Head and neck pits in an infant

Jean-Li Lim

CASE

A female infant, aged four months, presented with her mother who complained of persistent discharge from the baby's neck since one month of age. The girl was otherwise well. She was born normally full term and childhood immunisations were up to date. Development milestones were appropriate for her age.

On examination, a right preauricular pit and a second pit midway down her neck were seen (Figure 1). There were mucinous secretions from the neck pit. No abnormalities were observed on her left. Incidentally, her mother herself had bilateral preauricular pits.

QUESTION 1

What is the most likely cause of the pit at the neck area?

QUESTION 2

What are these pits associated with?

QUESTION 3

What investigation(s) would support this diagnosis?

ANSWER 1

Brachial cleft malformations, particularly defects in the second brachial arch, are one of the most common causes of congenital anomalies in the head and neck.[1] They can occur as cysts, sinus tracts, fistulae or cartilaginous remains. Most cysts present as a painless, compressible lateral neck lump. Brachial sinuses and fistulae are usually diagnosed in infancy or early childhood, with the child having a discharge from the defect. If left untreated, recurrent localised infection might occur.

ANSWER 2

In view of the preauricular pit and the brachial anomaly, branchio-oto-renal syndrome (BORS) was suspected. BORS or Melnick–Fraser syndrome is an autosomal dominant genetic disorder with an incidence of one in 40,000 in the general paediatric population.[2]

The clinical presentation of BORS is highly variable, making it a diagnostic challenge. Incomplete penetration of the mutations along *EYA1*, the main gene associated with BORS, results in phenotypic variance even among affected individuals of the same family.[3]

Based on previous phenotyping studies, individuals without a family history who have three of the major criteria OR two major and at least two minor criteria will fulfil the diagnosis of BORS. Among those with an affected first-degree relative, only one major criterion is required for diagnosis (Table 1).[4]

Hearing impairment might range from mild to profound and be conductive, sensorineural or mixed type. It can be present at birth or develop later in life.[2–6] Renal involvement includes structural anomalies such as renal agenesis, hypoplasia and dysplasia. Ureteropelvic junction (UPJ) obstruction, hydronephrosis and vesicoureteral reflux have also been documented.[5] In fact, 6% of those with renal involvement go on to develop end-stage renal failure (ESRF).[4–6] Clinical variants of the disorder without kidney involvement is known as brachio-otic syndrome (BOS).

ANSWER 3

Based on the working diagnosis, a urine analysis, renal function test (including creatine, electrolytes, estimated glomerular filtration rate) and ultrasound of the kidneys, ureter and bladder should be ordered to look for renal involvement. An ultrasound of the neck can rule out the presence of a brachial cyst. A hearing assessment should also be ordered.

Targeted gene testing for mutations on *EYA1, SIX1* and *SIX5,* the genes associated with BORS/BOS, is useful to confirm the diagnosis.[3–6] This is especially helpful among individuals who require an early diagnosis but do not meet all the diagnostic criteria due to

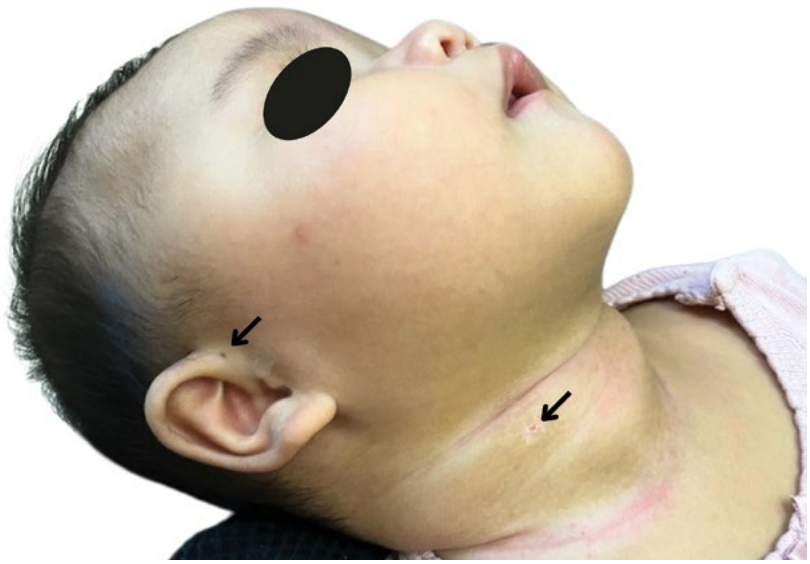

Figure 1. Pits at the preauricular and neck area (marked by arrows).

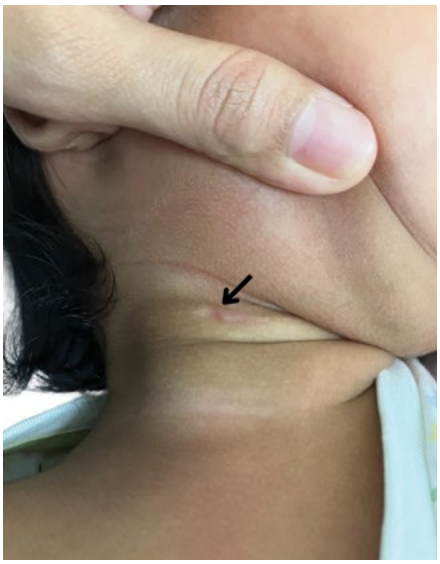

Figure 2. Surgical scar of the excised brachial pit (marked by an arrow).

Table 1. Diagnostic criteria for branchio-oto-renal syndrome[4]

Major criteria	Minor criteria
• Brachial anomalies	• External ear anomalies
• Hearing impairment	• Middle ear anomalies
• Preauricular pits	• Inner ear anomalies
• Renal anomalies	• Preauricular tags
	• Facial asymmetry
	• Palate abnormalities

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the heterogenicity of the disorder.[3] However, genetic testing does not predict disease severity and neither will it affect management options.[5,6] Genetic testing might not always be readily available, but is especially useful for prenatal screening among women with BORS/BOS or who have had a child with BORS/BOS.[5]

CASE CONTINUED

Although her urine analysis and renal function test was normal, ultrasonography showed bilateral small kidneys. The ultrasound of her neck revealed no collection or cyst beneath the pit. Her auditory brainstem response hearing test was normal as well. Based on these findings, a clinical diagnosis of BORS was made.

QUESTION 4

How would you manage this infant?

ANSWER 4

Management of BORS is multidisciplinary and dependent on the clinical presentation. Genetic counselling and further testing by a geneticist were arranged for her and her family. The pediatric team, which included a pediatric nephrologist, monitored her renal function six-monthly and she had a yearly ultrasound. Despite normal renal function, her serial ultrasounds showed persistent bilateral small kidneys. The patient also underwent sinus excision at the age of one year as the brachial pit was persistently discharging (Figure 2). Intraoperative findings revealed a 4-cm sinus with no fistulous communication, which was confirmed histopathologically.

The patient's initial hearing test was normal, and so an annual hearing assessment should suffice in terms of monitoring. In individuals with evidence of hearing impairment, more frequent otologic assessment is required to detect any fluctuation or progression of the hearing loss. Children with hearing loss should be referred early, preferably before they are school age so that the necessary interventions can be conducted to minimise impairment in speech, language, learning and social skills.

In view of the possible otologic involvement and renal progression in the future, use of ototoxic and nephrotoxic drugs should be avoided.

Key points

- A child born with a preauricular pit and branchial defect should be assessed for BORS.

- Diagnosis is usually clinical, but genetic testing is useful to confirm the diagnosis.
- Because of the highly variable clinical presentation and risk of progression, individuals with BORS will require long-term hearing and renal surveillance.

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