https://doi.org/10.54361/ljmr.v14i1.09

Shewanella algae meningitis and early onset neonatal sepsis: a case report of Libyan newborn and literature review

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Abstract: Neonatal sepsis still a main leading cause of morbidity and mortality among neonates, especially in the developing countries ,Most cases of Neonatal sepsis in neonatal intensive care unit are attributed to GB streptococcus, klebsiellapneumonia and other members of Enterobacteriaceae family.Shewanella algae (S.algae)is a gram –negative saprophytic bacillus, commonly associated with the marine environment,which has been isolated from humans.Early onset neonatal sepsis caused by S.algae is uncommon.Wereporta first case of Shewanella. Algaemeningitis in newborn with early onset neonatal sepsis which was responding to antimicrobial therapy and associated with good early out come and no late neurodevelopmental sequel.

Keywords: Shewanella algae,neonatal meningitis, early onset neonatal sepsis, Libya.

Introduction

Neonatal sepsis, ablood stream infection occurring during the first month of life,is associated with increased mortality and morbidity (1).Early onset neonatal sepsis (EONS)develop within three days of birth.The organisms associated with it are derived from the mother during the intrapartum period;these are group B streptococciklebsiella,escherichia coli,streptococcus viridians,enterococci, staphylococus aureus,pseudomonas aeruginosa and theother gram negative bacilli (2, 3).Shewanella spp;saprophytic non fermenting gram - negative bacilli are an uncommon cause of human disease associated with three characteristic patterns of human infection; i.e.,soft tissue infection,bacteremia and neonatal sepsis (4, 6, 12).Here, we report a case of neonatal meningitis and early onset neonatal sepsis caused by shewanella algae. Shewanella algae is amarine bacteria and an uncommon cause of infection in humans caused by exposure to sea water.However, these infections are often associated with high mortality.Prematurity is a known as a risk factor. Thus, we report an uncommon case of meningitis with early onset neonatalsepsis caused by shewanella algae in a newborn delivered by caesarean section at 34 weeks of gestation. S.algae is saprophytic bacterium and a novel pathogen ofneonatal sepsis and very rare cause of neonatal meningitis particularly inan institutional setup,where exposure tocontaminated water is unlikely. This casehighlights the importance of a clinical suspicion and microbiology laboratory in indentifying the correct etiologicalagent for neonatal meningitis and sepsis (Shewanella algae in our case),therefore, facilitating the use of an appropriate antibiotics, which resulted in a better and satisfactory clinical early andlate outcome.

Case:a 39 years old para four diabetic lady with previous four caesarean sections presented at 34 weeks gestation in labor,she has history of intrauterine fetal death at 36 weeksand history of abortion at 18 weeks. No history of premature rupture of membrane. Emergency lower segment caesarean section was done and 3.235kg female baby was delivered.Apgar score was 5/10 at one minute and 9/10 at 5 minute thenthe baby was transferred to the special care baby unit for management as infant of diabetic mother where the baby develop sign of mild respiratory distress (transit

tachypnea of newborn: TTN). Oxygen supply with oxyhood, intravenous fluid was started. Complete blood count revealed WBC24 Hgb 18.7g/dl platelets 266 lymphocyte 25.8% neutrophils 62.8% bloodsugar, serumcalcium monitoring was done and managed accordingly, earlyenteral (trophic) feeding was started by nasogastric tube. On the second day, respiratory distress was subsided (Transit tachypnea of newborn). Oral feeding by sucking was started, she developed hypocalcaemia and hypomagnaecemia. Treatment was given, at the end ofthe second day of life she was well,jaundice, serum bilirubin was at phototherapy leveland C reactive protein (CRP) was negative.On thethird day,she was unwell depressed activity, hypoxic,oxygen saturation by pulse oximetry 70%, Febrile 39.5℃, tachypnic RR 65/min, tachycardia 170 beat /min systemic examination was normal. The baby was transferred to the intensive care unit where CBC, CRP Bloodsugar, S.Calcium, B.Urea and electrolyte. Full septic screen was done (Lumber puncture,suprapubic aspiration for2 urine culture and sensitivity, blood for culture and sensitivity,chest X ray),parenteral antibiotic Ampicillin 100mg/kg day divided 12 hourlyand gentamycin 5mg/kg /day iv divided 12 hourly was started. Investigations results revealed total white cell count21.1x10^3/µl,red blood cells 5.05x10^6per µl, hemoglobin 17.1 g /dl,platelet 173 x10^3 /µl. The differential leucocytes count (Neutrophils 82.4%, lymphocyte 13.8%, mixed 3.8%. Immature Neutrophils 17.4x 103 per µl.CRP was raised 4.8mg /dl. Ampicillin and gentamycin was started as empirical therapy. Blood sugar at timeoflumber puncture was44 mg/dl,cerebrospinal fluid sugar was<10mg/dl and cerebrospinalfluid protein was > 300 mg/dl. The baby was stable ampicilin dose was increased to150mg /kg 12hourly intravenously.After24 hours the baby general condition was unsatisfactory, lethargic, mottled skin,developed prolonged apnea stopped by mechanical stimulation.Complete blood count, CRP, blood sugar,urea,electrolytes, serum calcium,and blood culture was taken. ampicilin and gentamycinwere discontinue.Cefotaxime (clamoring) and amikacin were started. CRP was 2.4mg /dl. WBC 20.1 ×10^3/µL neutrophils % 65% lymphocyte%25.9% HGB 16 gm/dlS.Calcium was 7.7 mg/dl,blood sugar was 188mg/dlblood urea 25mg/dl, sodium 146 mmol/l and potassium 4.2 mmol/l. Treatment of hypocalcaemia was done.

Blood and cerebrospinal fluid cultures was done by automated bioMerieuxcustomer and VITEK 2-compact and gave a positive result after 24 hours where gram negative bacilli which produced β-haemolytic colonies with a tan pigment on blood agar media were isolatedfromCSF culture (Figure1)which is growth of shewanella algae.Blood culture also revealed the growth of shewanella algaeafter three days.

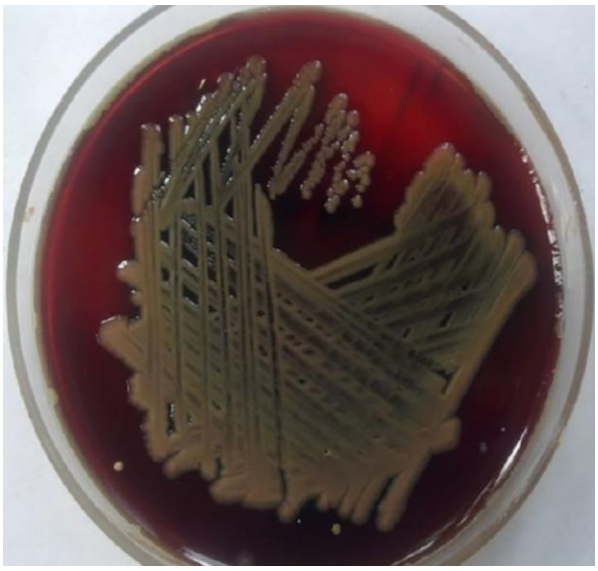

Figure1:β haemolytic colonies with tan pigment of gram negative bacilli on blood agar media (shewanella algae)

The anti-microbial susceptibility test reported that isolate was resistant to ampicilin, gentamycin,amoxicillin clavulanic acid and sensitive to cefotaxime, ceftazidime, cefetriaxone, meropenem,imipenem, ciprofloxacillin.Urine culture showed no growth. The patient became better, his vital signs and oxygen saturation by pulse oximetrywere normal.Neurological and systemic examination was normal, repeated blood sugar and serum calcium were normalwhen the cultures revealed growth of Shewanella algae we ask the mother about exposure to sea water and she reported that her house is too near to the sea and gave history of swimming in sea water frequently before delivery.Head ultrasound examination was normal.CRP after 3 days of startingcefotoxime(claforan)and amikacin was1.2 mg/dl. One week after it was negative.Two weeks of treatment was completed, the baby was well, accepting oral feeding.Normal examination CRP negative. No growth in second blood culture.Antibiotic stopped and discharged with good condition .on follow up as outpatient she was doing well. Normal development.Now she is 5 years old with normal physical and neurological development.

Discussion

The genus shewanella is an oxidative,H25 producing gram negative bacillus (1, 4,6,7), the two bio-types,S.algae and S.putrifaciens (7,9). S.putrefaciens are differentiated based onhaemolytic propertyon blood agar,ability to ferment carbohydrates,growth at42℃,ability to grow on salmonella-shigella agar and 6.5%sodium chloride (1,4,9,10).Shewanella spp are often isolated from natural habitats like water and soil.Human infection caused by this group of organism is rare. Common infection caused by this organism include skin and soft tissue infection (8-12,14,16),hepatobiliary disease(6,13) and bacteremia(4,9,13,18),including neonatal sepsis,(2,5,10,11,12,14-16).

Commonly,infections caused by this organism are associated with exposure to environmental sources like water.The first cases of S. algae bacteremia were reported in Denmark (1999) in two patients with chronic leg ulcers. They had been exposed to the same marine environment (8).Iwata etal reported aprimary shewanella algae septicemia in aJapanese women undergoing hemodialysis (18). S.algae infections have been reported in children,butthere have been no previous reports of bacteremia. Ear infections are common and aseries of 65 cases described children who have otitis media that occur during summer (1,16).Sardelic etal. reported a case of ventriculitis and peritonitis caused by S. algae, it was in Croatia in child with ventriculoperitoneal shunt(17). The infection developed after contact with seawater and began as otitis (14).Tan etal reported a case of purulent pericarditis with greenish pericardial effusion caused by shewanella algae (19). Shewanella algae bacteremia and associated cellulites in a patient with multiple myelomawas seen in Budap reported by Krsnik (20). Acase of bacteremia and suppurative vertebral osteomyelitis/discitis due to shewanellaalgae occurring after raw-fish consumption in Kansenshogakau Zasshi reported by Shimizu and Matsumura (21).An outbreak of shewanella algae and shewanella putrefaciens infections caused by a shared measuring cup in general surgery unit in Korea was happenreported by Kum etal. (22).

Since traditional new born care practice like bathing or prelacteal feeding are wide in rural populations,adherence to the standard obstetric care and health education would be

imperative .In preventing this infections,especially in the case of non-institutional deliveries. In hospital setups,vigilant nursing care along with surveillance of hospital environment and facility for rapid laboratory diagnosis is likely to reduce the risk of shewanella infections (15),in our patient the source of infection remained undetected.Although the infection was acquired postnatally,water was unlikely to be a source in this case as the baby was not exposed for bathing or pre lacteal feeding.More ever the environmental screening of water sources in neonatal intensive care unit and delivery suite failed to grow shewanella spp. So,the infection was most likely maternal acquired as the mother reported swimming in sea water before delivery. In Carolina, García-Fragoso etal reported S.algae bacteremia in extreme preterm baby with maternal history of swimming in sea water early in pregnancy (16).Shewanella bacteremia has been reported in infants prematureand term neonates (7,13, 15,16),Brink etal studied bacteremia in 24 patients,of which the majority were prematureneonate (66%,16 out of 24), (2,7,10,15,16).Pnemonia and respiratory distress were strongly associated with shewanellabacteremia (16), however in our case the baby has norespiratory illness apart fromTTN in the first hours of life as inCharles et al. reported acaseof neonatal sepsis caused by S.algae has no associated respiratory diseases (15).In the case, series of infections by shewanella spp.However, all the patients were adult and mainly presented with wound and soft infections which were chronic in nature (9,18,19).In all the previously reported cases of shewanella infection in adults, children and neonates no case of meningitis had been documented in the literature.AlthoughS.algae has been isolated from various human samples (1).Early onset neonatal sepsis[EONS]caused by this organism is uncommon.Around 13-28% mortality has been reported with shewanella infection (1,10).In spite, there is treatment failure due to emergence of resistance of carbapenemduring therapy for shewanella algae bacteremia reported by Kim and his etal (23). Susceptibility to gentamycin,cephalosporine and ciprofloxacillin was seen in various studies (11,15,16).This is in accordance with our finding since in ourisolated strainexhibited resistance to the ampicilin,gentamycin and highly sensitive to amikacin,cephalosporines andcarbapenemes.The patient was improved clinically as we were starting gentamycin as empirical therapy and changed to amikacin

and cephalosporine in from of cefotoxime (claforan)when the patient became febrile and CRP was raising and repeated blood culture result revealed no growth and finally the patient did not develop any early or late sequels which support the sensitivity of our isolated strain to these antibiotic treatment.So, earlydetection and initiation of proper treatment 0f shewanella algae meningitis and sepsis resultsto successful outcome. In conclusion, shewanella algae is an unusual human pathogen.Neonatal sepsis caused by shewanella algae is uncommon and neonatal meningitis caused by shewanella algae is veryrare and was notreported in the literature before. Early diagnosis and proper management ofneonatal meningitis caused by S.algae is associated with early good outcome and normal neuro-development.

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