

Bilateral partial ureteral duplication with double collecting system in horseshoe kidney

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ABSTRACT

The horseshoe kidney is the most common renal fusion anomaly. Approximately one-third is associated with other congenital anomalies. The combination of horseshoe kidney and bilateral ureteral duplication is a very rare entity. The horseshoe kidney anomaly discovered incidentally in ultrasound examination in our patient when he was being detected for urinary incontinence. Because he had dilated renal pelvis he had undergone intravenous pyelography (IVP). Bilateral double collecting system and bilateral partial hydronephrosis was detected on IVP. Magnetic resonance urography was also performed in the same patient for better delineation.

Key words: double collecting system, horseshoe kidney

INTRODUCTION

The horseshoe kidney is the most common renal fusion anomaly, affecting 1/400 of the population [1]. Horseshoe kidney may occur as an isolated entity, but approximately one-third is associated with other congenital anomalies [2]. Duplication of the renal collecting system is the most common upper tract anomaly with an incidence of 0.5–0.8%. The combination of horseshoe kidney and bilateral ureteral duplication is a very rare entity. Only one case has been reported till now [3]. We have therefore found it plausible to report the following case of horseshoe kidney and bilateral partial ureteral duplication with double collecting system.

CASE PRESENTATION

A 50-year old female patient was referred to our department by her own physician because of urinary incontinence for about 20 years. She had been treated with surgery by a urologist for urinary incontinence in 2007. Physical examination and laboratory tests were normal. Abdominal Ultrasound (US) examination showed bilaterally dilated calyces in a horseshoe kidney (not shown). Intravenous urography (IVU) showed

horseshoe kidney, bilaterally double collecting system, bilaterally partial ureteral duplication, bilaterally grade 2 dilatation in calyceal system and dilatation in left proximal ureter (*Fig. 1*). The patient also underwent magnetic resonance imaging (MRI) examination to delineate the double collecting system better. MRI also showed double ureter and bilateral dilated double collecting system. Bilateral duplicated ureters united at the level of the pelvic entry in MRI (*Fig. 2, 3, 4*).

DISCUSSION

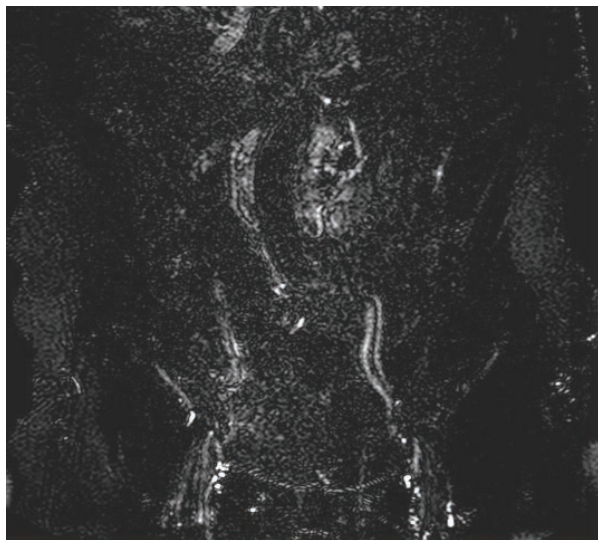
In embryological life, during their ascent, the kidneys pass through the arterial fork formed by the umbilical arteries. Sometimes both kidneys are pushed so close together during their passage through the arterial fork that the lower poles fuse. This results in the formation of a horseshoe kidney. Early splitting of the ureteric bud may result in partial or complete duplication of the ureter. The metanephric tissue may then be divided into two parts, each with its own renal pelvis and ureter [4].

Duplicated renal collecting systems comprise renal units containing two pyelocalyceal systems associated with a single ureter or double ureters. The two ureters may empty separately

Figure 1. IVU showed double collecting system, bilateral hydronephrosis and ureteral duplication in a horseshoe kidney.



Figure 3. Fat suppressed coronal MR image showed bilateral duplicated ureters.



into the bladder or fuse to form a single ureteral orifice. Duplex kidney has two pyelocalyceal systems and it is associated with a single or bifid ureters (partial duplication) or two ureters (double ureters) that drain separately into the urinary bladder (complete duplication). The upper pole ureter drains the upper pole of a duplex kidney while the lower pole ureter drains the lower pole [5].

Unilateral duplication is six times more frequent than bilateral duplication, with equal superiority to right and left sides [6]. Partial or complete duplication of the ureter is one

Figure 2. Gradient echo axial MR image shows horseshoe kidney.

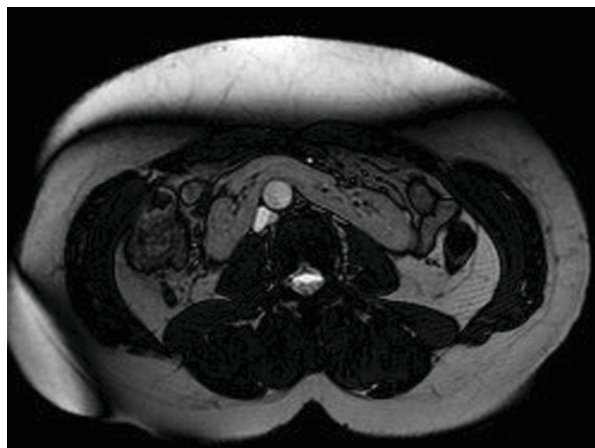
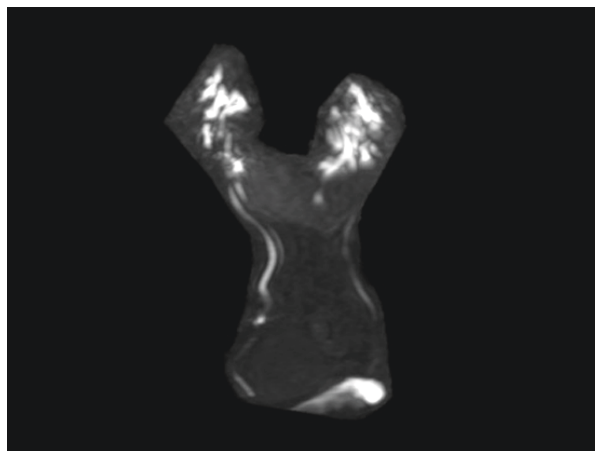


Figure 4. Contrast enhanced coronal MIP (maximum intensity projection) study also showed hydronephrosis in horseshoe kidney and duplication of ureters.



of the most common congenital malformations of the urinary tract, with an estimated incidence of 0.8 % [7, 8].

Smith et al. described the incidence of malformations of the upper urinary system among 18460 consecutive patients, referred to a urological department over a 23 year period, 24 patients with horseshoe kidneys and 4 other patients with bilateral, completely duplicated ureter and pelvis were found [9]. Khong et al., had reported a 9-month-old boy who had a horseshoe kidney, associated with bilateral single system ectopic ureters. The right ureteric orifice was located near the midline of a deformed trigone while the grossly dilated left ureter inserted into the posterior urethra [10]. Christoffersen et al. had described partial hydronephrosis, bilateral duplication of the pelvis and ureter with horseshoe kidney [3]. Kuzel et al. described a horseshoe kidney with bilateral double pelvis system and double ureters [11].

CONCLUSIONS

Duplicated renal collecting system with horseshoe kidney is a very rare entity. IVU must be the main radiological investigation method. US and computed tomography (CT) must also be added when complex urogenital abnormalities found [12]. MRI may also give additional knowledge as in our case without x-ray. Gadolinium use may also increase its sensitivity.

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