrinsic calcifications

- **Treatment**
  - Surgical excision
  - EXIT procedure (ex utero intrapartum treatment)
    - Commonly develop during 2nd trimester and can expand rapidly causing esophageal and/or Airway obstruction
Dermoid Cysts

- Composed or one or two germ layers
  - ectoderm and/or mesoderm
- Commonly found in the midline/submental region but are seen on the lateral neck as well.
  - Also seen in the orbit, nose, nasopharynx, and oral cavity
- Presentation
  - Painless, superficial mass that moves freely with the underlying skin
- Diagnosis
  - US and/or CT
  - CT and MRI
    - r/o intracranial extension (orbit, nose)
- Treatment
  - Surgical excision
    - Avoid intraoperative rupture as this increases rate of recurrence
STERNOCLADOMASTOID TUMORS OF INFANCY

- Presents between birth-3 weeks of life
- Firm, mobile, painless mass with in the SCM
  - Related to congenital torticollis and
  - Congenital hip dysplasia
- Caused by injury to SCM in utero or during delivery
- Diagnosis
  - U/S
- Treatment
  - Conservative
    - 50-70% resolve within 1st year
  - Physical therapy
    - Limited neck rotation
  - Surgery
    - Unresponsive to PT
    - Diagnosed after age 1
References


References