

Diagnosis and Management of Pediatric Neck Masses

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Pediatric Neck Masses

- Frequent finding
- Extensive differential diagnosis:
 - Lymphadenopathy (#1)
 - Congenital lesions
 - Malignancy
- Few established guidelines for evaluation
- Logical method of evaluation needed
- Can often arrive at diagnosis based on history and physical examination

Pittsburgh Studies

- May M. Neck masses in children: diagnosis and treatment. *Pediatr Ann*, 1976.
- Zitelli BJ. Neck masses in children: adenopathy and malignant disease. *Pediatr Clin N Am*, 1981.
- Zitelli BJ. Evaluating the child with a neck mass. *Contemp Pediatr*, 1990.
- Cunningham MJ, Myers EN, Bluestone CD. Malignant tumors of the head and neck in children: a twenty-year review. *Int J Pediatr Otorhinolaryngol*, 1987.
- Mandell DL. Head and neck anomalies related to the branchial apparatus. *Otolaryngol Clin N Am*, 2000.
- Mandell DL, Wald ER, Michaels MG, Dohar JE. Management of nontuberculous mycobacterial cervical lymphadenitis. *Arch Otolaryngol Head Neck Surg*, 2003.
- Otteson TD, Hackam DJ, Mandell DL. The Ex Utero Intrapartum Treatment (EXIT) procedure: new challenges. *Arch Otolaryngol Head Neck Surg*, 2006.
- Anne S, Teot L, Mandell DL. Fine needle aspiration biopsy: role in diagnosis of pediatric head and neck masses. *Int J Pediatr Otorhinolaryngol*, 2008.
- Mantle BA, Otteson TD, Chi DH. Fourth branchial cleft sinus: relationship to superior and recurrent laryngeal nerves. *Am J Otolaryngol*, 2008.

Children vs. Adults (May M, 1976)

	Children	Adults
■ Benign:	90%	20%
■ Malignant:	10% (M=F)	80% (M>F)
■ Common cell type:	Mesenchymal (90% benign + malignant)	Ectodermal (90%)
■ % Malignancies		
Epidermoid:	4%	80%
■ Parotid solid tumors:	50% malignant	20-25% malignant
■ Thyroid nodule:	80% malignant	80% benign

Large Series

- Torsiglieri et al. 1988:
 - Children's Hosp. of Philadelphia
 - 481 neck mass biopsies in 445 children (mean age = 6.2 years) over 5-year period

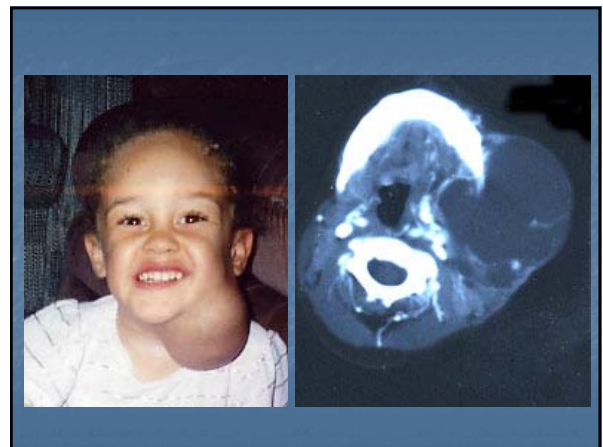
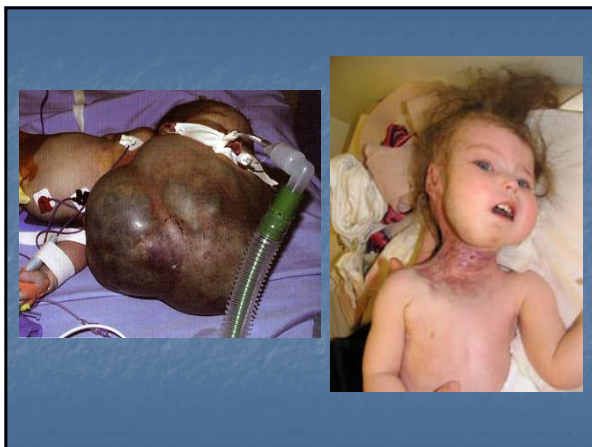
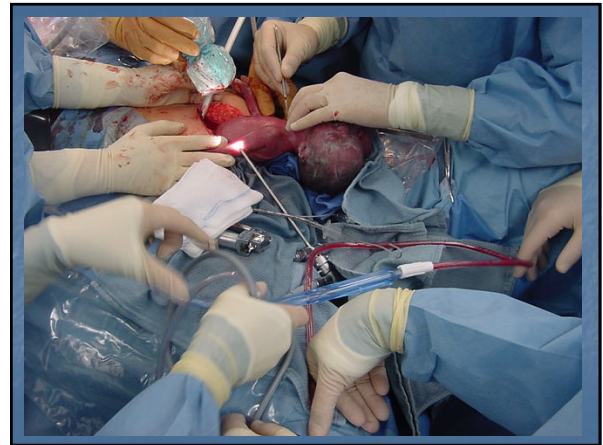
Etiology	#	%
Congenital	244	55
Inflammatory	118	27
Malignant	48	11
Noninflammatory benign	23	5
Benign neoplasms	12	3

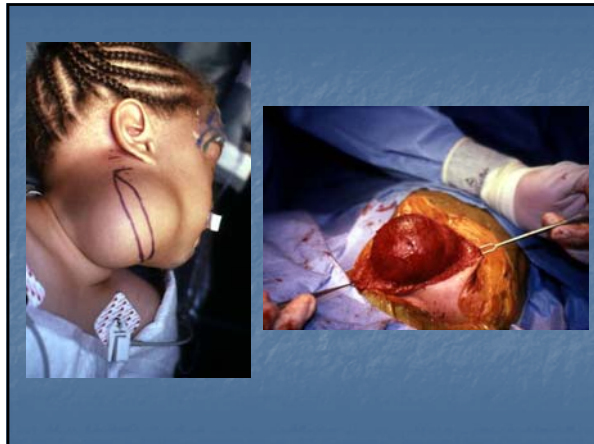
Evaluation

- History and physical examination:
 1. Age
 2. Symptoms
 3. Growth pattern
 4. Location
 5. Physical characteristics

Age

- If mass present at birth:
 - Ddx limited to congenital lesions
 - However: congenital cysts may present later if become infected; confused with lymphadenitis





Neoplasms

- Malignancy:
 - #1 cause of death from late infancy to early childhood
 - #2 cause of death (after accidents) in children and adolescents
(Bleyer 1990)
 - Head + neck neoplasms: 5% of all primary pediatric malignancies (Bonilla + Healy 1989)

Age and Malignancy

- 0-6 years:
 - Neuroblastoma (32%) (#1 before age 5, rare after age 5)
 - Non-Hodgkin's lymphoma (23%)
 - Rhabdomyosarcoma (19%)
 - Hodgkin's lymphoma: rare under age 5
 - 7-13 years:
 - Hodgkin's lymphoma(37%)
 - NH Lymphoma (33%)
 - 14-21 years:
 - Hodgkin's lymphoma(40%)
 - NH Lymphoma (27%)
 - Increase in thyroid CA, salivary gland tumors, NP CA, SCCa
- (Conley 1970, Jaffe 1973, Cunningham 1987)

Malignant Neoplasms

	Conley 1970 (n=111)	Jaffe 1973 (n=178)	Cunningham 1987 (n=241)
Lymphoma:	21%	55%	59%
Hodgkin's:	55%	47%	59%
Non-H:	45%	53%	41%
Rhabdo:	22%	11%	13%
Fibrosarcoma:	20%	6%	<1%
Neuroblastoma:	5%	5%	5%
Thyroid CA:	6%	5%	10%
SCCa:	4%	4%	2%
Salivary CA:	8%	1%	2.5%

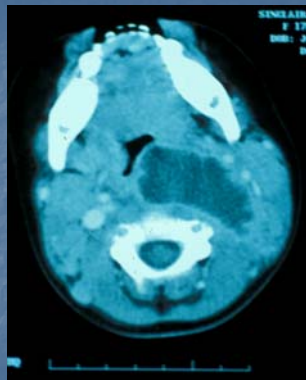
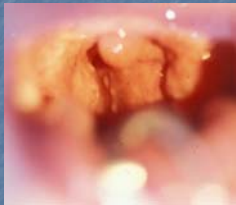


Symptoms

- If associated with URI:
 - Inflammatory adenopathy
 - Congenital cystic lesion
- Generalized symptoms (fever, weight loss, night sweats, fatigue):
 - Malignancy
 - Uncommon inflammatory conditions (TB)
- Asymptomatic:
 - Benign lymph node
 - Congenital lesion
 - Malignancy

Growth Pattern

- Recent enlargement (\pm pain):
 - Inflammatory adenopathy (URI)
 - Congenital masses during URI:
 - TGD cysts, branchial cysts, lymphangiomas
 - With high fever, neck stiffness, dysphagia, dyspnea:
 - Consider abscess
- Rapid enlargement over 2 months (non-tender):
 - Malignant lesions
- Slow or no enlargement over \geq 6 months:
 - Benign
 - Congenital



Growth Pattern

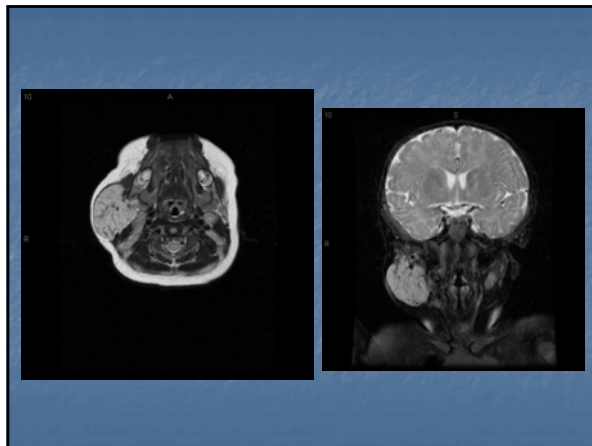
- Immediate enlargement with straining or crying
 - Venous malformation
 - Hemangioma
- Enlargement and pain while eating:
 - Sialadenitis
- Associated with trauma:
 - Hematoma

Vascular Anomalies

(Mulliken + Glowacki, *Plast Reconstr Surg*, 1982)

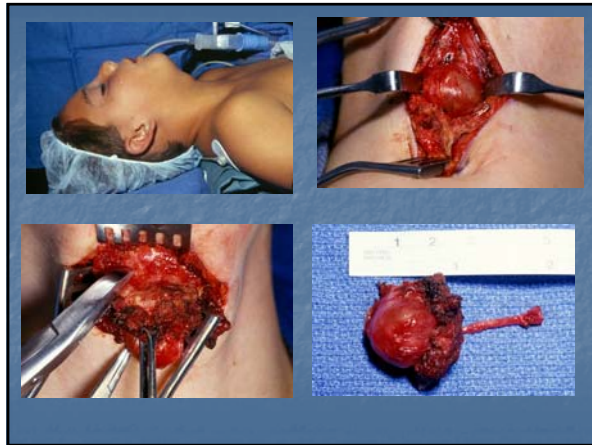
- Hemangiomas
 - Not present at birth
 - Endothelial proliferation (benign neoplasm)
 - Grows rapidly in early infancy
 - Undergoes slow involution
- Vascular Malformations
 - Present at birth
 - Dysplastic vessels with quiescent endothelium
 - Grows with the child
 - Slow-flow lesions: capillary, lymphatic, venous
 - Fast-flow lesions: arterial, arteriovenous (AVM)





Location

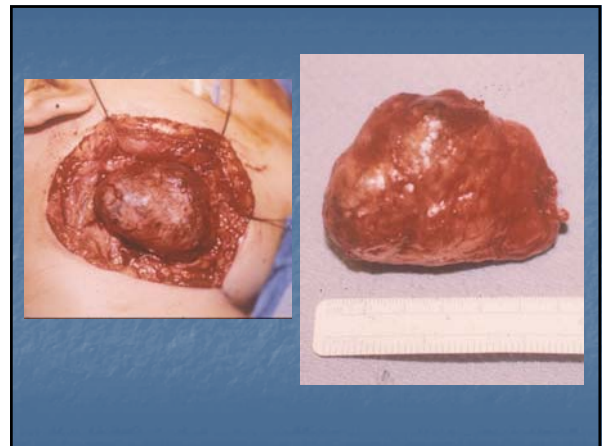
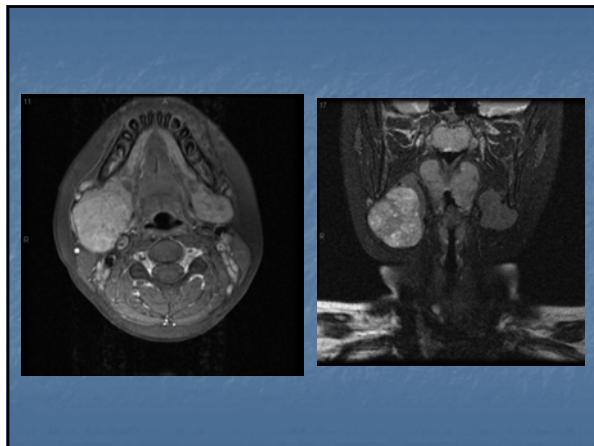
- Submental:
 - Lymphadenitis:
 - Teeth, lips, gingiva
 - Thyroglossal duct cyst
 - Dermoid cyst
 - Cystic hygroma
- Midline:
 - Thyroglossal duct cyst
 - Dermoid cyst
 - Lymphadenitis
 - Thyroid nodule
 - Excluding thyroid, most masses anterior to SCM are benign



Location

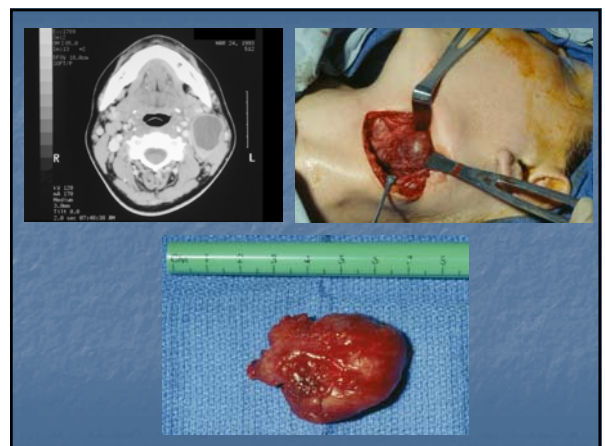
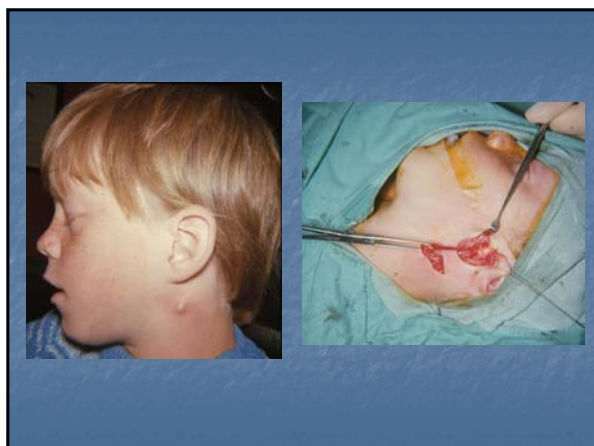
- Submandibular triangle:
 - Lymphadenitis
 - Lymphangioma
 - Sialadenitis:
 - >90% CF children > 2 years have submandibular gland enlargement (Zitelli 1981)
 - Atypical mycobacterial infection
 - Cat-scratch disease

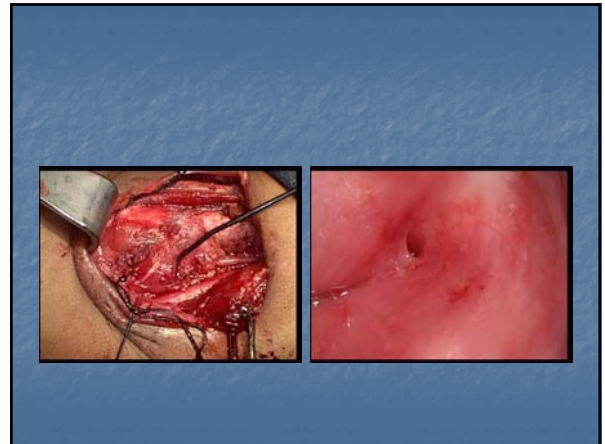
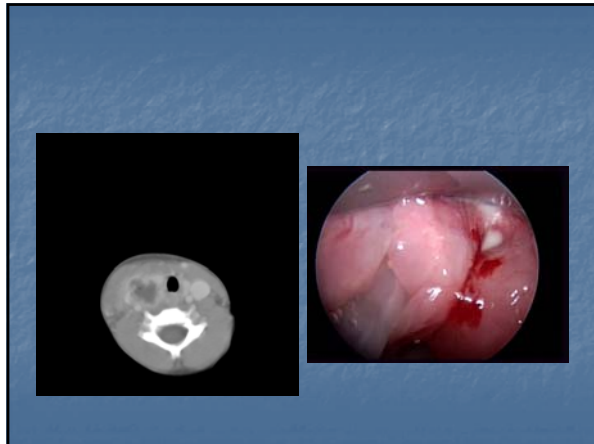




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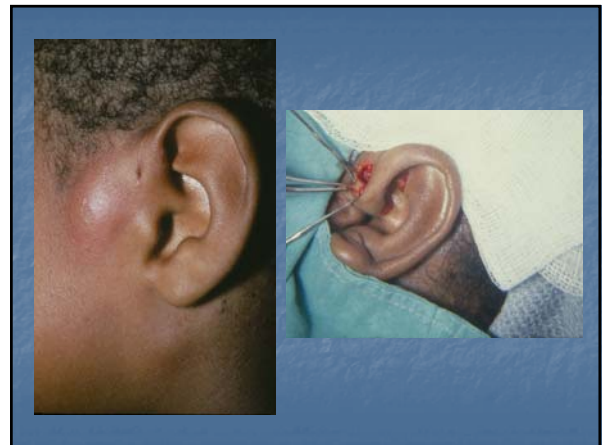
- Anterior deep cervical:
 - Lymphadenitis
 - May remain enlarged for months after viral infection
 - Branchial cleft cyst (anterior to SCM)
 - Lymphangioma
 - Neuroblastomas, sarcomas





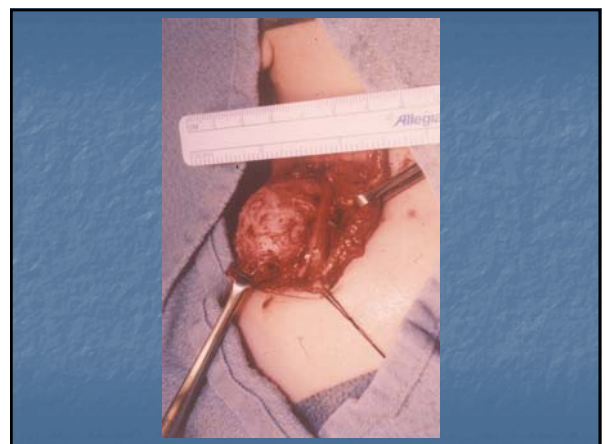
Location

- Preauricular:
 - Lymphadenitis:
 - Drain temporal region and conjunctival sac
 - Preauricular sinus/cyst
 - 1st branchial cleft anomaly
 - Cystic hygroma
 - Parotitis
 - Parotid neoplasm/adenopathy
 - Atypical mycobacterial infection
 - Cat-scratch disease
 - Hodgkin's disease



Location

- Occipital:
 - Lymphadenitis:
 - Scalp infections, seborrheic dermatitis, viral infections
 - Normally palpable in 5% of children (Zitelli 1981)
 - Lymphoma
 - Metastatic disease
 - Cystic hygroma
- Supraclavicular:
 - Lymphoma
 - 35% of children with lymphoma present with supraclavicular mass (Barni 1986)
 - 35% of children with supraclavicular mass have lymphoma (Forsiglietti 1983)
 - Cystic hygroma
 - Mediastinal disease (TB, histoplasmosis, sarcoidosis)
 - Metastatic disease



Physical Characteristics

- Shape, size, consistency, symmetry, mobility, signs of inflammation, suppuration, overlying skin discoloration
- Cystic:
 - Lymphangioma, congenital cysts
- Solid:
 - Inflammatory nodes vs. neoplasms
- Diffuse, soft, spongy:
 - Cystic hygroma, hemangioma

Physical Characteristics

- Lymphadenitis:
 - Multiple inflamed masses with fever, rash, irritability
- TGD cyst:
 - Midline mass, retracts with tongue protrusion or swallowing
- Congenital muscular torticollis:
 - Firm, noninflamed, solid mass within SCM; head tilt

Management

- H+P may supply enough information to assess risk of serious disease
- Individualize management
- If presumed bacterial adenitis or low-risk mass of undetermined etiology:
 - Consider trial of Abx and observation
- CBC with differential:
 - Inflammatory or malignancy suspected
- Serologic studies:
 - EBV (mono), cat-scratch disease, toxoplasmosis, CMV, histoplasmosis
- Skin testing and CXR: Mycobacterial infections
- CXR: When malignancy suspected, or if + PPD
- US: Distinguish between cystic and solid lesions; thyroid anatomy
- CT: Extent of lesion, cystic vs. solid, bony anatomy, abscess
- MRI: Excellent soft tissue resolution, vascular lesions, long exam time

Management

- Indications for open biopsy:
 - Palpable node that doesn't respond to, or grows larger despite, medical therapy, especially posterior neck/supraclavicular
 - Adenopathy with prolonged systemic symptoms (fever, weight loss, night sweats)
 - If any suspicion for atypical infection: send for routine C+S, AFB stain, mycobacterial culture, Warthin-Starry stain for cat-scratch
- FNA:
 - Well-described in adults
 - Less consistently used in children
 - Limited by experience of cytologists



Conclusions

- Pediatric neck masses are different than adult neck masses
- Differential diagnosis depends upon:
 - Age
 - Symptoms
 - Growth pattern
 - Location
 - Physical characteristics
- Management individualized