Group A Streptococcal meningitis in a neonate from a tertiary care centre

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Abstract:
Introduction Group A streptococcus (GAS), also known as Streptococcus pyogenes causes wide range of infections more common in children than adults. Most people who acquire the infection are previously healthy individuals while some do have predisposing underlying illnesses. Streptococcus pyogenes causes invasive infections, but is a highly uncommon cause of meningitis. Case Fifteen days old baby girl presented to paediatric emergency unit at our institution with history of fever for 2 days, vomiting and irritability for 1 day. Antenatal history was uneventful. No history of symptomatic pharyngitis of any of the close family contacts including parents and other siblings or grandparents. On examination child was irritable and afebrile, anterior fontanel was bulging and there was no neurological deficit. Vital signs were stable, oedema was present on the right dorsal side near the wrist. Child was admitted with working diagnosis of meningitis which was confirmed by Cerebrospinal fluid fluid (CSF) examination. CSF showed increased White Blood Cell count (t.wbc 820cumm t.rbc 70cumm 60 crenation polymorphs 80 lymph 20 bacteria present) with neutrophilic predominance. Cerebrospinal Spinal Fluid protein of 679 mg and sugar of less than 5 mg. Latex agglutination performed on CSF was negative for Hemophilus influenzae type b, Neisseria meningitides, Escherichia Coli, Streptococcus group B and Streptococcus pneumoniae. CSF culture grew of beta-haemolytic streptococcus susceptible to penicillin, grouping was performed and reported as Group A Streptococcus. Conclusion GAS meningitis is uncommon but serious disease affecting the older neonates. GAS meningitis continues to occur sporadically in children therefore paediatricians should be aware of GAS as a cause of acute meningitis and also that the life-threatening manifestations of invasive GAS disease in children can develop a fulminant form of meningitis associated with multisystem failure. GAS should be considered as a differential diagnosis of neonatal sepsis and meningitis. Prompt and appropriate treatment helps to reduce complications and decrease mortality rates.
Keyword: GAS, Group A streptococcus

Introduction

Group A streptococcus (1), also known as Streptococcus pyogenes causes wide range of infections more common in children than adults (2, 3). This unique organism is the most common bacterial cause of acute pharyngitis, and also gives rise to various cutaneous manifestations and systemic infections (4). GAS also causes serious non-suppurative complications like rheumatic fever and acute glomerulonephritis (5). Most people who acquire the infection are previously healthy individuals while some do have predisposing underlying illnesses (6). Streptococcus pyogenes causes invasive infections, but is a highly uncommon cause of meningitis. Meningitis due to Streptococcus pyogenes in children is described as a fulminant type of meningitis. Review of literature of meningitis due to GAS in 2008 has documented only 16 cases since 1966 (7). We report a 15 days old child who developed GAS meningitis who recovered completely on treatment with penicillin.

The aim of this report is to look into the various modes of transmission of GAS, identify the predisposing factors GAS meningitis in the paediatric age group.

Case report:

Fifteen days old baby girl was brought to paediatric emergency unit at our institution with history of fever for 2 days, vomiting and irritability for 1 day. Fever was low grade intermittent, not associated with rigors. Vomiting one episode, containing milk, non projectile, non bilious. Mother reported baby had been excessively irritable for one day. History of swelling over the dorsum of right hand for 1 day. No history of restriction of movements, no watery or foul smelling discharge from swelling. Baby was feeding well. There was no history of crying on passing urine or faeces. Antenatal history was uneventful. No history of symptomatic pharyngitis of any of the close family contacts including parents and other siblings or grandparents. On examination child was irritable and afebrile, no signs of pallor icterus, no lymphadenopathy, no cyanosis, anterior fontanel was bulging and there was no neurological deficit. Vital signs were stable, oedema was present on the right dorsal side near the wrist. Child was admitted with working diagnosis of meningitis which was confirmed by Cerebrospinal fluid fluid (CSF) examination. CSF showed increased White Blood Cell count (t.wbc 820/cumm t.rbc 70/cumm [60% crenation] polymorphs 80% lymph 20% bacteria present ++++) with neutrophilic predominance. Cerebrospinal Fluid protein of 679 mg% and sugar of less than 5 mg%. She was started on meningitic doses of cefotaxime after obtaining CSF for culture. Gram stain showed, many gram positive cocci in chains. CSF culture showed growth of beta-haemolytic streptococcus susceptible to penicillin, grouping was performed and reported as Group A Streptococcus. Biochemical tests to demonstrate the property of group A streptococcus to haemolyse red blood cells was also performed. Blood culture showed growth of same organism sensitive to all first line antibiotics. Subtyping of the organism was not available. Latex agglutination performed on CSF was negative for Hemophilus influenzae type b, Neisseria meningitides, Escherichia Coli, Streptococcus group B and Streptococcus pneumoniae. On day of admission child had seizures which were treated with intravenous phenobarbitone. Seizures...
were uncontrolled in view of which she was transferred to paediatrics intensive care where she required intubation and ventilation. She was given midazolam infusion and was started on intravenous dilantin. She was gradually weaned of ventilator after controlling seizures. She was stable for more than 24 hours in intensive care unit and was transferred to ward. In the ward, oral feeds were promoted and intravenous fluid were tapered and stopped. CT brain with contrast was performed which showed brain parenchyma of normal attenuation and no evidence of subdural effusion. In view of the wrist swelling ultrasound screening of right hand was done to rule out wrist septic arthritis, was normal. Antibiotics were given for 14 days total and stopped. She was discharged on oral antiepileptics with plan to continue for three months. Hearing test and neurological examination done at the age of 11 months were normal.

**Discussion:**
Group A streptococcus is an uncommon cause of meningitis in children and adults (6). Various infections caused by Group A streptococcus includes necrotizing soft tissue infections, adult respiratory distress syndrome and renal failure (8). Some of the co-morbid conditions for Group A streptococcus are head trauma, varicella infections (9, 10) while distant focal infections which act as predisposition factors are otitis media, pharyngitis, sinusitis and tonsillitis (11). However, in recent years invasive disease due to Group A streptococcus has been on an increase progressing to bacteremia and toxic shock syndrome (12).

Earlier bacterial meningitis due to GAS was uncommon and accounts for less than 0.2% of all cases of bacterial meningitis, with a total of 51 cases reported worldwide (13). Humans act as natural reservoir for GAS, Shetty et al has documented 30 cases of GAS meningitis over a 25-year period, from 1976 to 2001. Of these 52% had primary focus of infection in the ear, nose, and throat and blood culture grew GAS in 59% of cases (14). In India GAS meningitis continues to occur sporadically in children, GAS meningitis from year 1998 to 2010 in children was 14 cases over 13 yrs seen at our institution. GAS colonizes the oropharynx but does not usually invade the central nervous system directly and the pathogenesis of primary GAS meningitis is unclear (15). GAS meningitis in adults is associated with a focus of contiguous infection, however in healthy children meningitis is acquired as a consequence of bacteremia, which seems to be the pathogenesis in the present case of Group A streptococcal meningitis (16). Postnatal infections are transmitted by contact with hospital personnel, the mother, or family members, from breast milk or from inanimate sources such as contaminated equipment (17). Interestingly, cases of GAS meningitis following cochlear implantation have been reported (18). Iatrogenic meningitis following lumbar puncture is a rare complication of myelography, spinal anesthesia, intrathecal chemotherapy, and epidural anaesthesia (19). There was no recognizable underlying illness or predisposing factors for GAS meningitis in the present case. In the presence of a positive CSF culture for GAS, penicillin is the antimicrobial agent of choice since antibiotic resistance among isolates of GAS is currently not a clinically significant problem (20). However reduced efficacy of penicillin with high inoculum size called as the "the Eagle effect" of penicillin should be kept in mind.
while treatment with penicillin(21). GAS meningitis has been associated with a lower mortality if treated promptly. Compared to H. influenzae, N. meningitidis, and S. pneumoniae residual neurological damage due to GAS meningitis is much lower with better outcome (22).

**Conclusion:**
GAS meningitis is uncommon but serious disease affecting the older neonates. GAS meningitis continues to occur sporadically in children. Therefore paediatricians should be aware of GAS as a cause of acute meningitis and also that the life-threatening manifestations of invasive GAS disease in children can develop a fulminant form of meningitis associated with multisystem failure. GAS should always be considered as a differential diagnosis of neonatal sepsis and meningitis. Prompt and appropriate treatment helps to reduce complication and decrease mortality rates.

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