CASE REPORT

Congenital tuberculosis presenting as otorrhoea in a preterm infant

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SUMMARY

A premature infant of 25 weeks' gestational age presented at 8 weeks after birth with otorrhoea from the left ear. Following a course of topical and systemic antibiotics, the patient deteriorated developing facial nerve paralysis and cervical lymphadenitis. Contrast-enhanced CT and MRI of the head showed a destructive process of the left temporal bone. These findings prompted the clinicians to send swabs from the purulent discharge from the ear for acid-fast bacilli stain. Furthermore, surgical exploration and debridement were undertaken. Cultures from ear discharge and biopsy—taken during surgical procedure—revealed the presence of *Mycobacterium tuberculosis* complex. The patient developed necrotizing otitis media, left temporal bone osteomyelitis and cervical lymphadenitis. The infant's mother was found to have an endometrial biopsy positive for *M. tuberculosis* suggesting the diagnosis of congenital tuberculosis.

BACKGROUND

Tuberculosis manifested as otorrhoea is an uncommon presentation of this disease. Furthermore, tuberculosis in the neonatal period if not diagnosed early has a high rate of complications and mortality.

CASE PRESENTATION

We present the case of an infant (for which informed consent for both the infant and the mother were obtained) born to a gravida 1 mother following a caesarean section due to antepartum haemorrhage and breech presentation in the 25th week of gestation. Her prenatal ultrasounds and other investigations at the time of birth including the pathological study of the placenta were normal.

From birth to the seventh week of life the patient had a stable hospital course. At 33 weeks of corrected gestational age, the patient developed left-sided otorrhoea. On examination, there was purulent otorrhoea which precluded the visualisation of the tympanic membrane on otoscopy. There were no signs of acute mastoiditis and the infant was started on antibiotics. A few days later, the condition worsened with increased apnoeas, left lower motor neuron facial nerve palsy and ipsilateral cervical lymphadenitis. With further investigations and surgical exploration, the patient was found to have necrotizing otitis media, osteomyelitis from left temporal bone and cervical lymphadenitis. During examination of the left ear under general anaesthesia and surgical exploration, signs

of osteomyelitis (granulations and sequestered bone including destruction of middle ear ossicles) and encroachment of the process on the anatomical pathway of the facial nerve were documented. Having established surgical decompression of the mastoid which also showed destruction of the cortical bone, no attempt was entertained to follow the facial nerve canal for fear of exacting more damage on the nerve.

INVESTIGATIONS

The relevant biochemical investigations were a C reactive protein of 63 mg/L and a normal leucocyte count with mild elevation of monocytes (24%). The cerebrospinal fluid parameters were normal.

Contrast enhanced CT showed occlusion of the left external auditory canal and opacification of the ipsilateral middle ear with temporal bone erosion (figure 1) and an MRI demonstrated the soft tissue neck lesion in keeping with infection with either necrotic lymph nodes or abscess (figure 2).

While waiting for the results of the cultures from the ear discharge, a left-sided examination of the ear was undertaken with debridement of necrotic tissue. Biopsies of middle ear contents and lymph nodes were sent to pathology.

Cultures from the ear discharge initially grew *Staphylococcus aureus*. Days later, the cultures, smears and biopsies were reported positive for *Mycobacterium tuberculosis*. No evidence of *M. tuberculosis* involvement was found in the urine, blood, lungs or cerebrospinal fluid. An abdominal ultrasound was negative for liver granulomas and the liver function tests were normal.

Following the diagnosis of tuberculosis in the infant, the rest of her household members were evaluated for the disease. The infant's mother was asymptomatic but had a positive Mantoux test, a calcified granulomata in a chest X-ray, negative sputum for acid-fast bacilli and finally an endometrial biopsy positive for *M. tuberculosis*. The diagnosis of congenital tuberculosis was established based on the positive maternal endometrial biopsy. The rest of the infant's relatives were negative for tuberculosis.

Neither mother nor infant had immunosuppressive conditions.

DIFFERENTIAL DIAGNOSIS

The main differential diagnosis of otorrhoea are infections, mainly acute otitis media and acute otitis externa. Both can present with otorrhoea,

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Figure 1 CT temporal bones: image demonstrates complete opacification of the left middle ear (single arrow) with inflammatory changes that surrounds and occludes the ipsilateral external auditory canal and ipsilateral temporal bone erosion (triple head arrow).

erythema, oedema and irritability.¹ Our patient deteriorated with conventional treatment leading to further tests including a CT scan and MRI showing damage to the middle ear and adjacent structures.

The microbiology of otitis media in the neonate was described decades ago.² In this study, the predominant organisms isolated were *Escherichia coli*, *S. aureus* and *Klebsiella pneumoniae*, and in the cases of treatment failure *Pseudomonas aeruginosa* was the most common. Other frequent pathogens are *Streptococcus pneumoniae* and *Haemophilus influenza*. A recent retrospective study of 12 cases of neonates with otitis found *P. aeruginosa* as being the most common bacteria.³ Recognising the common micro-organisms should prompt the clinician to choose adequate parenteral antibiotics. In our case, we found the presence of *S. aureus* for which the patient received intravenous cloxacillin. Viruses and fungal infections can be also causes of otitis.

Otitis media may also coexist with congenital cholesteatoma. Cholesteatomas are non-neoplastic, keratinizing squamous epithelial lesions that can affect many different areas of the temporal bone. Congenital cholesteatoma usually presents at 4 years of age and although usually silent, when detected late may cause facial nerve palsy and otorrhoea. The diagnosis of cholesteatoma is made by adequate otoscopy, imaging studies (CT or MRI) or surgical exploration.⁴

Figure 2 Coronal brain STIR MRI: image shows the overall appearance of the soft tissue neck lesion in keeping with infection with either necrotic lymph nodes or abscess (white arrow). STIR, short T1 inversion recovery.

TREATMENT

After surgical debridement and cortical mastoidectomy, the patient was started on isoniazid, rifampin, pyrazinamide, moxifloxacin with vitamin B₆ (as isoniazid is a competitive inhibitor of pyridoxine metabolism).

OUTCOME AND FOLLOW-UP

Following the surgical debridement and the initiation of the antituberculosis drugs, the facial palsy and the otorrhoea gradually improved. The left-sided auditory brainstem response test showed a mild conductive hearing loss with a normal sensory reserve for both ears. As the mycobacterium was found to be fully susceptible to medications, the patient was discharged home on isoniazid, pyrazinamide and rifampin. The mother was also started on antituberculosis treatment and remained asymptomatic.

DISCUSSION

Although epidemiological data is limited, congenital tuberculosis is considered a rare disease with postnatal transmission being far more common.⁵ However, the incidence of tuberculosis in women of reproductive age has increased, and consequently the incidence of congenital tuberculosis may have increased.^{6,7} The diagnosis is difficult due to non-specific findings, low rate of positive strains and the long time it takes the cultures to grow the bacteria.

The pathogenesis of congenital tuberculosis can begin with a haematogenous spread from the mother, by ingestion of infected amniotic fluid or by direct contact with an infected birth canal.⁸ These mechanisms lead to the formation of one or more primary complexes in the liver, lungs, gut or middle ear.⁹

Cantwell *et al* proposed the most recent criteria to diagnose congenital tuberculosis.⁷ The primary criterion is a proved tuberculous lesion followed by at least one of the

following: lesions in the first week of life, a primary hepatic complex or caseating hepatic granulomas, tuberculous infection of the placenta or the maternal genital tract and exclusion of the possibility of postnatal transmission by a thorough investigation of contacts, including hospital workers, and by adherence to existing recommendations for treating infants exposed to tuberculosis. Our patient had a positive acid-fast bacilli, positive PCR and positive cultures for *M. tuberculosis* in the middle ear and in the cervical lymph nodes plus her mother had a positive endometrial biopsy for tuberculosis. We ruled out the possibility of postnatal transmission for the following reasons: first, the only close contact of the infant was her mother, however, she did not have active pulmonary tuberculosis (asymptomatic and negative sputum tests). Second, the rest of the infant's household were negative for tuberculosis. Third, healthcare workers looking after the infant were asymptomatic; furthermore, healthcare workers who immigrated to Canada from countries where tuberculosis is endemic are screened before they start working in our institution.

The clinical symptoms are variable. A recent analysis of 170 cases of congenital tuberculosis reported that most cases presented with non-specific symptoms at 2–3 weeks after birth, mothers being usually asymptomatic.¹⁰ In this study, otorrhoea and facial nerve palsy were uncommon manifestations being reported only in 5% and 6% of the cases.

In another study, tuberculous otitis media was reported to account for 1% to 3% of all cases of otitis media.¹¹ A more recent study found that tuberculosis was responsible for only 0.04% of chronic suppurative otitis media cases.¹² Case reports of congenital tuberculosis manifested as otitis media have shown a comparable evolution to our patient.^{13–15} It can present with lack of response to conventional treatment with or without systemic signs of sepsis. Complications include fistulas, facial nerve palsies, osteomyelitis, mastoiditis, hearing loss and spread of infection to the central nervous system.¹⁶

Learning points

- Diagnosis of tuberculosis in neonates is difficult and often is delayed.
- Maternal and family history may help raise the possibility of infection in the neonate; however, frequently household members are asymptomatic.
- If tuberculosis is not adequately treated, it carries a high risk of morbidity and mortality.

Infection in neonates is more frequently associated with disseminated forms compared with other age groups leading to severe sequela.¹⁷ Congenital tuberculosis has a mortality rate of 45% which is significantly reduced with timely treatment.¹⁸

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REFERENCES

- 1 Alizadeh Taheri P, Rostami S, Sadeghi M. External otitis: an unusual presentation in neonates. *Case Rep Infect Dis* 2016;2016:1–2.
- 2 Bland RD. Otitis media in the first six weeks of life: diagnosis, bacteriology, and management. *Pediatrics* 1972;49:187–97.
- 3 Iacovidou N, Falaena V, Alexaki A, et al. Spontaneous perforation of the tympanic membrane in the first 10 days of life. *Am J Perinatol* 2010;27:663–5.
- 4 James AL, Papsin BC. Some considerations in congenital cholesteatoma. *Curr Opin Otolaryngol Head Neck Surg* 2013;21:431–9.
- 5 Adhikari M, Pillay T, Pillay DG. Tuberculosis in the newborn: an emerging disease. *Pediatr Infect Dis J* 1997;16:1108–12.
- 6 Saramba MI, Zhao D. A perspective of the diagnosis and management of congenital tuberculosis. *J Pathog* 2016;2016:1–8.
- 7 Cantwell MF, Shehab ZM, Costello AM, et al. Brief report: congenital tuberculosis. *N Engl J Med* 1994;330:1051–4.
- 8 Smith MHD. Tuberculosis. In: Remington JS, Klein JO, eds. *Infectious diseases of the fetus and newborn infant*. 4th edn. Philadelphia: Saunders, 1995.
- 9 Starke JR. Tuberculosis. An old disease but a new threat to the mother, fetus, and neonate. *Clin Perinatol* 1997;24:107–27.
- 10 Peng W, Yang J, Liu E. Analysis of 170 cases of congenital TB reported in the literature between 1946 and 2009. *Pediatr Pulmonol* 2011;46:1215–24.
- 11 Lucente FE, Tobias GW, Parisier SC, et al. Tuberculous otitis media. *Laryngoscope* 1978;88:1107–16.
- 12 Weiner GM, O'Connell JE, Pahor AL. The role of surgery in tuberculous mastoiditis: appropriate chemotherapy is not always enough. *J Laryngol Otol* 1997;111:752–3.
- 13 Pejham S, Altman R, Li KI, et al. Congenital tuberculosis with facial nerve palsy. *Pediatr Infect Dis J* 2002;21:1085–6.
- 14 Ng PC, Hiu J, Fok TF, et al. Isolated congenital tuberculosis otitis in a preterm infant. *Acta Paediatr* 1995;84:955–6.
- 15 Park SH, Goh EK, Kong SK, et al. Tuberculous otitis media with facial nerve paralysis in an infant: a case of maternal transmission. *Otolaryngol Head Neck Surg* 2010;142:774–5.
- 16 Dale OT, Clarke AR, Drysdale AJ. Challenges encountered in the diagnosis of tuberculous otitis media: case report and literature review. *J Laryngol Otol* 2011;125:738–40.
- 17 Schaaf HS, Gie RP, Beyers N, et al. Tuberculosis in infants less than 3 months of age. *Arch Dis Child* 1993;69:371–4.
- 18 Snider DE, Bloch AB. Congenital tuberculosis. *Tubercle* 1984;65:81–2.

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