Proteus Mirabilis Septicemia and Meningitis in a Neonate

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Abstract

A 6-day-old premature baby boy presented in a pediatric clinic for severe jaundice, poor feeding and lethargy. He was born to a 24-year-old mother who was primigravida. Pregnancy was complicated by gestational diabetes, appropriately treated chlamydial infection, oligohydramnios and inadequate prenatal care. On physical examination, he was hypotonic and irritable with significant jaundice seen from his head to his lower extremities. Transcutaneous bilirubin obtained in clinic showed a level of 14 mg/dL. A serum bilirubin level was immediately ordered and it confirmed an elevated unconjugated bilirubin level of 18.9 mg/dL. He was admitted to the inpatient unit and a full septic work-up was initiated. Appropriate antibiotics were administered to cover for the most common pathogen involved in neonatal sepsis. A few hours into the admission, his condition deteriorated requiring intubation for multiple consecutive apneic episodes and seizure-like activity. Initial laboratory evaluation included an abnormal white blood cell count of 2,600/µL with left shift, elevated lactic acid of 9 mmol/L and a low bicarbonate level of 16 mmol/L further confirming acidosis. Analysis of cerebrospinal fluid revealed a white blood cell count of > 300/µL, low glucose with a level of 7 mg/dL and elevated protein level of 645 mg/dL. Due to his rapid clinical deterioration a few hours into the admission, a computed tomography scan of the brain was obtained. Computed tomography scan of brain showed significant damage to brain parenchyma consistent with anoxic brain injury. He expired on his second day of admission. Proteus mirabilis was the causative agent.

Keywords: Proteus mirabilis; Neonatal meningitis; Neonatal sepsis

Introduction

Proteus mirabilis is an uncommon infectious organism in neonatal sepsis. To our knowledge, there have been only a limited number of cases that have been described in literature worldwide that implicates Proteus as a cause of infection involving neonatal meningitis and septicemia. This organism is a common inhabitant of the human intestinal tract and most cases of Proteus infection in humans are considered community acquired infections [1]. In neonates, Proteus infection accounts for a very small percentage of neonatal sepsis. A review by Unhanand et al of bacterial meningitis cases admitted in Children’s Medical Center in Dallas from period 1969 to 1989 involving gram-negative enteric bacillary meningitis in neonates and infants identified 98 cases and 4% of those were caused by Proteus mirabilis [2]. Route of infection has not been established but presumed to be ascending infection during delivery due to its early presentation. In most of the cases reported in literature, the course of the infection appears to be fatal involving severe neurologic complication with cerebral abscess and pneumocephalus formation despite institution of appropriate antibiotics [2-5].

Case Report

A 6-day-old premature baby boy was brought into pediatric clinic with a 2-day history of poor feeding, lethargy and worsening jaundice. He was born at 36 weeks gestation and was discharged at 2 days of life after an uneventful stay in the newborn nursery. Per hospital protocol, he followed up in clinic early due to prematurity and jaundice. There was no history of injury. His mother was a 24-year-old primigravida and received inadequate prenatal care. Her pregnancy was complicated by gestational diabetes, chlamydial infection that was appropriately treated and oligohydramnios. His mother also had urinary tract infection caused by E. coli during her pregnancy and she received proper treatment. Repeat urine cultures on subsequent prenatal visit did not grow any bacteria. Maternal laboratory screenings for HIV, Group B Streptococcus, syphilis and hepatitis B were all negative. In
the ICU. He also developed hypotension and was placed on
vasopressor support.

Immediately after admission, he had brief episode of
head and right upper extremity rigidity. He also failed to re-
act appropriately to painful stimuli with placement of intra-
venous access and lumbar puncture. A full septic work-up
was performed and intravenous antibiotics with ampicillin
and cefotaxime was given. Three hours into admission, his
condition deteriorated. He had multiple apneic episodes ob-
served by the hospital staff along with a seizure-like activity.

Immediate laboratory investigation showed unconjugat-
ed hyperbilirubinemia with a serum level of 18.9 mg/dL. His
white blood cell count was 2,600/µL with seven bands and
22% neutrophils. Serum electrolyte abnormalities were sig-
nificant for low bicarbonate level. Lactic acid was elevated
at a level of 9.0 mmol/L. Cerebrospinal fluid (CSF) micros-
cy showed a white cell count of > 300/µL (differential was
not performed due to WBC degenerated per lab personnel), a
CSF glucose of 7 mg/dL and protein of 645 mg/dL.

A brain computed tomography immediately performed
after transfer to ICU showed global anoxic injury involving
the entirety of the brain with effacement of the basal cisterns
consistent with superior inferior transtentorial herniation and
subarachnoid hemorrhage.

Early into the second day of admission, his blood and
CSF culture grew gram-negative bacilli and was later identi-
ﬁed as Proteus mirabilis. The organism appears to be sensi-
tive to the antibiotics administered but his condition contin-
ued to deteriorate. Due to cardiovascular collapse associated
with sepsis, he continued to need multiple vasopressor sup-
port. His lactic acid remained elevated. Coagulation profiles
were deranged and he required transfusion of blood products
for correction. He was removed from sedation for several
hours but his physical examination did not reveal any spon-
taneous movements. His pupils were non-reactive and he did
not have any spontaneous respiratory effort observed with
ventilator support.

Electroencephalogram performed revealed severe sup-
pression of brain activity consistent with anoxic brain injury.

Discussion

Proteus mirabilis is not a commonly isolated organism in
cases of neonatal sepsis and infections of the central nervous
system. Some report it as the causative agent in about 4% of
cases of neonatal meningitis [3]. Cerebral abscess formation
and pneumocephalus has been described as also being as-
associated with Proteus infections [2-5]. Our patient had brain
findings that were most likely caused by the overwhelming
sepsis.

Clinical features appeared as early as day 6 of life, and
with no evidence of ear, sinus or urinary infections, ascend-
ning maternal transmission is the most likely route of infec-
tion. Reiner et al reported four fatal cases of Proteus infection
associated with a maternal Proteus urinary tract infection [6].
This was the first report that possibly linked maternal infec-
tion to development of neonatal infection. Given the poor
outcomes of most cases reported in the literature in the past
decades, early diagnosis method may be warranted through antepartum screening with appropriate institution
of prophylactic antibiotics during delivery. Though the case
reports involving Proteus have been sporadic, there is clear
evidence to show the infection is fatal in its early course.

We hope that with increased awareness, an evaluation of the
cost-effectiveness associated with implementing a screening
can be examined. Similar discussions in the obstetric com-
unity are taking place regarding universal toxoplasmosis
screening [7]. We think Proteus mirabilis should be added to
the discussion given its similar association with devastating
outcomes.

Although infection of this organism is not well reported
and its true prevalence is unknown, the gravity of the ill-
ness should still raise awareness. Pediatricians should have a
high index of suspicion when dealing with cases of meningi-
tis and septicemia that shows rapid deterioration of clinical
condition despite of appropriate management of antibiotics.
Moreover, better surveillance data need to be gathered to
better see the magnitude of the infection.

With this case report, we continue to expand the caus-
itive agents associated with early neonatal sepsis and the
organisms association with abscess formation. This report
provides further evidence that neonatal infection with Pro-
teus mirabilis is typically fatal and early screening methods
should be investigated and implemented.

References

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