RUSH UNIVERSITY
Children's Hospital

Evaluation and Management of Pediatric Neck Masses and Thyroid Disease

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- No disclosures to report

Learning objectives

- Describe a systematic approach for evaluation and work-up of congenital and acquired pediatric neck masses
- Discuss pearls and pitfalls for surgical excision of common pediatric neck masses
- Describe a diagnostic algorithm for work-up of pediatric thyroid nodules
- Review indications for pediatric hemi- and total thyroidectomy

Pediatric neck mass: differential diagnosis

Congenital	Inflammatory	Neoplastic
- Thyroglossal duct cyst - Branchial cleft cyst/ sinus - Vascular anomalies (hemangioma, lymphatic, venous, arterial, mixed) - Dermoid cyst - Bronchogenic cyst - Teratoma	- Reactive lymphadenopathy - Bacterial - Viral - Granulomatous - Mycobacterial (tuberculous, atypical) - Histoplasmosis - Sarcoidosis - Cat scratch disease	- Benign (lipoma, fibroma, neurofibroma, thyroid nodule) - Malignant (Hodgkin's lymphoma, NHL, rhabdomyosarcoma, neuroblastoma, thyroid carcinoma, metastasis)

Differential based on location of neck mass

Midline	Lateral
- Thyroglossal duct cyst - Dermoid/ epidermoid cysts - Cervical cleft - Teratoma - Submental lymphadenopathy	- Branchial cleft cyst - Lymphatic/ vascular malformation - Lymphadenopathy - Thyroid nodule - Thymic cyst - Laryngocele - Benign soft tissue tumor - Sialadenitis

- HPI
  - Age
  - Onset
  - Rapidity of growth
  - Fluctuation in size
  - Pain
  - Infection
  - Trauma
  - Travel
  - Exposure

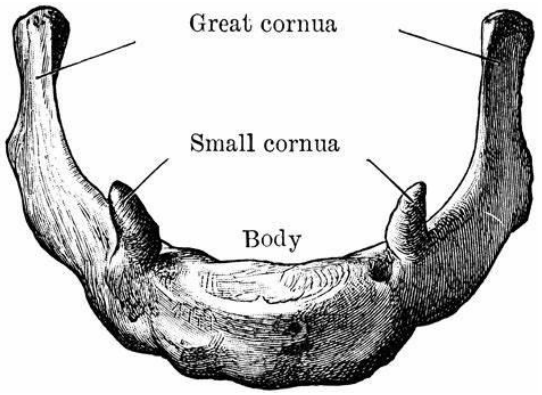
- Physical exam
  - Size
  - Multiplicity
  - Laterality
  - Consistency
  - Color
  - Mobility
  - Tenderness
  - Fluctuation

Work-up algorithm

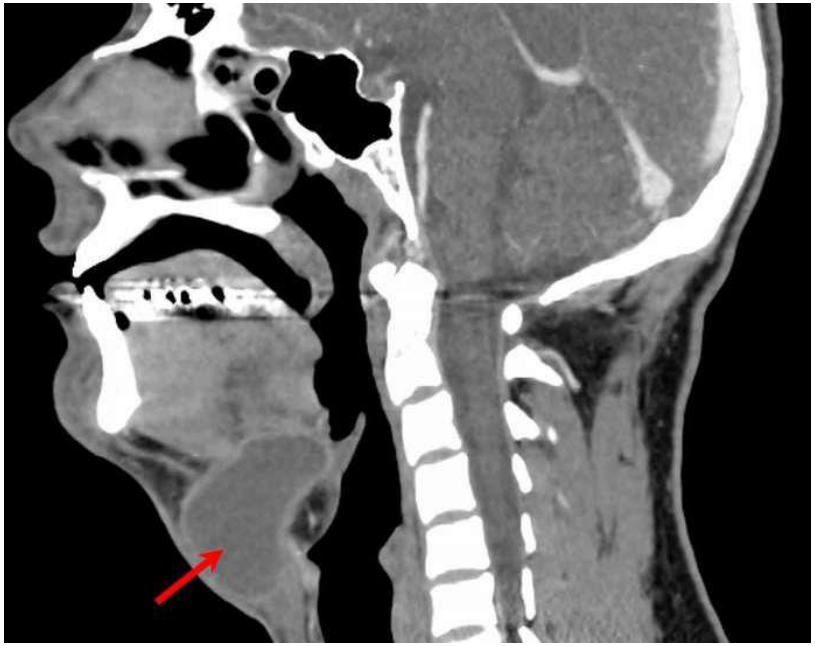
- Congenital: Ultrasound first
  - Consider CT or MRI if involves critical soft tissue structures such as parotid/ submandibular regions, proximity to facial nerve, atypical appearance or symptoms
- Inflammatory/ infectious:
  - CBC, trial of antibiotics
  - If persists beyond 2-3 weeks, consider CXR, PPD, US or specialty labs
- Neoplastic:
  - CBC, CXR
  - Can trial antibiotics
  - If persists beyond 2-3 weeks, FNA vs excisional biopsy

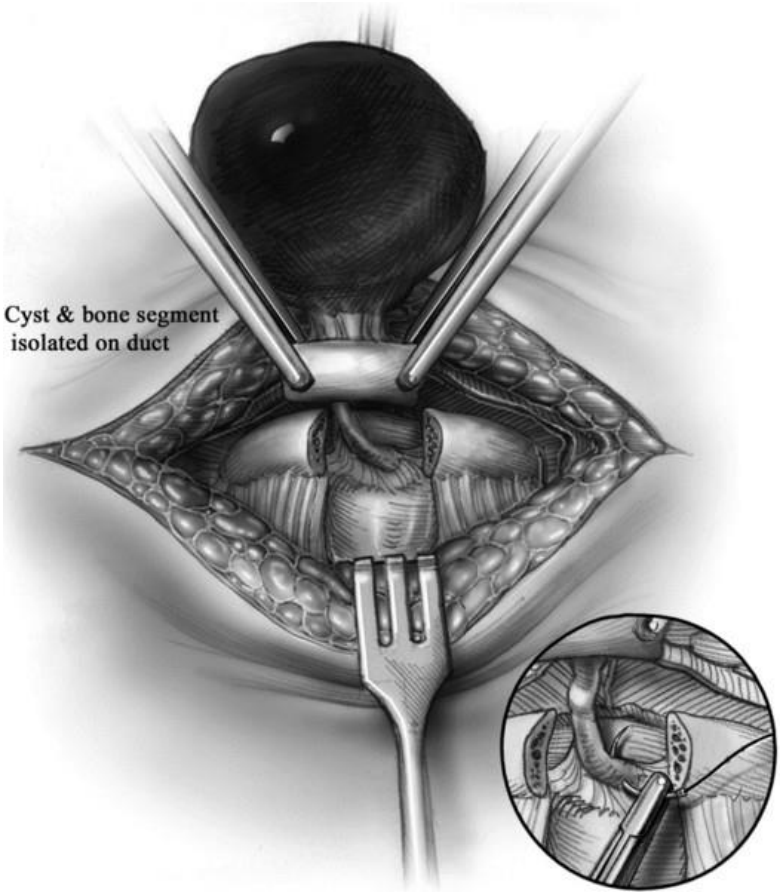
Thyroglossal duct cyst: classic

- Most common congenital lesion of neck
- Thyroid descends from foramen cecum into the neck at 5-8 wks gestation & thyroglossal duct obliterates
- Usually ~2-3cm midline cervical mass close to hyoid bone & moves with swallowing
- Recurrent infections common
- Treatment: Sistrunk procedure



Thyroglossal duct cyst: classic





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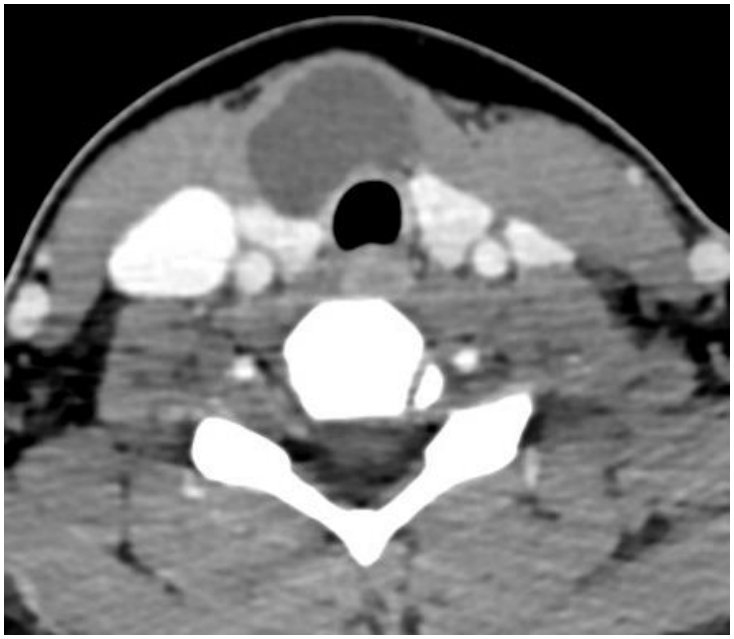
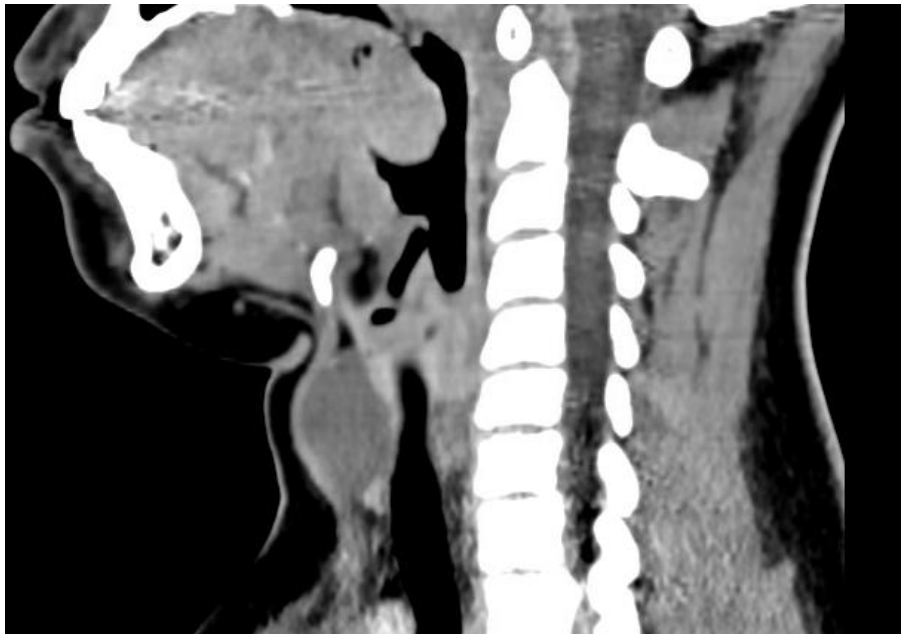
Thyroglossal duct cyst: pearls & pitfalls

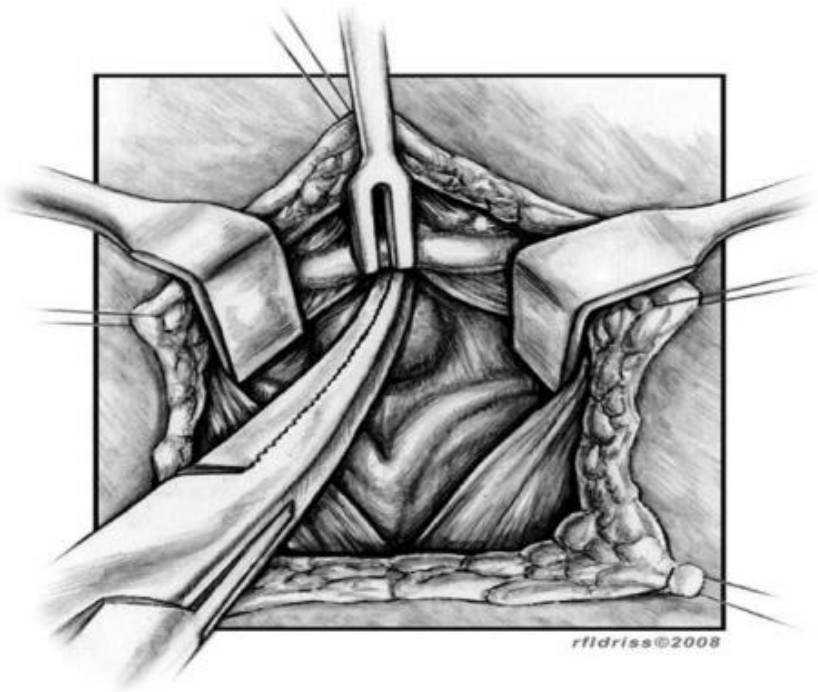
- Need to confirm normal thyroid tissue exists with thyroid US or CT
- Can be infrahyoid in location, Sistrunk still recommended
- Recurrence rates are high without excision of central portion of hyoid
- Can be paramidline especially if infrahyoid
- Metastatic papillary thyroid carcinoma is in the differential if paramidline, cystic & infrayoid

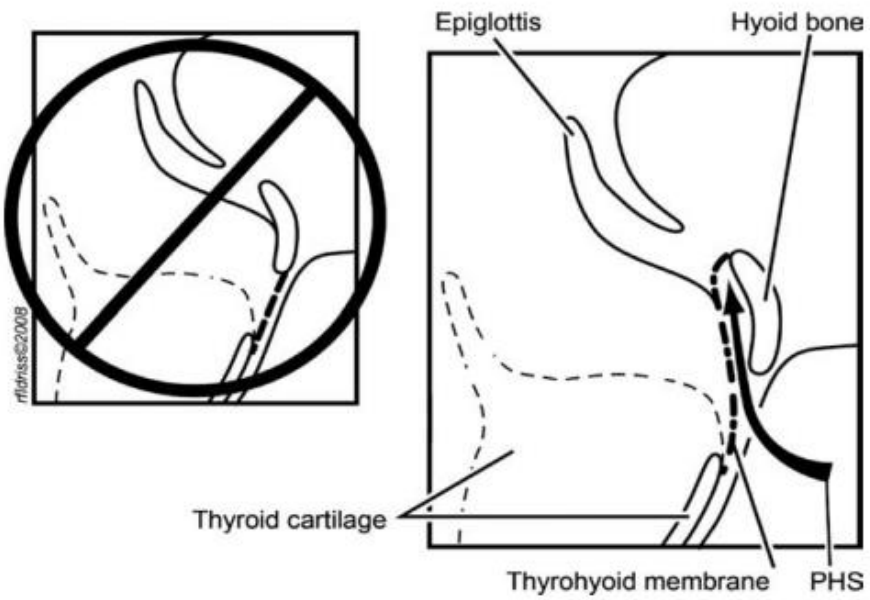
Infrahyoid thyroglossal duct cyst





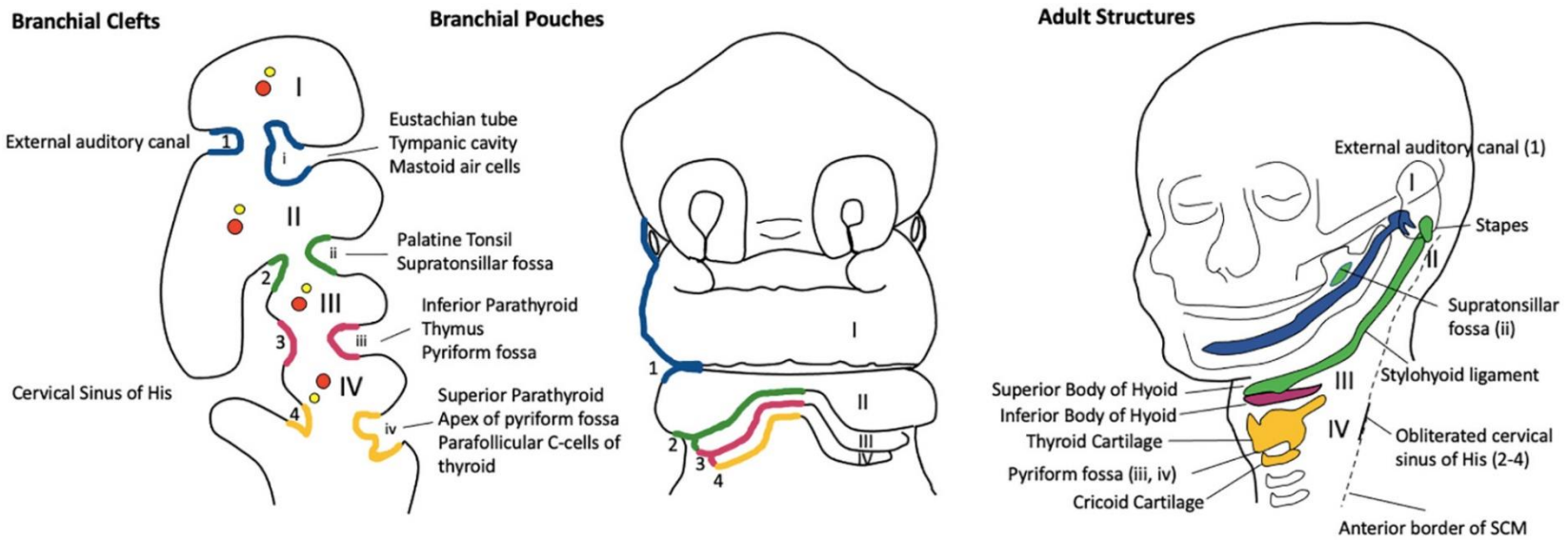
Thyroglossal duct cyst: posterior hyoid space





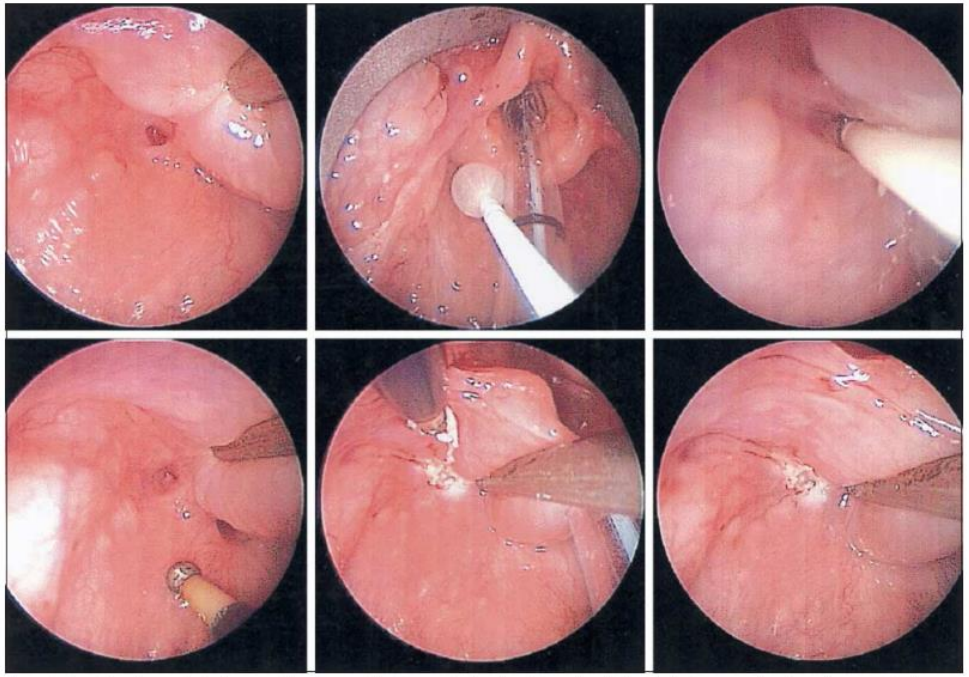
Branchial cleft anomalies

- Branchial anomaly and tract lie inferior to the derivatives of the associated arch & superior to all derivatives of the next arch



Branchial cleft anomalies: pearls & pitfalls

- Consider CT or MRI for surgical planning
- Dissect tract superiorly and ligate as close to tonsil/ oropharynx as possible for 2nd BCCs
- Consider DL to evaluate piriform sinus tract & use cautery to obliterate tract as 1st line treatment for 3rd & 4th BCC



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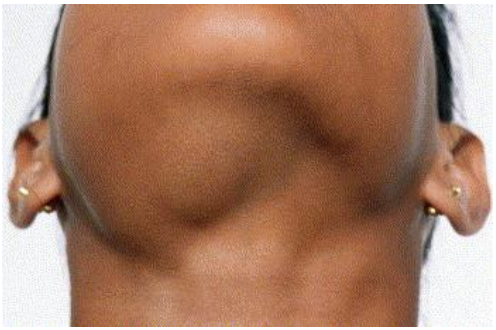
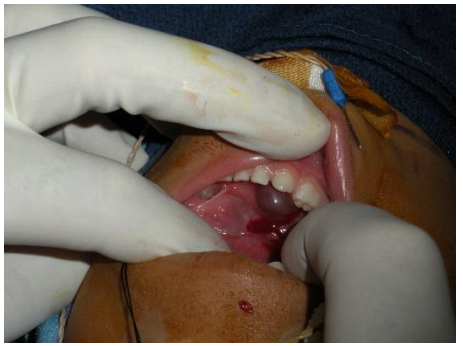
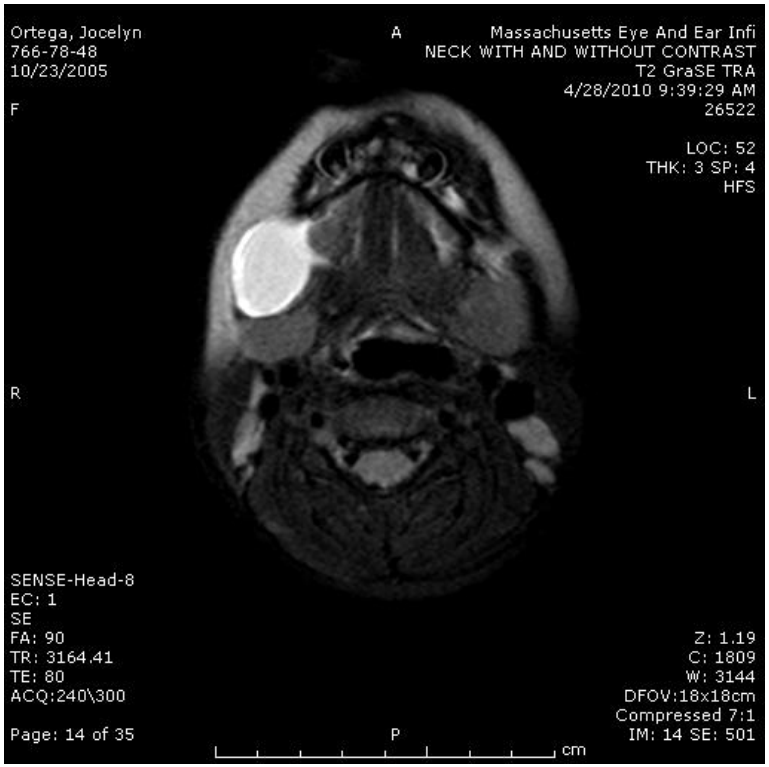
Plunging ranula

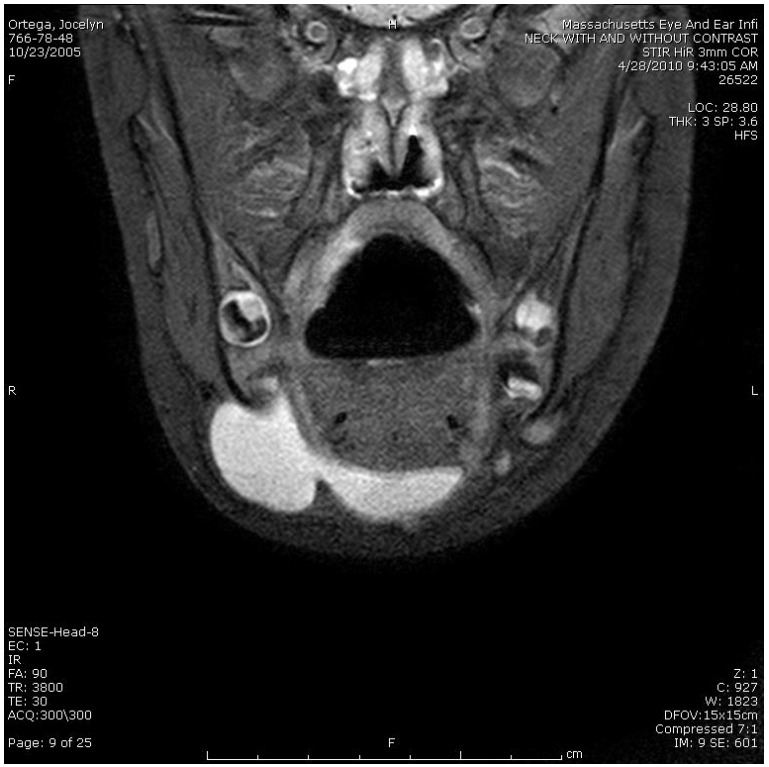
- Mucus extravasation pseudocyst arising from sublingual glands
- Mucus collection is in the infra mylohyoid compartment of the neck +/- associated intraoral collection
- Surgical procedures: marsupialization, excision of pseudocyst, excision of sublingual or submandibular gland





Plunging ranula





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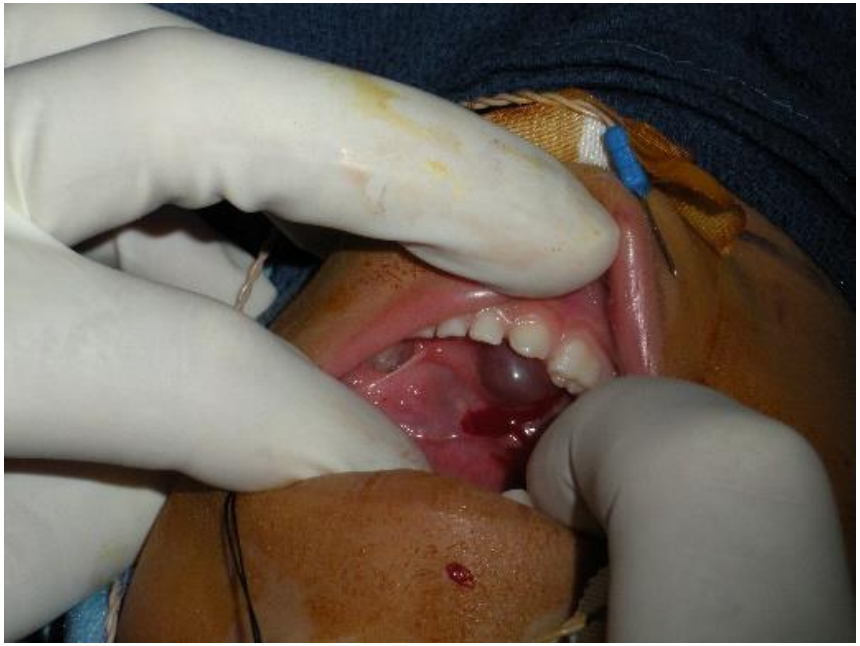
Plunging ranula



Plunging ranula: pearls & pitfalls

- Consider facial nerve monitor use
- Use lacrimal probe to cannulate Wharton's duct
- Utilize combined transoral + transcervical approach
- May need to excise submandibular gland for access
- Identify facial, lingual & hypoglossal nerves before ligating any vessels or ranula tract
- Consider decompressing cyst once all critical structures are identified & cyst limits have been delineated
- Excise culprit sublingual gland to prevent recurrence

Pediatric lymphadenopathy

- Infectious
  - Bacterial, viral, mycobacterial, fungal
- Neoplastic
- Lymphoproliferative
- Autoimmune/ immunologic
  - Castleman's disease
  - Kikuchi's disease
  - Kawasaki
  - Sarcoidosis
  - Rosai-Dorfman

Atypical (nontuberculous) mycobacterial cervicofacial adenitis

- M. avium-intracellulare, M. bovis
- Slow-growing
- Immunocompetent 2-5 yr olds
- Asymptomatic, may have violaceous overlying skin
- Predilection for submandibular/ parotid areas
- Treatment options: antibiotics vs complete surgical excision of all granulomatous/ infected tissue (may require partial parotidectomy)

Lymphoma

- Painless neck mass
- Hodgkin's in adolescents & NHL in 2-12 yr age group
- Male predominance
- High suspicion if:
    - >3cm in size
    - Firm
    - Multiple
    - Supraclavicular or posterior triangle nodes
- NHL may involve Waldeyer's ring

Rhabdomyosarcoma (RMS)

- 35-40% of RMS occurs in the H&N
  - 25% orbital
  - 50% parameningeal: paranasal sinuses, NP, NC, middle ear, mastoid
  - 25% non- orbital/ parameningeal: scalp, parotid, OC, pharynx, thyroid, parathyroid, neck
- MRI = imaging study of choice
- Excisional biopsy
  - FNA not adequate for diagnosis!

Rhabdomyosarcoma (RMS)

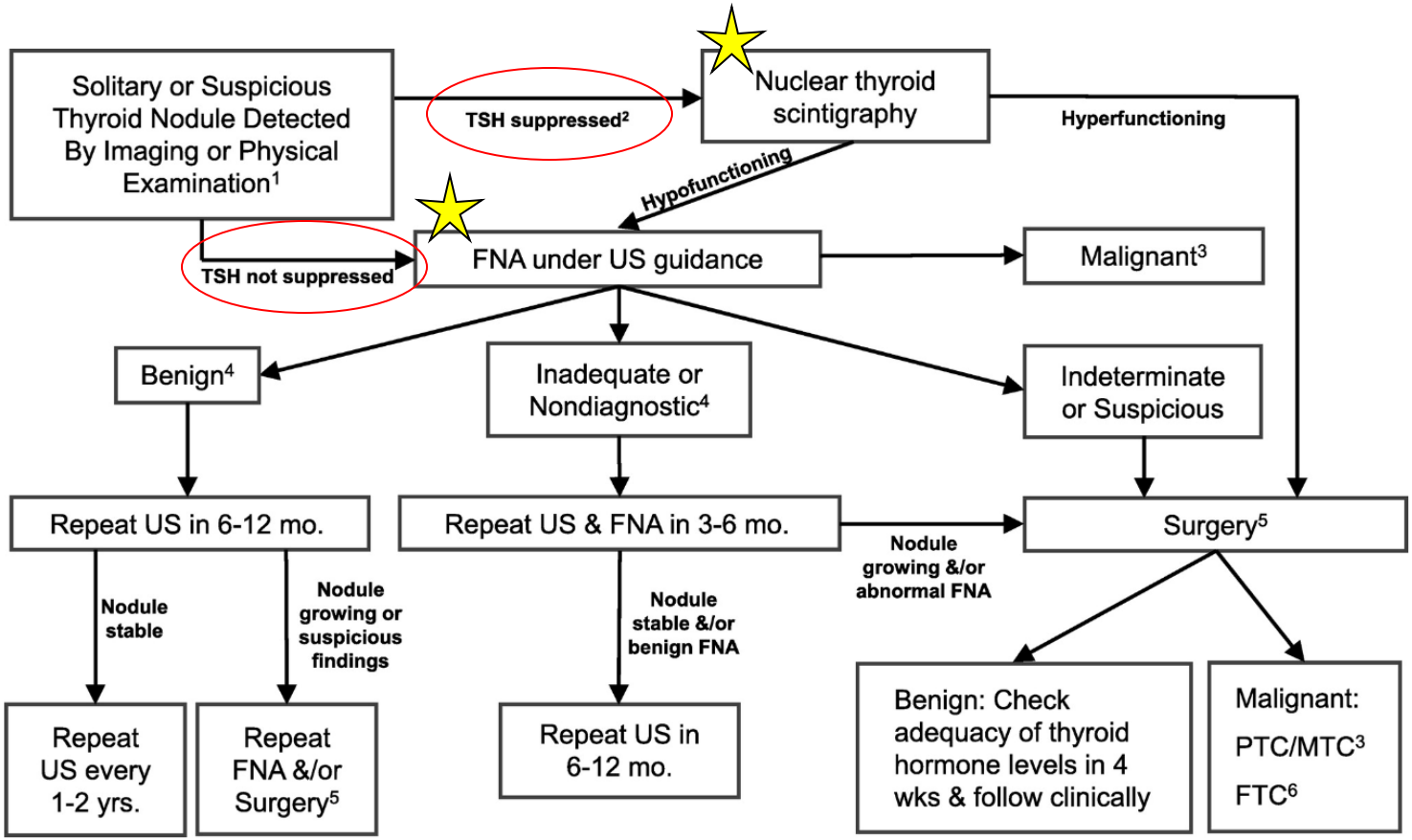
- Treatment options:
  - If small tumor, surgery than XRT
  - Induction chemo > local XRT > salvage surgery if any remaining disease
  - Chemo gold standard: VAC- vincristine, dactinomycin, cyclophosphamide

Pediatric thyroid disease

- Thyroid nodules are *less common* in children but *more likely* to be *malignant* (~25% vs 5% in adults)
- Risk factors: iodine deficiency, prior XRT (childhood CNS tumors, leukemia/ Hodgkin lymphoma survivors), genetic syndromes, antecedent thyroid disease
- DTC can present as a thyroid nodule or cervical LAD *without* a palpable nodule
- Children <10 yrs are at greater risk for more extensive disease & higher rates of recurrence

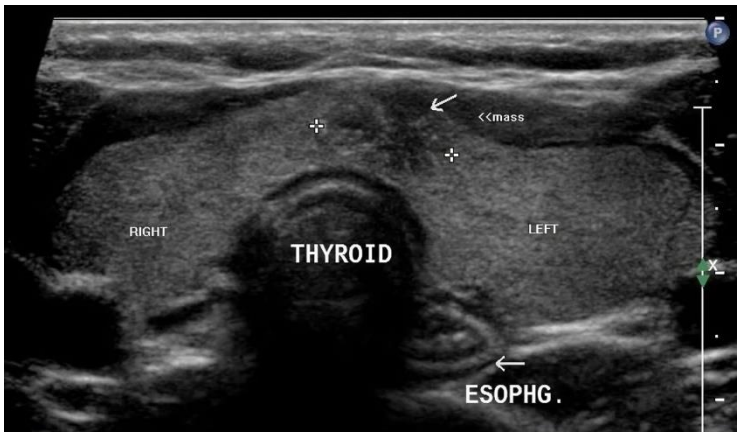
Management Guidelines for Children with Thyroid Nodules and Differentiated Thyroid Cancer

The American Thyroid Association Guidelines Task Force on Pediatric Thyroid Cancer



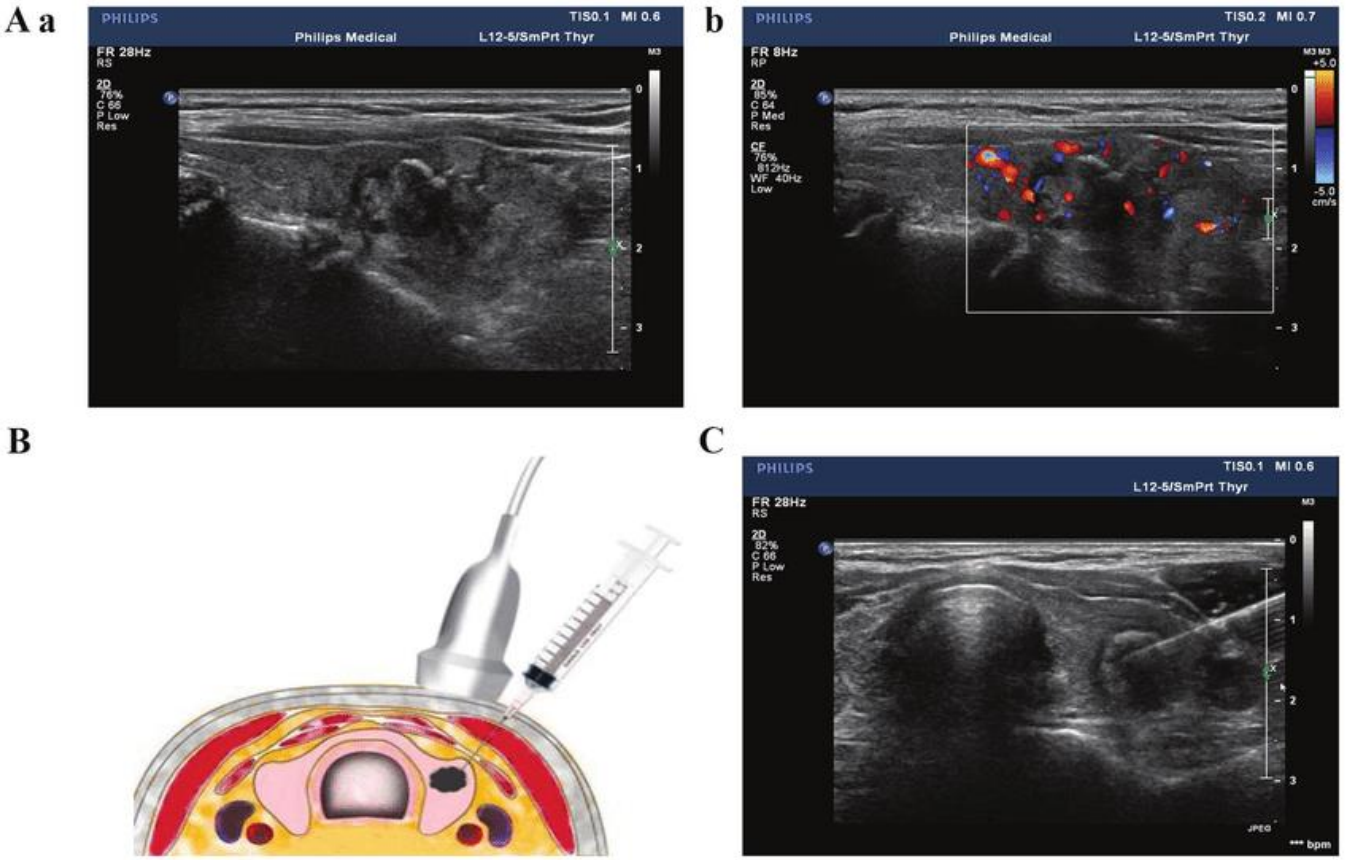
Pediatric thyroid nodule: work-up

- Thyroid function test (TSH, T3, free T4)
- Thyroid US
- Use US characteristics & clinical context to determine utility of FNA, *NOT size*
- FNA warranted for any thyroid nodule in children with risk factors for thyroid malignancy or high-risk US features:



- Hypoechogenicity
- Irregular margins
- Increased intranodular blood flow
- Microcalcifications
- Abnormal cervical lymph nodes

Pediatric thyroid nodules: work-up



All FNAs in children should be performed *with US guidance*

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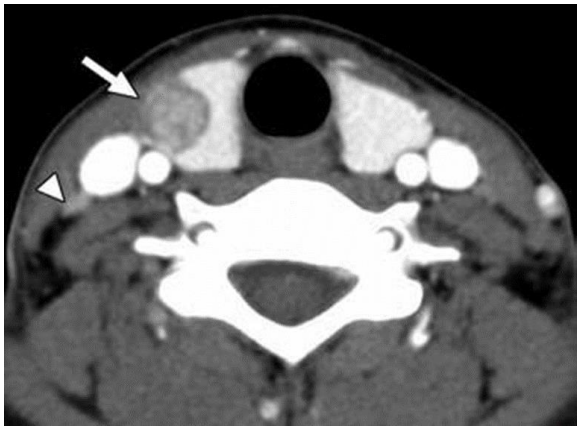
DTC preoperative work-up

- *Comprehensive neck US* including bilateral lateral necks & central neck to assess for any locoregional metastatic disease
- <u>Consider CT or MRI for</u>:
  - Large or fixed thyroid masses
  - VF paralysis
  - Bulky metastatic LAD
  - Concern for invasion of aerodigestive tract
- <u>Chest CT</u> for patients with substantial cervical LAD to evaluate for lung metastases



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Indications for pediatric hemithyroidectomy

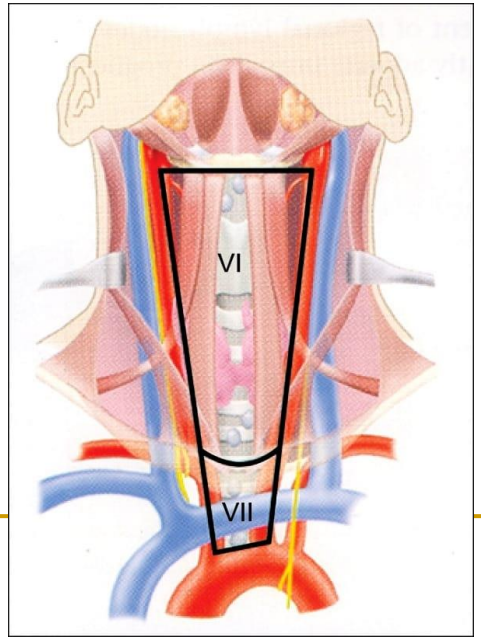
- Benign solid nodules >4cm
- Autonomous functioning nodule (toxic adenoma)
- Lesions demonstrating significant growth
- Compressive symptoms
- Lobectomy favored over FNA for most nodules with indeterminate cytology
- Cosmetic concerns
- Patient/ parent preference

Indications for pediatric *total* thyroidectomy

- Papillary thyroid carcinoma
  - Increased incidence of *bilateral* or *multifocal* disease in pediatric patients
  - Long term analysis: total thyroidectomy decreases risk for persistent/ recurrent disease compared to lobectomy
- Graves' disease:
  - 1) failure to achieve lasting remission on anti-thyroid drugs
    2) intolerance to methimazole & propranolol
  - 3) concerns regarding safety of RAI
- Large goiters especially if compressive symptoms
- Congenital goiter

To dissect the central neck or not?

- Central neck dissection for children with malignant FNA and:
  - Gross extrathyroidal invasion
  - Locoregional metastasis on preop imaging or intraop findings
- Goal: Decrease need for 2nd procedure & increase disease-free survival



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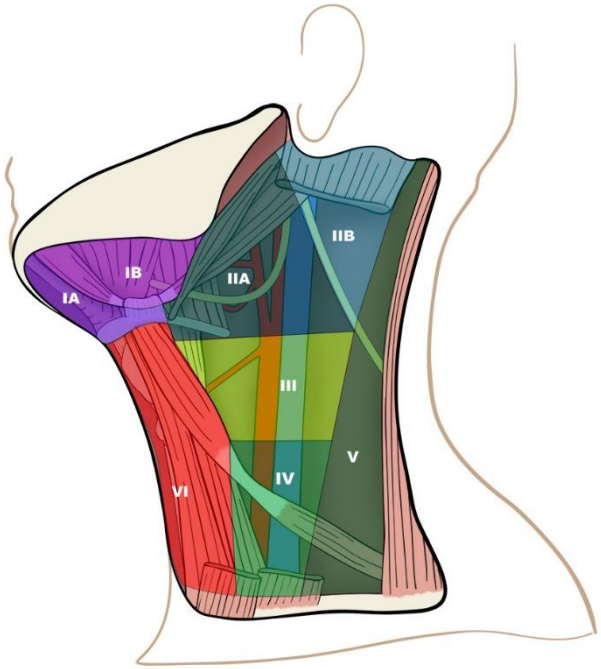
To dissect the lateral neck or not?

- Prophylactic lateral neck dissection is *not* recommended
- Lateral neck dissection if:
  - FNA-confirmed metastatic disease in the lateral neck



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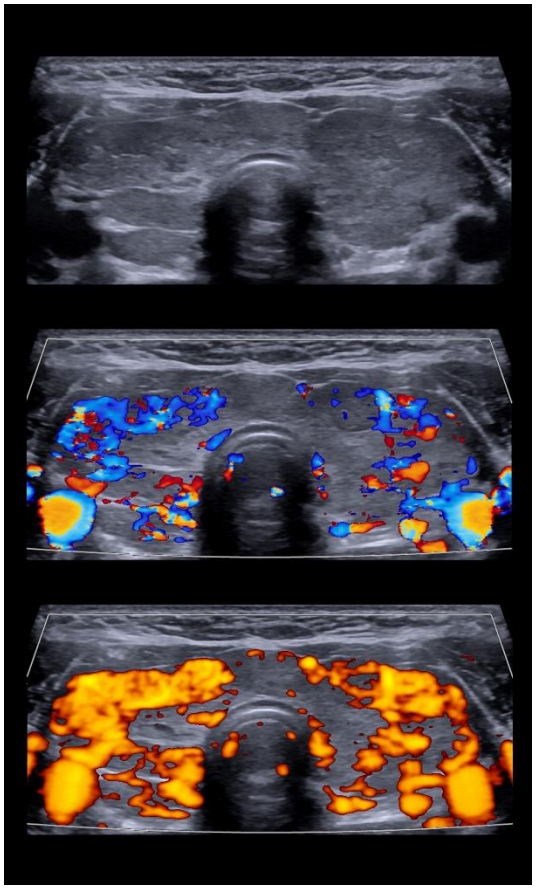
Pediatric thyroid surgery: pearls & pitfalls

- Graves' patients: euthyroid prior to surgery to prevent thyroid storm
- Intraop RLN monitoring especially in patients undergoing CND or revision surgery
- Consider staging 2nd side if weak nerve signal
- PTC may present as diffuse enlargement of a lobe or entire gland
- Recurrence of DTC in children has been reported as long as 40 yrs after initial therapy
  - Children with DTC should be followed for life!



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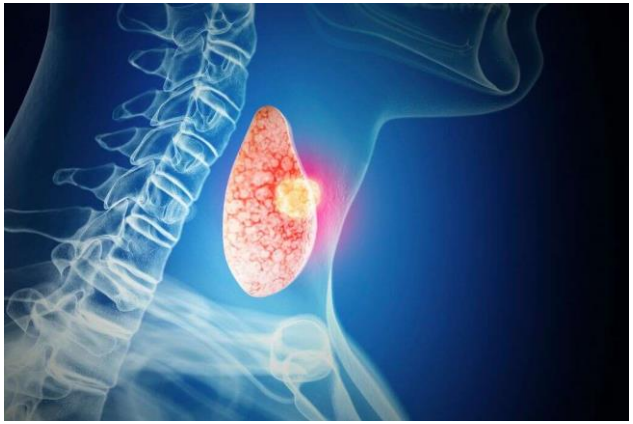
Pediatric thyroid disease: pearls

- Thyroid nodules are *uncommon* in children but when present, *more likely* to be malignant
- *Thyroid US + TFTs* for all pts presenting with thyroid nodule
- US features & clinical risk factors determine need for FNA, *NOT* nodule size!
- All FNAs = *US guidance*
- Comprehensive neck US necessary to evaluate all regions of bilateral neck prior to thyroid surgery when concern for malignancy
- If performing lobectomy, must continue close surveillance of nodules in remaining lobe



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