G34 Pyelonephritis—Sudden and Unexpected Death in Infancy

Cristin M. Rolf, MD, University of Kentucky, Office of the Associate Chief Medical Examiner, 100 Sower Boulevard, Suite 202, Frankfort, KY 40601-8272; and Bonnie Mitchell, MD, University of Kentucky, Department of Pathology and Laboratory Medicine, 800 Rose Street, UKMC MS 117, Lexington, KY 40536-0298*

The goal of the presentation of these two separate cases is to demonstrate that acute pyelonephritis, which may not be detected clinically, is an unusual cause of sudden and unexpected death in infants.

This presentation will impact the forensic community and/or humanity by informing all of the role acute pyelonephritis plays in sudden, unexpected death in infancy, and providing a discussion of the differential diagnosis. This potentially lethal condition can be misdiagnosed clinically or masked by other co-morbid infections such as otitis media and viral illnesses.

This poster presents two cases of infants dying suddenly and unexpectedly from acute pyelonephritis. In the first case the infant had no known risk factors, in contrast to the second infant who had significant risk for the development of pyelonephritis. The authors review the pathogenesis, incidence, and differential diagnosis of pyelonephritis in infants dying suddenly and unexpectedly.

The first case is that of a previously healthy 7-month-old white female with medical history of asthmatic bronchitis. The infant appeared to be in her normal state of health, playing before she went to sleep the night before her death. She was fed a bottle around 3:00 AM and placed on top of her mother's chest, which was the infant's usual sleeping position at night. At around 6:00 AM the mother noted the infant to lifelessly fall limp from her chest onto the couch. The Coroner's investigation disclosed no evidence of maternal intoxication. No wedging or overlay was suspected. The mother stated the infant had a low-grade fever over the preceding 2-3 days. Despite emergency care and ACLS protocol, the infant could not be resuscitated. Gross autopsy findings revealed no evidence of accidental asphyxia or trauma. All other findings were negative except for an enlarged left kidney demonstrating wedge-shaped foci of pink, soft expanded renal cortex and medulla. No stigmata of sepsis were present. No congenital anomalies of the urogenital tract were grossly evident. Microscopic examination of the kidneys revealed acute pyelonephritis of the left kidney characterized by acute inflammatory cell infiltrates involving the renal tubules and interstitium. Tubular abscesses were present. Death in this case was attributed to acute pyelonephritis.

The second case involved a 10-month-old white male infant diagnosed with Ectrodactyly-Ectodermal Dysplasia-Clefting Syndrome complicated by extrophy of the urinary bladder with subsequent hydronephrosis. The infant had undergone multiple corrective surgical procedures for extrophy, epispadias, anteriorly placed imperforate anus, and cleft palate. His course was complicated by bilateral hydroureter and hydronephrosis. Prophylactic Cephalexin was prescribed throughout the last months of his life. On the day before death the infant developed recent onset of fussiness and low-grade fever, and was diagnosed in the local pediatric clinic with otitis media. He was prescribed Amoxicillin clavulanate and discharged to home. The next evening the infant was placed in an infant swing to calm his fussiness. He was found unresponsive in the swing 2 hours later. The body was positioned sitting in the seat with his head extended over the backrest of the seat. Coroner's investigation revealed no evidence of swing malfunction or positional compromise of respiratory excursion. At autopsy, gross examination revealed the facial and appendicular stigmata of Ectrodactyly-Ectodermal Dysplasia-Clefting Syndrome with postnatal operative corrections. The repaired urinary bladder contained numerous stones, and the mucosa was significant grossly and microscopically for chronic cystitis. Bilateral hydroureter and hydronephrosis were present. A perinephric acute inflammatory exudate was present around the right kidney and adjacent right liver lobe. Histopathologically, both kidneys demonstrated chronic interstitial nephritis, and the right kidney contained acute and chronic inflammatory cell infiltrates within the renal interstitium associated with focal tubular abscesses. Postmortem blood cultures yielded *Proteus mirabilis, Citrobacter freundii,* and *Enterococcus faecalis*. Death was attributed to acute pyelonephritis with perinephric abscess and urosepsis. The significant contributing cause of death was Ectrodactyly-Ectodermal Dysplasia-Clefting Syndrome complicated by extrophy of the urinary bladder.

Acute pyelonephritis is an acute suppurative inflammation of the kidney usually caused by a bacterial infection. Routes of bacterial spread to the kidney can be either hematogenous or due to retrograde ascension from the infected lower urinary tract. Risk factors for pyelonephritis include the following: hematogenous septic spread; congenital obstruction of the urinary tract; vesicoureteral reflux; pregnancy; instrumentation; age and sex; renal lesions with scar; or immunodeficiency. Papillary necrosis, pyonephrosis, perinephric abscess, and urosepsis represent complications of acute pyelonephritis. Both cases involve ascending route of infection. Although the first infant had no gross anomalies of the urogenital tract, functional vesicoureteral reflux cannot be excluded. An incompetent vesicoureteral orifice, which is not detectable on visual inspection, could have allowed the reflux of urine and bacteria into the ureter and kidney. The hematogenous route was not deemed likely in either case. The second case involved a physical anomaly of the urinary tract with subsequent chronic traction and obstruction of the ureters.

The clinical diagnosis of pyelonephritis in infancy may be difficult for several reasons. A diagnostic index of suspicion was blunted by the mild febrile presentation in the first case. Clinical focus on otitis media masked the

 ** Presenting Author*

more serious infection in the second case. This poster presents two cases of pyelonephritis, which were neither suspected by parental caregivers nor diagnosed clinically in the presence of a less serious infection. Pyelonephritis constitutes a rare cause of sudden and unexpected death in infancy.

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 ** Presenting Author*