Paediatric case of group A streptococcal pharyngitis, arthritis and osteomyelitis associated with dental neglect

Tomohiro Hiraoka 1, Taro Chujo,2 Mitsuru Tsuge,3 Yoichi Kondo1

SUMMARY

Group A streptococcus (GAS) causes a wide variety of infections in the paediatric population, ranging from pharyngitis to rare but severe invasive diseases, such as bacterial arthritis and osteomyelitis. Dental neglect is a type of child neglect in which caregivers fail to provide adequate care and treatment for dental diseases. This results in poor oral hygiene and can lead to complications including sepsis. We report the case of a 4-year-old boy, suffering from child neglect, presenting with GAS pharyngitis and subsequent bacterial arthritis in the right ankle, osteomyelitis in the right talus and abscess in the right calcaneus. He was first treated with penicillin, which was changed to clindamycin because of a suspected drug-induced rash. He was discharged after 6 weeks of intravenous therapy when symptoms had resolved and inflammatory markers were within the normal range. The case highlights that dental neglect may present a risk for subsequent invasive infections.

BACKGROUND

Group A streptococcus (GAS) is an aerobic, gram-positive coccus, which causes pharyngitis, cutaneous infection and invasive infections (eg, bacteraemia, necrotising fasciitis, bacterial arthritis and osteomyelitis). Bacterial arthritis and osteomyelitis mostly result from haematogenous spread and rarely occur after GAS pharyngitis. Dental neglect is the failure of caregivers to provide adequate dental care typified by visibly untreated caries that are easily detected by non-dental health professionals. Severe untreated caries and gingivitis can result in bacteraemia. We report a case of a 4-year-old boy suffering from dental neglect, who after acute pharyngitis, went on to develop GAS arthritis and osteomyelitis.

CASE PRESENTATION

A 4-year-old boy presented with sore throat, fever and pain in the right ankle for 3 days before consulting his family doctor. He was born healthy and had no significant medical history. His throat was red, and his right ankle was swollen and painful on examination. A throat rapid strep test was positive, and a blood culture revealed GAS. He was treated with intravenous penicillin. Despite this, his symptoms worsened, and further investigations revealed a sepsis with osteomyelitis in the right ankle and abscess in the calcaneus. He was discharged after 6 weeks of intravenous therapy when symptoms had resolved and inflammatory markers were within the normal range.

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Accepted 29 December 2020

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positive. A radiograph showed no fracture or dislocation. Since a dose of ceftriaxone (CTRX) did not alleviate the pain, he was referred to our hospital.

His family had previously been in contact with us for child neglect. A thorough physical examination was conducted. The patient weighed 17.1 kg (+0.1 SD), was 101.9 cm (−0.6 SD) tall and had a temperature of 38.4°C. Dry lips and an inflamed throat were observed, and gingivitis and many mild-to-severe carious lesions were clearly noticeable (figure 1). The right ankle was swollen and painful, which precluded walking (figure 2A). Heart and lung sounds were normal.

INVESTIGATIONS
A blood test showed that white blood cell, C reactive protein (CRP) and procalcitonin (PCT) levels were increased to 27.14×10^9/L, 15.64 mg/dL and 8.33 ng/mL, respectively; and anti-streptolysin O (ASO) activity was as high as 1940 IU/mL (table 1). An enhanced CT revealed arthritis in the right ankle (figure 3). White pus, obtained by puncture from the right lateral malleolus, demonstrated gram-positive chain-forming cocci, suggestive of GAS (figure 4). Whole-body non-enhanced CT showed no other signs of arthritis, acute otitis media or retropharyngeal abscess.

Table 1  Blood and urinalysis results

<table>
<thead>
<tr>
<th>Blood test</th>
<th>RBC</th>
<th>×10^12/µL</th>
<th>TP</th>
<th>g/dL</th>
<th>Specific gravity</th>
<th>Urinalysis</th>
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<tbody>
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<td>RBC</td>
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<td></td>
<td>TP</td>
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<tr>
<td>Hb</td>
<td>113</td>
<td>g/L</td>
<td>Alb</td>
<td>3.2</td>
<td>Glucose</td>
<td></td>
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<tr>
<td>WBC</td>
<td>27.14</td>
<td>×10^9/L</td>
<td>T-Bil</td>
<td>0.6</td>
<td>Bilirubin</td>
<td></td>
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<tr>
<td>Neutrophils</td>
<td>90.0</td>
<td>%</td>
<td>AST</td>
<td>59</td>
<td>U/L</td>
<td>Ketones</td>
</tr>
<tr>
<td>Lymphocytes</td>
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<td>%</td>
<td>ALT</td>
<td>31</td>
<td>U/L</td>
<td>Protein</td>
</tr>
<tr>
<td>Platelets</td>
<td>256</td>
<td>×10^9/L</td>
<td>LDH</td>
<td>420</td>
<td>U/L</td>
<td>Nitrites</td>
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<tr>
<td>PT–INR</td>
<td>1.00</td>
<td>s</td>
<td>Cr</td>
<td>0.33</td>
<td>mg/dL</td>
<td>Leucocyte esterase</td>
</tr>
<tr>
<td>APIT</td>
<td>29.2</td>
<td>s</td>
<td>Cr</td>
<td>1.56</td>
<td>mg/dL</td>
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<tr>
<td>Fibrinogen</td>
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<td>mg/dL</td>
<td>CK</td>
<td>1562</td>
<td>U/L</td>
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<tr>
<td>FDP</td>
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<td>µg/mL</td>
<td>CK-MB</td>
<td>17</td>
<td>U/L</td>
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<tr>
<td>D-dimer</td>
<td>3.31</td>
<td>µg/mL</td>
<td>ASO</td>
<td>1940</td>
<td>IU/mL</td>
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</tr>
<tr>
<td>CRP</td>
<td>15.64</td>
<td>mg/dL</td>
<td></td>
<td></td>
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<tr>
<td>PCT</td>
<td>8.33</td>
<td>ng/mL</td>
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</tbody>
</table>

Alb, albumin; ALT, alanine aminotransferase; APIT, activated partial thromboplastin time; ASO, anti-streptolysin O; AST, aspartate aminotransferase; BUN, blood urea nitrogen; CK, creatine kinase; Cr, creatinine; CRP, C reactive protein; FDP, fibrinogen-degradation product; Hb, haemoglobin; LDH, lactate dehydrogenase; PCT, procalcitonin; PT–INR, prothrombin time–international normalised ratio; RBC, red blood cell; T-Bil, total bilirubin; TP, total protein; WBC, white blood cell.

TREATMENT
The patient was admitted with a temporary designated guardian. On day 1, arthroscopic synovectomy and joint cleaning were performed, and a drainage tube was inserted. A course of sulbactam/ampicillin was initiated but changed to ampicillin (ABPC) and clindamycin (CLDM) to maximise the dosage of ABPC. Daily dental brushing was performed by a child guardian or nurse. Throat and blood cultures were negative, but the punctured fluid culture revealed GAS that was sensitive to ABPC and CLDM. ABPC alone was continued from day 3. Fever disappeared from day 5, and the right ankle swelling and redness improved (figure 2B). The drainage tube was removed on day 7, and rehabilitation was started. Gadolinium-enhanced MRI on day 8 (figure 5A) revealed osteomyelitis in the right talus and an abscess in the right calcaneus. Administration of antibiotics...
was continued and surgical intervention was not required: the abscess was small in size and showed improvement with the antibiotic treatment. On day 18, pink, raised and non-circular rashes developed on both feet and ears, and expanded symmetrically to the whole body. Due to a suspected allergic reaction to ABPC, ABPC was switched to CLDM and chlorpheniramine on day 21, and the rashes disappeared on day 28.

Immunological screening was normal. The drug-induced lymphocyte stimulation test to ABPC was negative. The emm gene-type GAS was determined by the National Institute of Infectious Diseases in Japan to be emm1, producing the M-1 protein. Intravenous antibiotics were administered for 6 weeks until CRP and PCT were within the normal range. The patient was then discharged and advised oral amoxicillin for another 6 weeks.

OUTCOME AND FOLLOW-UP
At 2 months after discharge, the patient had completed oral medication and had good motor function.

DISCUSSION
GAS causes a wide variety of infections in the paediatric population, ranging from pharyngitis to severe invasive diseases. Over 600 million cases of GAS pharyngitis occur per year.1 Invasive cases are reported in 1.5–3.8/100 000 people, 14.8% of which are bacterial arthritis and osteomyelitis.2,3 GAS accounts for 8% and 4% of cases in children with bacterial arthritis and osteomyelitis, respectively.4 The risk factors for bacterial arthritis and osteomyelitis in older infants and children include immunodeficiency, trauma, vascular catheters and varicella zoster virus infection. No such factor was found in the patient's history and examination, except for minor scratches on the right ankle.

GAS enters the joint space mostly through haematogenous spread. One major virulence factor allowing invasiveness is the M protein, encoded by the emm gene. It provides anti-phagocytic properties, which help GAS avoid destruction by the host’s immune system. The type of M protein closely correlates with specific clinical phenotypes, for example, M-1, 3, 5, 6, 12, 14, 17, 19 and 24 with pharyngitis, and M-33, 41, 42, 52, 53 and 70 with impetigo.5 There is also a definitive and consistent tendency for his help in collecting images, and Dr Tadayoshi Ikibe from the Department of Bacteriology 1, at The National Institute of Infectious Diseases, Japan, for his help in analysis of bacterial strains.

Consortium. TH wrote the manuscript. TC was involved in managing the patient. MT and YK supervised and approved the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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Acknowledgements The authors would like to thank Editage (www.editage.com) for English language editing. They also wish to acknowledge Dr NaGaaki Terakado from the Department of Dental Surgery at Matsuyama Red Cross Hospital, for his help in collecting images, and Dr Tadayoshi Ikibe from the Department of Bacteriology 1, at The National Institute of Infectious Diseases, Japan, for his help in analysis of bacterial strains.