Atypical Mycobacterial Lymphadenitis in the Head and Neck of Pediatric Patients

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Grand Rounds Presentation
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3 yo F with 4 wk h/o enlarging neck mass as pictured. Denies f/c. mildly reactive PPD. No change with Amoxicillin Rx’ed by PCP. What would you do?

- A. observation
- B. different course of antibiotics
- C. I&D
- D. Surgical excision
- E. Surgical excision + antibiotics
NOTES: La Miseria by Cristobal Rojas in 1886. The author, suffering from TB, depicts the social aspect of the disease, and its relation with living conditions at this period of time.
History

- **Hippocrates** first coined the term scrofula.
- From Aphorisms circa 400 BC:
  “11. In persons affected with phthisis, if the sputa which they cough up have a heavy smell when poured upon coals, and if the hairs of the head fall off, the case will prove fatal. 12. Phthisical persons, the hairs of whose head fall off, die if diarrhoea set in”

NOTE: In Aphorisms by Apocrotes circa 400 BC
“King’s Evil”

- In the Middle Ages in England and France, royalty could heal scrofula.
- Began with:
  - King Edward the Confessor in England in ~1003-1066
  - Philip I in France in 1052-1108
- Showed that their right to rule was God-given.
- Charles II touching a pt ->
History of Atypical


- 2 subsequent papers M. avium was described in 2 children; previously described as virulent in chicks earlier.
Epidemiology

- Found in:
  - Natural soil and water environments
- As opposed to tuberculosis,
  - Atypicals not transferred from pt to pt from airborne contact
- Most common single organ affected is the lung; this is usually in immunocompromised adults.
  - Can involve cutaneous tissue as s.c. nodules, cellulitis, abscess
  - Can involve eye as keratitis, scleral buckle infections, and peri-ocular tissue in adults
Pathophysiology

- 2 clear routes of acquisition
  - Inhalation -> pulmonary Dz
  - Ingestion -> GI Dz

- Based on mechanism of MAC infections of the lung/GI:
  - Organisms adhere to mucosal surface (ie intestinal mucosa)
  - Macrophages phagocytose organisms.
  - Within macrophage, MAC survives within a vacuole and replicate
  - When host’s defense weakens, the host cell ruptures and spills replicated organisms
  - Spreads via local lymphatics

NOTES: Macrophage phagocytosing mycobacterium
NOTES: The electron micrograph shows macrophages digesting pathogenic mycobacteria.
Etiology

- Secretions of OC, pharynx, face go to anterior cervical LN
- **Tonsils** considered portal site for TB, evidence for atypicals not present
- *Eruption of teeth and propensity of children to put contaminated objects in mouth may point to gingiva and OP mucosa as portals (2 sources state this)*
  - Supported by the fact that this infection appears to have predilection for the first echelon nodes of the OC and salivary glands.
- Natural history not clearly defined.
- Dissemination/co-lung disease not common.
TB vs. Atypicals

- Lai et al. from BU; retrospective review from 1972-1982 showed (n=250):
  - Ages 1-12 yo:
    - TB: 5
    - M. scrofulaceum: 10
    - MAC: 45
  - Ages over 12 yo:
    - TB: 147
    - MAC: 5
    - Others: 2
Cases of mycobacterial cervical adenitis by age group.

- **Mycobacterium tuberculosis**
- **Atypical Mycobacteria**

No. of Cases vs. Age, yrs

- <1
- 1-3
- 3-5
- 5-12
- 13-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- >80

Legend:

- Solid bars: Mycobacterium tuberculosis
- Open bars: Atypical Mycobacteria
Demographics

More females than males:
- Wolinsky: 1.3:1 F:M (96/105 had cervicofacial, 9 elsewhere)
- Fraser et al.: 17 F, 14 M
- Hazra et al.: 12 F, 7 M
- Tunkel et al.: 8 F, 7 M
- Robson et al.: 8 F, 4 M
- Kuth et al.: 6 F, 4 M

Age of affected:
- Wolinsky: 9.5 mo – 12 yo; median 2.92 yo; n=105
- Fraser et al.: 1 yo – 11 yo; mean 4.2 yr; mode = 4
- Hazra et al.: 15 mo – 56 mo; n=19
- Tunkel et al.: 17 mo – 78 mo; median 28 mo; n=15
- Robson et al.: 1 yo – 4 yo; mode 2 yo (x7); n=12
- Kuth et al.: 1 yo – 7 yo; mean 2.2 yo; n=10
Etiology
Mycobacterium, the genus

- **Tuberculous Disease**
  - M. tuberculosis (USA)
  - M. bovis
  - M. africanum
  - M. microti (not in humans)

- **Leprosy**
  - M. leprae
  - M. lepromatosis

- **Atypicals**
  - MAC = M. avium + M. intracellulare
  - M. kansasii
  - M. chelonei
  - M. scrofulacuem
  - M. malmonense
  - M. abscessus
  - M. fortuitum
  - M. lentiflavum
  - M. tusciae
  - M. palustre
  - M. interjectum
  - M. elephantis
  - M. heidelbergense
  - Among many others
Atypical Mycobacterial Lymphadenitis

- Most common pathogens
  - MAC
  - M. scrofulaceum
  - M. haemophilum
  - M. malmoense (northern Europe/England)
Kuth et al.

- German paper in 1995 showed increase in atypicals vs. TB in infectious lymphadenitis
  - 1987-1990: 1 out of 77 was + for atypicals, 4 were + for TB
  - 1991-1993: 9 out of 85 was + for atypicals, 5 were + for TB
  - In 1991, they started using the BACTEC TB 420 System for culture and DNA gene probe for MAC.
  - Attributed increase to improvement in detection.
Prospective personal experience from 1958-1990
105 cases, median age of 2.92 yo. (96/105 were H&N, 9 elsewhere)

98 positive cultures
- 1958-78
  - 35 M. scrofulaceum
  - 7 MAC
- 1979-90
  - 9 M. scrofulaceum
  - 26 MAC
Lindeboom et al.

- Combination of culture and/or PCR
  - PCR only for haemophilum and MAC

- Out of 100 children
  - MAC 71
  - M. haemophilum 22
  - M. malmoense 3
  - M. Kansasii 1
  - M. fortuitum 1
  - M. chelonei 1
  - Non-typable 1
Diagnosis
H&P

- Firm, painless, discrete cervicofacial mass
- Not-responsive to Abx (wks)
- May enlarge and become fluctuant
- Violaceous hue
- Skin may become necrotic
- May form chronic discharge/sinus tract formation
Presentation

- Fraser et al. with 5 yr retrospective review
  - N=31
  - 32% had palpable lymphadenopathy alone
  - 20% had lymphadenopathy with skin discoloration alone
  - 16% had skin discoloration only
  - 32% had necrosis or sinus formation

NOTES: Picture from: Figure 13. A child with a lump in the submandibular region of the anterior triangle. The skin change is typical of non-tuberculous mycobacterial infection.

**Diagnosis and management of neck lumps**
M.S. Thevasagayam, Andrew J. Parker - Surgery (Oxford) Volume 27, Issue 12, December 2009, Pages 523–529
# Lymph Node Site

<table>
<thead>
<tr>
<th>Author</th>
<th>SMan</th>
<th>Neck</th>
<th>Parotid/Pre-ear</th>
<th>SMen</th>
<th>Multiple</th>
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<tbody>
<tr>
<td>Hazra</td>
<td>10</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindeboom</td>
<td>77</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Tunkel</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td></td>
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</tbody>
</table>

**NOTES:** Picture from: Chris J. Stutchfield, Jenny Tyrrell. 
# Causes of lymphadenopathy in children and differential diagnoses

## Infectious causes of lymphadenopathy

<table>
<thead>
<tr>
<th>Age</th>
<th>Organism</th>
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<tbody>
<tr>
<td>Infant</td>
<td><em>Staphylococcus aureus</em></td>
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<tr>
<td>&lt;5 years</td>
<td><em>Group B Streptococcus</em></td>
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<tr>
<td></td>
<td>Group A β-haemolytic <em>streptococcus</em></td>
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<tr>
<td>≥5 years</td>
<td><em>Staphylococcus aureus</em></td>
</tr>
<tr>
<td></td>
<td><strong>Non tuberculous mycobacteria</strong></td>
</tr>
<tr>
<td>At any age</td>
<td>Cat scratch disease (<em>Bartonella</em>)</td>
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<tr>
<td></td>
<td>Toxoplasmosis (protozoal)</td>
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<td></td>
<td>Viral infections: Epstein-Barr Virus (EBV)</td>
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<tr>
<td></td>
<td>• Adenovirus</td>
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<td></td>
<td>• Herpes simplex virus</td>
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<td></td>
<td>• Varicella-zoster virus</td>
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<tr>
<td>Less common but all ages</td>
<td>Brucellosis</td>
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<tr>
<td></td>
<td>Lyme disease (<em>Borrelia</em>)</td>
</tr>
<tr>
<td></td>
<td>HIV</td>
</tr>
</tbody>
</table>

## Non-infectious causes of enlarged nodes at any age

- Malignancies
- Leukaemia
- Non-Hodgkin’s lymphoma
- Hodgkin’s lymphoma
- Neuroblastoma
- Rhabdomyosarcoma
- Metatstatic disease
- Histiocytoses
- Kawasaki disease
- Systemic lupus erythematosus
- Juvenile rheumatoid arthritis
- Chronic granulomatous disease
- Sarcoidosis
- Drugs
- Post-immunization (DTP, polio, typhoid)  
- Storage diseases (Gaucher, Niemann-Pick)

## Simulators of enlarged nodes at any age

- Salivary glands
- Parotitis (*crosses mandible*)
- Cystic hygroma (*transilluminates*)
- Branchial cleft cyst (*pitted/dimpled*)
- Thyroglossal cyst (*midline, moves on swallowing*)
- Demoid cyst (*midline*)
- Lipoma
- Sternomastoid tumour
- Fibroma/neurofibroma
- Cervical rib (*bony, CXR*)
Diagnostic Procedures

- U/S-guided FNA – tissue needed to culture
- Wound Culture, if already draining
- More of a clinical suspicion/diagnosis
Laboratory Work-up
Purified Protein Derivative (PPD)

• AKA Mantoux screening test
• 5 tuberculin units (TU) intradermal injection
• Positive if:
  ▫ 5 mm or more for HIV+, TB contact, CXR change, immunosuppressed
  ▫ 10 mm or more for recent immigrants, IVDU, high-risk (jail, homeless, microlab personnel, ENT residents), high-risk children (<4 yo, etc.)
  ▫ 15 mm or more with no risk factors
PPD (Wolinsky study)

- Induration size of:
  - None
  - 5 or less
  - 6-10
  - 11-15
  - >15
  - Positive (without measurement)
  - Not recorded

NOTES: Of the 13 that had no induration, 9 were retested with 250 TU and all were 13 mm or larger.

- # of Children:
  - 13
  - 14
  - 30
  - 27
  - 7
  - 8
  - 6
“Acid-fast” Bacilli

- Lipid-rich and mycolic acid-containing cell walls allow for low permeability of basic dyes.
Ziehl-Neelson method

- Fuchsin and phenol for colorization
- Hydrochloric acid and ethanol for acid decolorization
- Counterstaining with methylene blue
- Against blue background, acid-fast bacilli (AFB) appear as red rods under microscopy
Kinyoun Stain

- Prolonged exposure to auramine-rhodamine dye
- Decolorization with hydrochloric acid and ethanol
- Brief treatment with potassium permanganate solution
- Fluorescent microscopy reveals bright yellow rods against a dark background
- More sensitive than Ziehl-Neelson but more FP’s.
Culture

- **Special solid agars**
  - **Solid Lowenstein-Jensen medium**
    - +ferric citrate specifically for M. haemophilum
  - **Middlebrook 7H-11 agar plate**
  - Need 2-8 wk to get adequate growth

- **Liquid broth**
  - 7H-9 broth
  - Need 1-3 wk

**CDC recommends both methods for clinical specimens**
Runyon Criteria

• 4 groups – distinguished by in vitro growth characteristics
  1. Photochromogens – yellow pigment on light exposure
  2. Scotochromogens – produce pigment without light exposure
  3. Nonchromogens – no production of pigment
  4. Rapid growers – cultured within 1 wk
Species identification

- Nucleic acid probes
- PCR

Bottom Line – expensive and time-consuming for diagnosis of atypical mycobacterium and speciation.
Histology of H&E stain (Wolinsky study)

Histology (number of cases)
- Dimorphic granuloma (24)
- Caseating granuloma (40)
- Other granuloma (14)
- Fibrocaseous granuloma (5)
- Calcified granuloma (10)

Duration of disease
- 5.9 wk
- 10.2 wk
- 7.3 wk
- 12 wk
- 29.3 mo (range 2-132)
Radiology
Ultrasound
• No radiation
• Diagnostic for number and size of LN

Left: Transverse sonogram showing a lymph node involved with mycobacterial lymphadenitis (arrows). Note the intranodal cystic necrosis which appears as a hypoechoic area within the lymph node (arrowheads).

Right: Longitudinal sonogram showing a lymph node involved with mycobacterial lymphadenitis. The lymph node is hypoechoic and with dense intranodal calcification (arrows). Distal acoustic shadowing (arrowheads) is a common ultrasound artifact associated with dense calcification.
CXR

- R/O any pulmonary involvement
  - If positive, suspect TB, not atypicals
CT

- Robson et al. studied CT’s of 10 children (9 mo – 4 yo, avg about 2 yo) with atypical mycobacterial lymphadenitis.
- Masses were heterogeneous necrotic ring-enhancing masses
- 10 had violaceous hue
- On CT:
  - 10 had skin extension
  - Fat stranding: 9 was minimal, 2 were absent
  - All had necrosis
  - Only 1 had calcifications
    - Calcifications are highly suggestive of TB
- All pt had surgical procedure in addition to abx which included clarithromycin +/- ethambutol +/- rifampin +/- others
Girl, 2 years six months old, with nontender right submandibular mass. Axial contrast-enhanced CT scan shows medial displacement of right submandibular gland (S) by right submandibular adenopathy (A). Suppurative granulomatous material represented by low-density ring-enhancing subcutaneous mass (arrow) extending from adenopathy to skin. Minimal stranding of adjacent subcutaneous fat is present.
Girl, 2 years six months old, with nontender right submandibular mass. Axial contrast-enhanced CT scan shows medial displacement of right submandibular gland (S) by right submandibular adenopathy (A). Suppurative granulomatous material represented by low-density ring-enhancing subcutaneous mass (arrow) extending from adenopathy to skin. Minimal stranding of adjacent subcutaneous fat is present.
CT

- Hazra et al. had 6 pt with CT which showed:
  - Ring enhancing masses
  - Minimal inflammatory stranding of s.c. fat
  - 4/6 had skin extension
  - 1 had calcifications
Antibiotics
Isoniazid

- Bactericidal
- Inhibits cell wall mycolic acid synthesis
- Metabolized by acetylation
  - Rapid metabolizers in Japan/China/Alaska
- For atypicals:
  - 300 mg/day; up to 5mg/kg/day
- Monitor **hepatotoxicity**
  - Baseline LFT’s
- Monitor **neurotoxicity**
  - Peripheral neuropathy
  - Optic neuritis
  - Supplement with Pyridoxine at least 25 mg/day
- **Tyramine toxicity**
  - Watch for cheese and wine (remember MAOI’s for depression)
Rifampin and Rifabutin

- Eliminated by hepatic metabolism
- Rifampin is 600 mg/daily po, up to 10 mg/kg/day
- Rifabutin is 300 mg/daily po
- Rifampin makes urine and sweat orange. Soft contacts can be stained.
  - Can cause GI intolerance, flu-like Sx
  - Hepatic cholestasis
- Rifabutin can cause rash, orange discoloration, GI issues
  - Uveitis, neutropenia, thrombocytopenia, arthralgia
- Both are potent CYP enzyme inducers
  - Watch out with HIV drugs
Ethambutol

- MOA – interferes with protein metabolism through inhibition of RNA synthesis.
- Kidney excretion
- 15-20 mg/kg/day orally.
- Most common serious S/E: **Optic neuritis**. Pt needs baseline ophthalmologic exam for red/green color discrim and visual acuity. This is reversible with d/c of medicine.
- Also causes hyperuricemia, rash, dizziness
Macrolides

- Includes clarithromycin, azithromycin
- **Clarithromycin** key in MAC infections.
- Azithromycin used to MAC ppx.
- Primary metabolism in liver
- s/e include: GI intolerance (~erythromycin)
- Clarithromycin is potent CYP inducer
Fluoroquinolones

- MOA: inhibits deoxyribonucleic acid-gyrase and topoisomerase IV.
- Primary kidney excretion, some liver
- Contraindicated in children for adverse effects on cartilage development and tendon ruptures.
Other Antibiotics

- Aminoglycosides
  - Streptomycin and amikacin
- Beta-Lactams and Carbapenems
  - Cefoxitin and Imipenum-cilastatin
- Tetracyclines
  - Doxycycline and minocycline
- Bactrim
- Clofazimine
General Recommendations for MAC

- Clarithromycin plus Ethambutol
- +/- rifabutin, ciprofloxacin, levofloxacin
General Recommendations for *M. scrofulaceum*

- Isoniazid plus rifampin
- +/- clarithromycin
Hazra et al. (ID at Boston Children)

- N=19 with 9 undergoing surgery and 10 undergoing abx Tx.
  - Of the 10, 5 resolved and 5 needed surgery
  - 8 had MAC, others were ND
  - Susceptibility showed all isolates susceptible to clarithromycin and combo of rifampin and ethambutol

- Clarithromycin 20-30 mg/kg/day
- Ethambutol 12.5-19 mg/kg/day
- Rifampin 6-20 mg/kg/day
Fraser et al. in Scotland

- 5 yr retrospective review with n=31
  - 27 had surgery
  - 4 treated with triple therapy for 6 mo:
    - Clarithromycin 30 mg/kg/d
    - Ethambutol 15 mg/kg/d
    - Rifampin 20 mg/kg/d
  - No recurrence.
Surgical Intervention
Surgical Interventions

- Needle Aspiration
- Incision and Drainage
- Curettage
- Lymph Node(s) excision
- Lymph Node(s) excision +Abx
Needle Aspiration

- Alessia and Dudley at UCLA
- 9 pts treated from 1975-1988 with needle aspiration with concomitant Abx
- 39 total cases; 17 due to atypicals
  - 6 with LN excision, 1 with I&D, 1 with abx, 9 with aspiration
  - 5 needed 1 aspiration, 2 needed 2 and 2 needed 3
- 5 showed MAC, 2 showed scrofulaceum
Incision and Drainage (I&D)

- **DO NOT PERFORM I&D ON SUSPECTED MYCOBACTERIAL CERVICOFAICIAL LYMPHADENITIS!**
- Chronic local drainage
- Sinus tract formation
Curettage

• Recommended for when:
  ▫ Skin necrosis
  ▫ Fluctuation
  ▫ Proximity to FN

Figure 9. Atypical mycobacterial cervical lymphadenitis.
Tunkel et al. from JHU

  ▫ 10 had surgery
    ▪ No recurrence
    ▪ 3 had transient FN paresis which resolved in < 3 mo
  ▫ 5 had curettage (skin necrosis/fluctuation)
    ▪ 1 recurrence
      • Resolved with 2nd curettage
Surgical Excision

- Complete excision of the involved LN’s.
- Watch out for MM of FN for submandibular glands.
- Skin may be excised.

In a majority of the dissections (52%), the marginal mandibular branch of the facial nerve was found running along the angle and inferior border of the mandible. It was observed below the inferior border of the mandible in 32% of the cases. When below the angle and body of the mandible, its maximum distance was found to be 1.6 and 1.4 cm, respectively.
Schaad et al. circa 1979

- Combined review of 82 cases from Dallas and 298 cases in lit. = total 380 cases
- Surgical excision alone in 149 pts with 92% cure rate
- Surgery + Abx in 156 pts with 95% cured
- I&D in 63 with 16% cure rate
- Abx only in 10 pts with 1 cured.
Surgery vs. Abx: Lindeboom et al.

- Prospective randomized, controlled trial comparing surgical excision vs. Abx Tx for nontuberculous mycobacterial cervicofacial lymphadenitis in children
- 50 had surgical LN(s) excision
- 50 had clarithromycin and rifabutin for at least 12 wk
  - Clarithromycin 15 mg/kg/day BID
  - Rifabutin 5 mg/kg/daily once
Lindeboom et al. (cont)

- Ages 1-15 yo
- Inclusion:
  - >3 wk persistent cervical lymphadenitis
- Exclusions:
  - Immunocompromised pt’s
  - +serology for CMV, EBV, toxo, adenovirus, Cat
  - Resistance to clarithromycin and/or rifabutin
Lindeboom et al. (cont)

- **96% cure rate for surgery**
  - 38% had some skin excised
  - Failures
    - 1 had recurrence
    - 1 had second primary in neck
    - These treated with 3 mo C+R
  - **Complications**
    - 2% had hematoma
    - 12% had staph infection (Tx with FQ)
    - 12% had transient FN paresis of HB-2
    - 2% had permanent FN paresis of HB-2
66% cure rate for abx
- 44% had total regression
- 32% had partial regression -> all got draining sinuses
  - 22% cured after 6 mo
  - 10% needed surgery (4% had drug intolerance)

Failure in 34%
- 2% had no change in LN size -> surgery
- 18% had increase in LN size -> surgery
- 10% no cure after 6 mo abx for sinus tract -> surgery

Increased adverse effects vs. surgery:
- Fever, fatigue, abdominal pain, tooth discoloration, abnormal stools, allergic rash
Surgery+Abx: Fraser et al. in Scotland

- 5 yr retrospective review with n=31
  - 4 treated with triple therapy for 6 mo with cure
  - 27 surgery + Clarithromycin 30 mg/kg/d for 3 mo:
    - 6 had previous I&D and 3 of those had recurrence with 2 of them with skin involvement (50%)
    - 21 virgin necks with only 1 recurrence with skin involvement (4.8%)
    - 1 had permanent FN palsy

- Previous I&D is a poor prognostic factor
Parotidectomy

- Mentioned in literature
- Successful in eradication of disease
Fig. 2. **Left.** Fluctuant left parotid mass with overlying skin necrosis from NTM adenitis. **Right.** Appearance of surgical site 2 years after curettage of left parotid lesion.
Survey: Pilkington et al. from OHSU

- Nationwide survey of ASPO and EIN members
- 277 total cases
- Median age was 3 yo
- MAC most common cultured at 72%
- Abx only 14%, 32%
- Surgery only 17%, 16%
- Surgery+Abx 69%, 52%
Staging?: Penn et al. in 2011

Georgetown staging system of nontuberculous mycobacterial cervicofacial lymphadenitis [5].

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Painless, firm</td>
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<tr>
<td></td>
<td>Adherent to overlying skin</td>
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<tr>
<td></td>
<td>Increased vascularity</td>
</tr>
<tr>
<td>II</td>
<td>Fluctuance</td>
</tr>
<tr>
<td>III</td>
<td>Skin changes – violaceous coloration</td>
</tr>
<tr>
<td></td>
<td>Thinning of skin, parchment-like changes, shiny appearance</td>
</tr>
<tr>
<td>IV</td>
<td>Fistulization</td>
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Treatments recommended at the various clinical stages.

<table>
<thead>
<tr>
<th>Clinical stage</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>I</td>
<td>Antibiotics</td>
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<tr>
<td>II</td>
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<tr>
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<td>FNA+/-</td>
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<td>FNA+/-</td>
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<tr>
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<td>Excision +/-</td>
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<td>Staged Wound Closure</td>
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FNA: fine needle aspiration.
In the pediatric population, atypical mycobacterium manifest most commonly as a cervicofacial lymphadenitis in the submandibular region. It occurs more commonly in children between 1-5 yo with a female predilection. Diagnosis is usually clinical. MAC is the most common pathogen isolated surpassing M. scrofulaceum among others.
Summary (cont)

• Suspicion of atypical mycobacterial etiology of cervicofacial lymphadenitis should warrant surgical excision of all affected lymph nodes.
• Abx alone is inferior to surgical excision.
• I&D should never be performed as there is a high likely of recurrence and chronic sinus tract.
• Adjuvant abx has not been proven to improve outcome of this disease.
3 yo F with 4 wk h/o enlarging neck mass as pictured. Denies f/c. mildly reactive PPD. No change with Amoxicillin Rx’ed by PCP. What would you do?

- A. observation
- B. different course of antibiotics
- C. I&D
- D. Surgical excision
- E. Surgical excision + antibiotics
References


THANK YOU!

QUESTIONS?