An eight-month-old child with cervical adenitis

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CASE PRESENTATION

A previously well, eight-month-old girl presented with erythematous swelling in the right submandibular region (Figure 1). According to her parents, nodular swellings had appeared three weeks previously in the temple and submandibular regions, and were increasing in size. Eleven days before presentation, the parents attended a primary care clinic where seven days of oral cephalexin was prescribed, without effect.

The patient had no constitutional symptoms, and growth and development were normal. The child had been born in Canada following an uncomplicated pregnancy and vaginal delivery, and she was breastfed exclusively for five months. Her vaccinations were up to date, and did not include Bacille Calmette-Guérin. The patient had travelled with her mother on two three-week trips to Bangkok, Thailand, when she was between four and seven months of age. Both times the family stayed with the patient's maternal grandmother, who had an undiagnosed respiratory illness (that included cough and weight loss) and in whom *Mycobacterium tuberculosis* (MTB) had not been excluded. During travel, the patient reportedly had no animal contacts, insect bites or water exposures, and never consumed undercooked meats, unpasteurized dairy products or tap water.

On examination, the patient was afebrile with normal vital signs. Palpation of the right-sided, anterior cervical, infraclavicular and supraclavicular lymph nodes revealed lymphadenopathy. There was a palpable, nontender right temple mass 1 cm in size, and a fluctuant, erythematous, nontender submandibular mass 4 cm in size (Figure 1). The remainder of the physical examination was noncontributory.

Laboratory investigations revealed a white blood cell count of $18.1 \times 10^9/L$, a hemoglobin level of 119 g/L and a platelet count of $353 \times 10^9/L$. Electrolytes, creatinine and C-reactive protein levels were normal. Blood cultures were negative after five days incubation. A chest x-ray was normal. An ultrasound scan demonstrated a complex, hypoechoic mass 3.7 cm in size, with internal septations in the subcutaneous tissue of the submandibular region associated with local adenopathy, and a 1 cm cystic lesion at the right temple. Tuberculin skin testing (TST), performed using the Mantoux method with five tuberculin units of purified protein derivative, was positive at 17 mm of induration. The patient was HIV negative, and there was no clinical suspicion of other immunodeficiencies.

On admission, the patient was started empirically on intravenous clindamycin. Due to lack of improvement on clindamycin after four days, the patient underwent surgical incision and drainage of the submandibular mass for diagnostic and therapeutic purposes.

DIAGNOSIS

Microscopic examination of surgical samples detected 1+ acid-fast bacilli. Gram and fungal stains and bacterial and fungal cultures were negative. Biopsy material underwent standard molecular testing for MTB using the Amplified *M tuberculosis* Direct assay (Gen-Probe, USA) and *Mycobacterium avium* complex (MAC) testing with the appropriate AccuProbe assay (Gen-Probe, USA). Both tests were negative. For organism identification, polymerase chain reaction analysis of the heat shock protein hsp65 was performed, yielding a 401 bp amplicon that was sequenced (1). The hsp65 sequence identified the organism (10 days after sample collection) as *Mycobacterium haemophilum*. After 40 days

Figure 1) Photo of the patient before incision and drainage of the lesion

incubation, cultures became positive in the liquid Mycobacteria Growth Indicator Tube (BD, USA) mycobacterial detection system. Molecular testing confirmed the presence of *M haemophilum*.

Testing for immunological evidence of MTB infection, using the QuantiFERON-TB Gold in Tube (QFT-GIT; Cellestis, Ltd, Australia) interferon-gamma release assay (IGRA) was negative (0 IU/mL).

DISCUSSION

Nontuberculous mycobacterial (NTM) adenitis in children has historically been diagnosed using a combination of clinical suspicion, TST and mycobacterial culture (which generally takes weeks to provide results) (2). Treatment is therefore empirical and based on TST and clinical presentation, in the context of possible exposure to MTB. Treatment of NTM adenitis usually involves surgical excision of lesions, unless risk of injury to adjacent structures is high, in which case antibiotic treatment with possible later surgical intervention is the norm (3). Treatment of MTB adenitis involves antimycobacterials.

MAC currently accounts for up to 80% of NTM adenitis in children (3). Studies involving MAC as the predominant isolate have suggested that a TST induration of 5 mm to 9 mm is consistent with NTM adenitis, while indurations >15 mm suggest MTB infection (4). Recently, *M haemophilum*, which is prevalent in the environment and linked with water exposure (5), has been described in Israel and Europe as being responsible for a significant proportion of NTM adenitis in children (5,6). This may be related to recent improvements in culturing techniques allowing detection of this organism (7).

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Unlike MAC, *M haemophilum* infection is associated with greater induration on TST (6), making it difficult to differentiate NTM and MTB infection. QFT-GIT and other region of difference-1 based IGRA tests are more specific for MTB versus TST (8). IGRAs do not cross-react with most NTM, including MAC and *M haemophilum* and, thus, make useful adjuncts in the evaluation of mycobacterial adenitis (9). However, IGRA tests may have reduced sensitivity in very young children and may not be sufficient on their own to exclude MTB infection (10).

The differential diagnosis of cervical adenitis should always include NTM and MTB as possible causative agents. Sampling of affected lymph nodes for culture and molecular diagnostic testing is crucial. Where suspicion of MTB exists, molecular testing may yield a diagnosis weeks before traditional culture methods, potentially saving children toxicity from antimycobacterial drugs. Culturing of samples is likewise essential for obtaining drug sensitivities, particularly in MTB infection. Unfortunately, the only laboratories routinely using molecular typing of NTM adenitis in Canada are the British Columbia Centre for Disease Control in Vancouver, British Columbia, and the National Microbiology Labs in Winnipeg, Manitoba.

The present patient was at high risk for tuberculosis adenitis (based on history, clinical picture, surgical sample positivity for acid-fast bacilli and TST results), and was initiated on quadruple tuberculosis therapy (ie, isoniazid, rifampin, ethambutol and pyrazinamide).

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Polymerase chain reaction and sequencing results became available one week later, identifying the acid-fast bacilli as *M haemophilum*. Medications were changed to ciprofloxacin and rifampin 30 days before mycobacterial cultures identified the organism. This combination provided coverage of *M haemophilum* based on the literature (11), and tuberculosis prophylaxis in case of exposure. Due to the location, size and complexity of the masses, antibiotic treatment was chosen to reduce mass size before complete surgical excision, to be performed three months later. The temple mass resolved with antibiotic treatment alone. The patient is currently doing well.

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