Nephrocalcinosis in a preterm infant

Lisa Fox and Sheryle Rogerson

Newborn Services, Royal Women’s Hospital, Parkville, Victoria 3052, Australia.
Correspondence to Lisa Fox via ASUM. Email author@asum.com.au

Abstract Bilateral medullary echogenic foci are not uncommonly seen in renal ultrasounds of sick, preterm neonates. Often, the likely diagnosis is nephrocalcinosis. We present one such case. The long term outcome in this population is unknown, but is generally thought to be essentially good.

Discussion

The ultrasound appearance of the kidneys in neonates differs significantly from that in older children. The renal cortex has echogenicity equal to or greater than that of the liver and spleen, whereas in older children and adults, the cortex is relatively hypoechoic. The echogenicity of neonatal renal cortex is due to the relative concentration, as well as the increased cellular volume, of glomeruli. The medullary pyramids appear prominent and hypoechoic because of a relatively lower cortical volume.

Increased medullary echogenicity in the preterm infant is a non-specific finding and may be due to a number of problems such as nephrocalcinosis, the sloughed papillae of papillary necrosis, vascular congestion, fungal infection or early transient protein cast deposition (Tamm-Horsfall proteinuria).

The infant described in this case had non-specific findings of tubular dysfunction and haematuria. When correlated with the clinical history, identification of increased echogenicity in the medulla, unchanging over two weeks, although not a definitive diagnosis, suggests nephrocalcinosis as the likely diagnosis of the ultrasound findings. Serial ultrasounds would have been helpful in establishing this more definitively.

Infants affected by nephrocalcinosis tend to be sicker infants, who are more likely to have periods of acidosis, or to have received treatments such as diuretics and steroids. The ultrasound appearance of increased medullary echogenicity tends to be symmetrically bilateral, and may range from hyperechogenicity at the tip of the pyramid or hyperechoic rim around the pyramid to intense hyperechogenicity filling the pyramid entirely.

Long-term effects remain unknown, although many...
studies have suggested the majority have resolved by mid childhood. A small study of 14 very low birth weight infants followed to seven years reported no measurable differences in renal function compared with a control group. Others have reported renal calculi in a few affected children. In one recent study of 40 preterm infants nephrocalcinosis was associated with poorer glomerular and tubular function at seven years1,2,4,5,7.

Renal papillary necrosis (RPN) is the major differential diagnosis in this clinical situation. RPN can present with haematuria, features of urinary infection, renal obstruction or colic. Occasionally, it may present as acute renal failure and lead to chronic renal failure. Increased medullary echogenicity may be patchy or diffuse, unilateral or bilateral, and tends to be more extensive as severity increases6. RPN can be distinguished from nephrocalcinosis on ultrasound with time as RPN shows distortion of the papillae and sloughing within two weeks, whereas nephrocalcinosis tends to remain unchanged. In adults, it has been related to the use of non-steroidal anti-inflammatory drugs, as well as diabetes, dehydration/hypotension, renal vein thrombosis, acidosis and respiratory distress. There is limited information regarding the neonatal population.

Conclusion
Nephrocalcinosis is common in the preterm population, particularly those with significant or prolonged illness. Ultrasound findings should be correlated with clinical history. Despite a degree of reassurance from the literature that these children are unlikely to suffer adverse long term consequences, further long term follow up studies are required before this can be conclusively determined. The lack of clarity from the existing literature regarding long term prognosis may justify long term follow up of these children.

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