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Calyceal diverticula in children: Imaging findings and presentations☆

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KEYWORDS
Diverticulum;
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Abstract A calyceal diverticulum consists of a cystic eventration in the renal parenchyma that is lined with transitional cell epithelium with a narrow infundibular connection with the calyces or pelvis of the renal collector system; thus, the term pyelocalyceal diverticulum would be more accurate. Very rare in pediatric patients, calyceal diverticula can be symptomatic and require treatment. Calyceal diverticula are underdiagnosed because they can be mistaken for simple renal cysts on ultrasonography. To determine the approach to their follow-up and management, the diagnosis must be confirmed by excretory-phase computed tomography (CT) or magnetic resonance imaging (MRI).

This article aims to show the different ways that calyceal diverticula can present in pediatric patients; it emphasizes the ultrasonographic findings that enable the lesion to be suspected and the definitive findings that confirm the diagnosis on CT and MRI. It also discusses the differential diagnosis with other cystic kidney lesions and their treatment.

PALABRAS CLAVE
Divertículo;
Riñón;
Tracto urinario;
Ecografía;
Tomografía computarizada

Divertículos caliciales en niños: hallazgos radiológicos y formas de presentación

Resumen El divertículo calicial (DC) es una eventración quística intraparenquimatosa tapizada por epitelio celular transitorio con una estrecha conexión infundibular con los cálices o pelvis del sistema colector renal, por lo que el término más exacto es divertículo pielocalicial. Muy raro en la edad pediátrica, puede ser sintomático y requerir tratamiento. Está infradiagnosticado por confundirse con quistes renales simples por ecografía;

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t su diagnóstico se confirma con tomografía computarizada (TC) o resonancia magnética (RM) en fase excretora, para determinar su seguimiento y manejo. Nuestro objetivo es mostrar las diferentes formas de presentación de los DC en la edad pediátrica, haciendo hincapié en los criterios ecográficos que permiten una aproximación diagnóstica y en los hallazgos definitivos en TC y RM. También discutimos el diagnóstico diferencial con otras lesiones quísticas renales y su tratamiento.

Introduction

Calyceal diverticula (CD) are cystic eventrations of the upper urinary tract found within the renal parenchyma and covered by epithelium of non-secretor transitional cells. They contain urine and are located at the periphery of a calyx and communicate with it through a narrow isthmus or infundibulum.[1–4]

CD are categorized as type I, those that communicate with a minor calyx or infundibulum, or type II, those that stem from the renal pelvis or a major calyx (Fig. 1). Type I is the most common of the two and is usually found in the upper pole. Type II are bigger, usually asymptomatic and located in the interpolar region of the kidney.[1,5,6] They can be multiple and bilateral.[2]

The exact etiology of CD is unknown, but the hypothesis is that they are congenital. Embryologically, the pyelocalicial system develops from consecutive divisions of the ureteric buds that are surrounded by the metanephric blastema. From the first third to five generations of divisions, the buds dilate to make up the cavity of renal pelvis and the major calyxes. Consecutive subdivisions result in an approximate number of 20 minor calyxes. The reduced number of calyxes occurs due to the absorption of several branches in the pelvis. One of these calyxes can give rise to the formation of a sac connected to the collecting system that dilates under pressure from the urine causing one diverticulum. The similar incidence (3/1000) in children and adults confirms this theory.[1,3–6] In adults, acquired CD have been described following infectious processes leading to infundibular fibrosis and stenosis.[2,4]

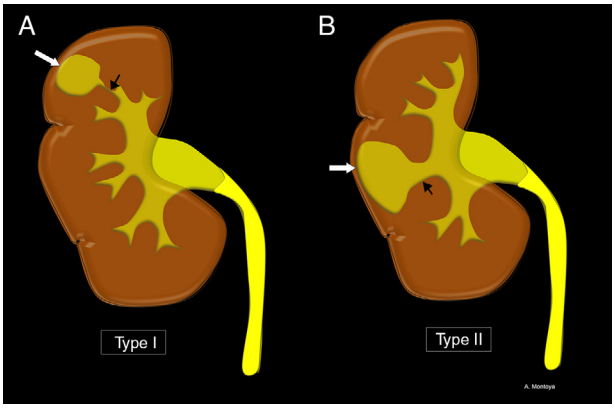

Figure 1 Schematic representation of the different types of calyceal diverticula (CD). (A) Type I. Communication of the CD (white arrow) with a minor calyx through the infundibulum or isthmus (black arrow). (B) Type II. Communication of the CD (white arrow) with a major calyx or pelvis through the infundibulum or isthmus (black arrow).

Possibly, the true prevalence of CD is higher since they are misdiagnosed after being taken for renal simple cysts. A more precise analysis of the ultrasound findings can help us distinguish CD from renal cysts, being the computed tomography (CT) scan, or the magnetic resonance imaging (MRI) with contrast in the excretory phase the imaging modalities that confirm the diagnosis.

Our goal will be to show the different clinical presentations of CD during the pediatric age, paying special attention to the ultrasound criteria that allow a certain diagnostic approach and the definitive findings made through CT scan and MRI. We will also be discussing differential diagnosis with other renal cystic lesions and their therapy.

Clinical presentation

CD are rare in children and are usually found incidentally in imaging studies conducted for other reasons (Fig. 2). Most remain stable and asymptomatic, but approximately 20% have complications and require therapy.[7] Colicky flank pain, hematuria, and recurrent urinary tract infections are some of the most common clinical presentations of symptomatic CD.[1,4]

The most common complication in 30–50% of the cases is intradiverticular lithiasis (Figs. 3 and 4) favored by urine stagnation in the cystic cavity.[1,2,5,8] It seems clear that in their formation other metabolic factors such as hypercalciuria, hyperuricosuria, or hyperoxaluria play an important role, which is why these factors should always be studied when finding CD. The composition of most intradiverticular stones is mixed: calcium oxalate monohydrate and hydroxyapatite.[9]

CD predispose to recurrent urinary tract infections that can become complicated with the formation of abscesses (Fig. 5). The narrow isthmus or infundibulum occludes, urine stagnates, and infection develops. The concomitant association of vesicoureteral reflux in some of these cases contributes to the infection. In the presence of CD, one urosonography should be conducted.[7,10,11]