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An unreported case of *Streptococcus cristatus* septic arthritis of wrist in a neonate

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ABSTRACT

Septic Arthritis of the wrist is rare in the paediatric population due to its extraarticular metaphysis. We report here a case of wrist septic arthritis in a neonate caused by an uncommon causative organism, *Streptococcus cristatus*.

A 15 days old male child was referred with the complaint of swelling and decreased movement of the left wrist for 5 days. Local examination revealed warm, tender, erythematous and fluctuant swelling over the dorso-ulnar aspect of the left wrist. Ultrasonography of the affected region was suggestive of focal fluid collection in the wrist and periosteal elevation of the distal ulna. Aspiration followed by arthrotomy of the wrist joint was performed and multiple holes were made in the distal ulnar metaphysis using 0.8mm k-wire. The pus culture was positive for *Streptococcus cristatus*, sensitive to vancomycin, which was given for a total of 4 weeks. At one year follow up the child had a full, painless range of motion with no functional deficit. Final follow up x rays of the left wrist were normal.

Streptococcus cristatus strains are described as Gram-positive, catalase-negative cocci, approximately 1 μm in diameter growing in chains and were originally isolated from the human throat and oral cavities. Its association with bone and joint infections has not been described in the literature. To our knowledge, this is the first case of isolated septic arthritis of wrist in a 15 days old child caused by *Streptococcus cristatus*.

To conclude, wrist septic arthritis in a neonate is a rare entity. With the advanced diagnostics, species-level identification of rare organism like *Streptococcus cristatus* is possible along with antibiotic sensitivity for appropriate therapy. Early surgical decompression and intravenous culture-directed antibiotics are the mainstays of management.

1. Introduction

Septic arthritis is defined as an infection of a joint which can present independently or along with osteomyelitis of the adjoining metaphysis.[1] Its incidence varies in different parts of the world. The incidence of neonatal septic arthritis/osteomyelitis in India is approximately 1 in 1500 live births[2] as compared to 1 in 15000 live births in USA[3] and 1 in 5000 live births in UK.[4] Knee and hip are the most commonly affected joints.[5] Involvement of the wrist is very rare due to its extra-articular metaphysis; its exact incidence is unknown. In view of its subtle signs and symptoms, early diagnosis becomes a challenge.[6,7] However, if not treated timely, it can lead to devastating complications like permanent joint destruction and growth abnormalities.[8,9] The purpose of this study is to describe an unreported case of wrist septic arthritis in a neonate caused by *Streptococcus cristatus*.

2. Case report

A 15 days old male child was referred to us by a paediatrician

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with the complaint of swelling and decreased movement of the left wrist for 5 days. The child was delivered at full term by Caesarean Section, cried immediately with no history of neonatal intensive care stay. Along with wrist swelling, otorrhoea and umbilical inflammation were also present when the child first reported to the referring paediatrician at age of 10 days. Maternal perinatal history was uneventful with no complaints of fever, oral, genitourinary and skin infections. There was no history of any surgery during the pregnancy.

The general physical examination was normal. Ear discharge and the umbilical inflammation were resolved when the child reported to us. Local examination revealed warm, tender, erythematous and fluctuant swelling of 4 cm × 4 cm over the dorso-ulnar aspect of the left wrist (Fig. 1a and 1b).

Blood investigations revealed total leucocyte count (TLC) as14,800/cu.mm and C-reactive protein (CRP) as 90 mg/L (Table 1). Blood culture was negative for any organism. X-ray of the left wrist did not reveal any bony changes (Fig. 1c and 1d). Ultrasonography of the affected region was positive for internal echoes suggestive of about 4 ml of focal fluid collection in the wrist, involving distal metaphysis of the ulna, with periosteal elevation (Fig. 1e).

After discussing with the parents and with their informed written consent, we planned for aspiration followed by arthrotomy of the wrist joint on the same day of presentation (15th day of life). Under General anesthesia, first aspiration of the wrist joint was done which revealed 3 ml of frank pus. After aspiration, arthrotomy was done for thorough drainage of the abscess. Multiple drill holes were made in the distal ulnar metaphysis using 0.8mm k-wire. An above elbow plaster slab was applied for 2 weeks. Samples were sent for gram staining, ZN (Ziehl Neelsen) staining for acid-fast bacillus, aerobic bacterial culture/sensitivity and histopathological examination. Vancomycin was started empirically in weight-related dose on the same day of surgery and the first dose was administered after retrieving the sample. The culture was positive for *Streptococcus cristatus* (97% confidence value on Phoenix System) which was sensitive to vancomycin, linezolid, quinolone including levofloxacin, cephalosporins including cefazolin, cefotaxime, ceftriaxone, cefepime, cefuroxime, beta-lactam, and beta-lactamase inhibitor combinations including amoxicillin/clavulanic acid, and ampicillin/sulbactam. Vancomycin was continued after consulting with a paediatric Infectious Diseases Consultant. CRP and TLC normalized on the 3rd day after surgical drainage. Intravenous vancomycin was continued for 4 weeks. After 45 days, the patient again developed otorrhoea with purulent discharge which was positive for *Proteus mirabilis*. Culture-sensitive antibiotic (oral amoxicillin-clavulanic acid syrup) was administered for 2 weeks leading to complete cessation of ear discharge. Further investigations in the form of basic immunodeficiency tests and 2D ECHO of the heart were also done and were found to be normal. At 1 year of follow up, the patient was asymptomatic with a full range of motion of the affected wrist (Fig. 2a and 2b). His final follow up X-rays were normal with no change in ulnar variance (Fig. 2c and 2d).

Table 1
Lab investigations.

Date	TLC (per cu.mm)	CRP[a](mg/L)
Day of presentation	14,800	90
After 2 days of arthrotomy	6040	9

TLC: Total Leucocyte Count, CRP: C Reactive Protein, mg/L – milligram per liter, cu.mm – cubic millimeter.
[a] CRP was measured using Immunoturbidimetric assay.

3. Discussion

Isolated septic arthritis of wrist is very rare in neonates. To our knowledge, this is the first case of isolated septic arthritis of wrist in a 15 days old child caused by *Streptococcus cristatus*. *Streptococcus cristatus* strains are described as Gram-positive, catalase-negative cocci, approximately 1 μm in diameter growing in chains (Fig. 3a and 3b) and were originally isolated from the human throat and oral cavities.[10] Based on the clustering patterns resulting from core genome phylogenetic analysis, Jensen et al. later concluded *Streptococcus oligofermentans* as a synonym of *Streptococcus cristatus* and classified them under *Streptococcus mitis* group.[11] Typical human habitats of this species of streptococci are the oropharynx, epithelial surfaces of the oral cavity, teeth, skin, and gastrointestinal and genitourinary tracts. Its association with endocarditis and septicaemia[10] has been reported but there is no literature regarding its association with bone and joint infections. Intrapartum transmission is responsible for most cases of early-onset neonatal infection and is the likely cause in our patient.[12]

Strong et al. had reported septic arthritis of 7 wrists in 6 infants in 1995.[13] All of them had the affection of more than one joint. In their series, the youngest child was 3 days old (range 3–145 days). Four of these wrists were treated with multiple aspirations whereas three were not timely diagnosed and had no surgical treatment. All patients in their series had a good function with no complaints of pain at final follow up. In contrast, there was isolated involvement of wrist joint in our case report and the age of the child was 5 days old when wrist swelling was first noticed.

Rushkoff ES et al. reported septic arthritis of twenty-nine wrists in twenty-eight patients.[14] There were only two children but none of them was of neonatal age group. *Staphylococcus aureus* was the most commonly recovered organism. All of them were treated with

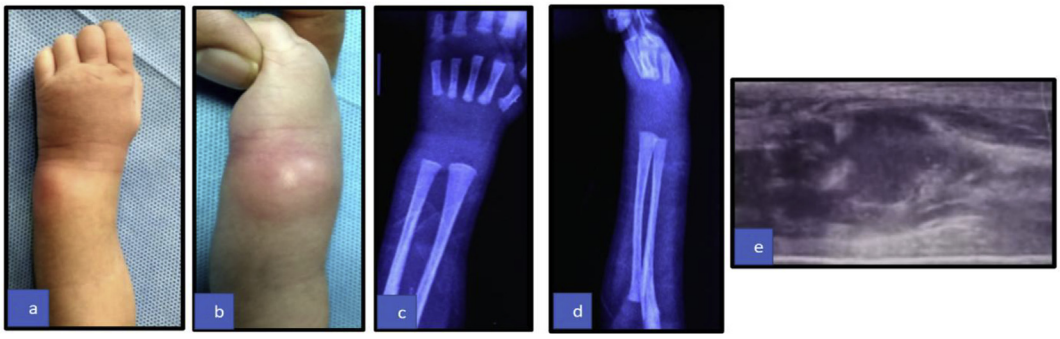

Fig. 1. (a–e): 15 days old infant presented with complaint of swelling over left wrist. 1a and 1b: Swelling over dorso-ulnar aspect of left wrist at the time of presentation. 1c and 1d: AP and lateral view of the affected wrist at the time of presentation. 1e: USG of the affected wrist showing focal fluid collection.

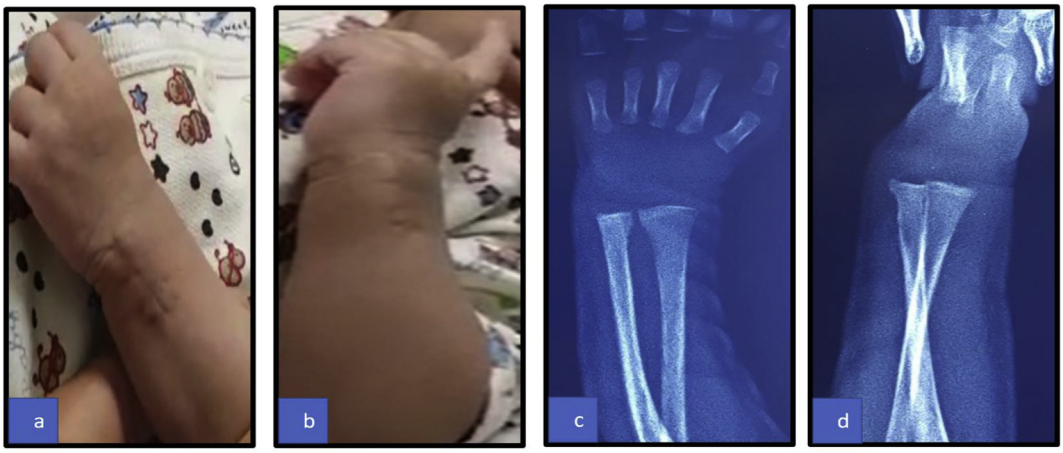

Fig. 2. (a–d): 2a: One year follow up showing healed surgical scar. 2b: Lateral view of the affected wrist showing good extension. 2c and 2d: AP and lateral view of the affected wrist at final follow up showing no deformity with normal ulnar variance.

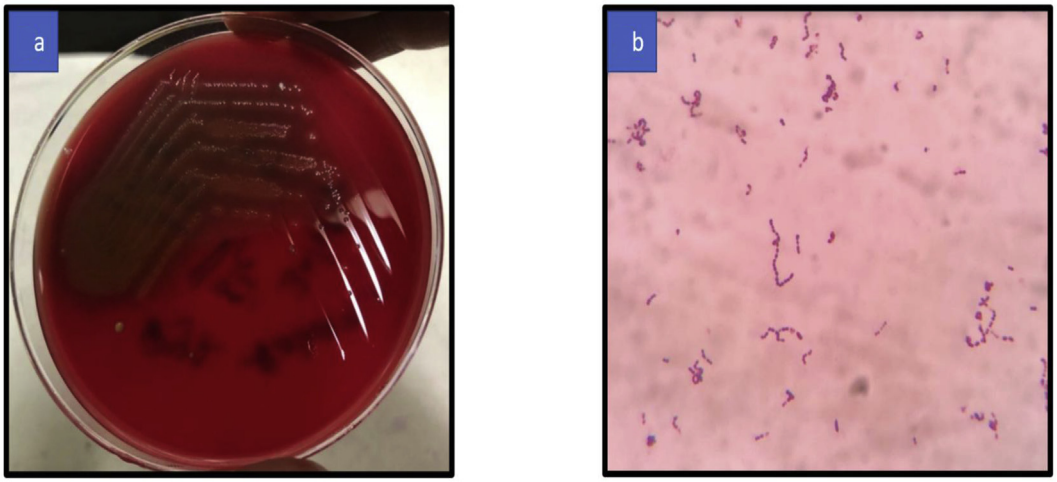

Fig. 3. (a–b): 3a: Agar plate showing growth of *Streptococcus cristatus*. 3b: Microscopic view showing *Streptococcus cristatus*.

early surgical drainage, parenteral antibiotics, and early mobilization after surgical decompression. They found that the long-term results deteriorated in direct proportion to the delay in surgical decompression and cases which were drained after sixteen hours of diagnosis had a fair or poor outcome. In our case, arthrotomy of the wrist joint and surgical decompression was carried out within 10 hours of diagnosis.

The duration of antibiotics for septic arthritis depends on the involved organism, at least 3 weeks for *Staphylococcus aureus and* Gram-negative organisms, 2–3 weeks for *Streptococcus pneumoniae*, group B *Streptococcus*, group A *Streptococcus*, *Hemophilus influenzae, and K. kingae*.[15,16] Antibiotics are continued for 2 weeks in case of culture-negative specimens.[16] However, most of the time it is individualized depending on the overall recovery of the patient, type of joint involved and on improving inflammatory markers (ESR and CRP). In most cases of neonatal septic arthritis, the duration of antibiotics is 3–4 weeks. In cases of accompanying osteomyelitis, a longer antibiotic course of 4–6 weeks may be required.[17]

In reported patient, as the aspirated fluid was purulent and suspicion of *Staphylococcus aureus* including methicillin-resistant *Staphylococcus aureus* (MRSA) was high, vancomycin was chosen empirically. After culture and sensitivity, vancomycin was continued for 4 weeks based on patient recovery, neonatal age, delayed identification of species and limited information regarding this rare bacterial infection. Oral therapy has been used successfully to complete treatment of septic arthritis in neonates, but the absorption of antibiotics in this age range is unpredictable.[17]

At one year follow up the child had full, painless range of motion with no functional deficit (Fig. 2a and 2b). He can crawl with full weight bearing. Final follow up x rays of the left wrist are not showing any signs of limb length discrepancy, angular defects, or growth arrest (Fig. 2c and 2d). Long-term follow up is required to assess growth restriction or deformity of the left ulna.

4. Conclusion

Wrist septic arthritis in a neonate is a rare entity. With the advanced diagnostics, species-level identification of rare organism like *Streptococcus cristatus* is possible along with antibiotic sensitivity for appropriate therapy. Early surgical decompression and

intravenous culture-directed antibiotics are the mainstays of management.

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None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcot.2019.02.002.

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