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# Fetal MRI Urography and Antenatal Diagnosis of Posterior Urethral Valve

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## Abstract

Posterior Urethral Valve (PUV) is the most common cause of lower urinary tract obstruction in male fetus at the antenatal period. Keyhole sign of urethra, distention of bladder caused by the obstruction and bilateral ureters and pelvicalyceal dilatation can be determined secondary to vesicoureteral reflux. The degree and duration of obstruction determine the prognosis and kidney damage. At antenatal period ultrasound (USG) is the first and the most widely used imaging modality in diagnosis of PUV. As a complementary and an ancillary method MRI is preferred in both maternal and fetal causes. Our case shows the contribution of MRI in the diagnosis of PUV.

**Keywords:** Posterior urethral valve; Fetal MRI urography; Antenatal hydronephrosis

## Case Report

The pregnant who was 23 years old with her first pregnancy, according to her last menstrual period she was 19 weeks pregnant and admitted to our hospital with the diagnosis of cystic mass in the fetal abdomen according to the ultrasound which was performed in another institution. Clinical and laboratory examinations of the pregnant had no prominent feature. According to the USG examination which was performed in our clinic using a Siemens Antares 0.5 device, the age of fetus was same with the calculated gestational age according to last menstrual period of mother and the male fetus was at 19 weeks of gestation. The amount of amniotic fluid revealed normal. Pelvicalyceal ectasia of kidneys and distension of bladder were observed (Figure 1). Preliminary diagnosis was considered as a PUV. Because of the bladder distention and the fetal position we had difficulties in detailed visualization of the fetal abdomen and a fetal MR urography examination was planned. We used Philips Achieva 1.5 tesla, XL-torso coil and in T2-weighted single-shot TSE SPIR sequence of the investigation bilateral pelvicalyceal ectasia and bladder distention with bilateral dilatation and tortuosity of ureters and dilatation and elongation of the proximal urethra (keyhole sign) were observed (Figure 2 and Figure 3). Infravesical obstruction was diagnosed secondary to PUV.

**Figure1:** USG examination. The pelvicalicsiel dilatation of the kidneys and over-distention of bladder (arrow).

## Introduction

Posterior urethral valve is the most common cause of lower urinary tract obstruction A PUV is a congenital obstruction caused by a malformation of the posterior urethra. The significance of this obstruction depends on the secondary effects on the bladder, ureters, and kidneys. It may cause irreversible pathologies both on kidney and bladder function.

PUV has an estimated incidence of one in 5000 to 8000 in the community, among the only male fetuses [1]. PUV is divided into three types by Young as type 1, type 2 and type 3. Type 1 is the most common seen, as 90 % [2].

As embryologically, PUV is thought to occur as a result of the abnormal insertion of mesonephric duct into fetal cloaca. Valve consists at the level of verumontanum in posterior urethra that prevents urine

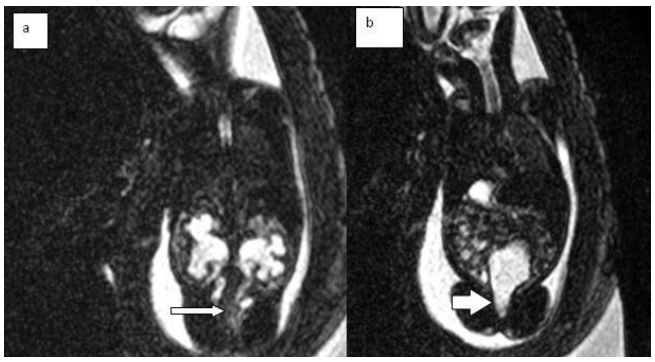


**Figure 2:** a-b. T2 weighted coronal MR imaging. a- the pelvicalyceal dilatation of the kidneys(arrow), bilateral tortuze and dilatation of ureters(arrow). b- key-hole sing of the proximal urethra (arrow).

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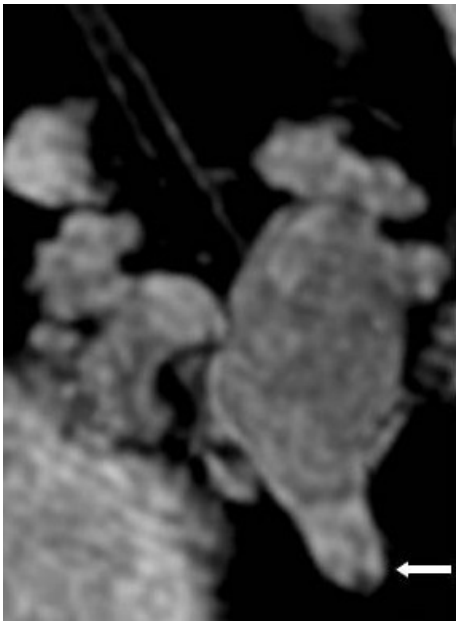

**Figure 3:** 3D MRİ Urography. Bilateral pelvicalyceal ectasia of kidney, bladder distention, key hole sing of proximal urethra (arrow).

flow. Clinical signs are the same at tree types of PUV, but severity of symptoms varies depending on the degree of obstruction.

Secondary to mechanical obstruction, dilatation and elongation of the proximal urethra, distension of the bladder and VUR develop at the PUV [3]. PUV patients can present ureterohydronephrosis as a consequence of functional ("valve bladder") or mechanical obstruction and only ~50% of the patients VUR. VUR-mediated dilation observed in the ureters. Hydronephrotic and dysplastic changes of kidneys, subcapsular and perirenal urinoma with the finding of ascites is seen [4,5]. Oligohydramnios and lung hypoplasia are the poor prognosis criteria. Kidney and bladder damage occur depending on the severity and intrauterine detection time of the obstruction. The detection of PUV before 24 weeks extent pressure of obstruction to the process of delivery and worse prognosis [6], the main aim of treatment is to minimize the load on the bladder and kidney, but one-third of these patients, although the most advanced treatments fall in kidney failure to the long-term [7].

Ultrasound is the most widely used imaging modality the diagnosis of PUV and intrauterine fetal examination, because of noninvasive and real time imaging. Maternal obesity, fetal position and oligohydroamnios cause difficulties to examine with ultrasound [8-11]. In such cases, the search for additional fetal anomalies, MRI can be used as the complementary of ultrasound and to obtain additional information. Ultrafast pulse sequences, magnetic resonance (MR) can now acquire high-quality fetal images in an extraordinarily short time, thereby eliminating artifacts due to fetal movements. The lack of ionizing radiation is an advantage of MR, and no side effects for the embryo have been reported [12,13]. There are some studies with MRI in the diagnosis of PUV [14-16].

In our case, in USG examination, remarkable dilatation of the pelvicalyceal structures and over-distention of bladder have been shown. Ureters, due to extensive distension of bladder and proximal urethra and because of the position of the fetus could not be evaluated with USG.

In our patient, amniotic fluid was within normal limits and neither increased echogenicity nor cystic lesion in kidneys is evaluated. According to the USG examination the initial diagnosis of our patient was PUV; to obtain certain diagnosis MRI examinations were performed because of the evaluation difficulties with USG. Remarkable pelvicalyceal dilatation of kidneys and over-distention of bladder were observed with MRI, in addition to these findings, tortuozite and dilated bilateral ureters and proximal urethra dilatation (key hole sing) were evaluated. Due to all these findings certain diagnosis of our patient was PUV.

Antenatal fetal ultrasound is the first and most important imaging method to examine urinary tract pathologies. The matter of arising from fetus and mother, MRI can be used as a complementary and useful method especially in uncertain diagnosis. Early diagnosis and early intervention can be made.

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