Case Report

A Herlyn-Werner-Wunderlich Syndrome Variant with Ipsilateral Renal Agenesis with Contralateral Renal Cysts: A Case Report

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Herlyn-Werner-Wunderlich syndrome is a complicated disorder of the female productive system, including a uterus didelphys, blind hemivagina, and ipsilateral renal agenesis. We report a case of Herlyn-Werner-Wunderlich syndrome accompanied by renal cysts. Because the embryogenic processes of the reproductive and urinary systems are closely related, the accompanying renal cysts in this patient is considered to be a variant of Herlyn-Werner-Wunderlich syndrome.

Key words: disorder of the female productive system, Herlyn-Werner-Wunderlich syndrome, renal cysts, variant

Introduction

Herlyn-Werner-Wunderlich (HWW) syndrome is a rare and complex female genital malformation characterized by three disorders: 1) uterus didelphys; 2) unilateral low vaginal obstruction; and 3) ipsilateral renal agenesis.[1-4] HWW syndrome is a kind of developmental anomaly of the Müllerian duct. It is usually asymptomatic and difficult to diagnose until the menstrual cycle begins.[1,5] It presents with progressive pelvic pain after menarche, sometimes with regular menstruation and a palpable pelvic mass due to hemi-hematocolpos.[2,5]

Case Report

This 14-year 11-month-old girl had suffered from intermittent lower abdominal pain for two weeks for which she had received enema several times at a local hospital. Because of persistent abdominal pain and fever up to 39°C with diarrhea, she was admitted to our hospital. Physical examina-

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tion showed lower abdominal pain on palpation without rebound tenderness or muscle guarding. Laboratory data revealed a C-reactive protein level of 199 mg/L (normal: < 5 mg/L), leukocytes 17,360 × 10^9 cells/L (neutrophils 91.8%, lymphocytes 4.4%, monocytes 3.5%, eosinophils 0.1%, and basophils 0.2%). Pregnancy test was negative, and urinalysis showed no pyuria. Her menstrual cycle was regular and her last menstrual period was on the day of admission.

After admission, abdominal computed tomography demonstrated a loculated fluid collection of size 8.6 × 4.2 cm in the left parametrium with wall thickening and adjacent fatty stranding. In addition, multiple renal cysts were noted over the right kidney and the left kidney was absent (Fig. 1). The tentative diagnosis was left pelvic abscess for which ampicillin, gentamicin and metronidazole were prescribed. A gynecologist was consulted who suggested abdominal magnetic resonance imaging (MRI) for suspected uterine pathology. MRI revealed hypoplasia of the uterus right horn and a left hemivagina obstruction (Fig. 2), suggesting the diagnosis of Herlyn-Werner-Wunderlich (HWW) syndrome. MRI also demonstrated multiple cysts in her right kidney. Blood culture revealed growth of *Escherichia coli*, extended-spectrum β-lactamases strain, for which antibiotics was switched to Ertapenem according to the antibiotic susceptibility test. After control of infection, resection of the vaginal septum and drainage of the left pyometra and pyocolpos were performed. The culture of suspicious pus during the operation showed no growth of pathogen. The procedure went smoothly and she was discharged in a stable condition. In addition, because of multiple cysts in her right kidney, we arranged renal sonography for her parents which showed no anomaly. The clinical course is shown briefly in Fig. 3.

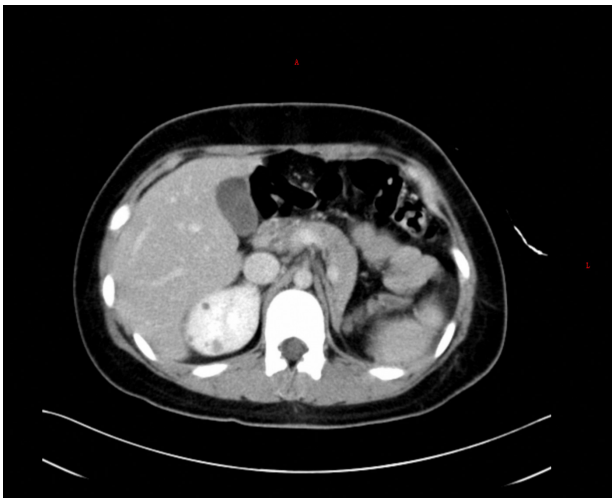

Fig. 1 Axial computed tomography (with contrast) showing left side renal agenesis with contralateral renal cysts.

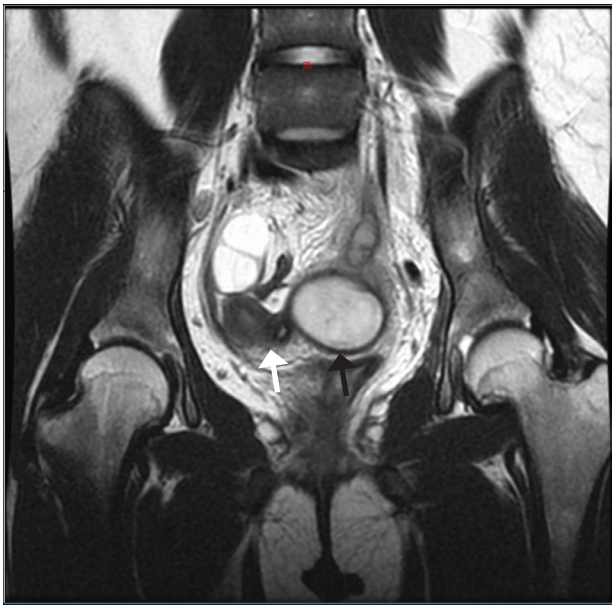

Fig. 2 Coronal view, fat suppression T2-weighted magnetic resonance imaging showing hypoplasia of the uterus (right horn of the uterus, white arrow), and abscess formation over the left horn of the uterus and left hemivagina (pyometra and pyocolpos, black arrow).

Discussion

Functionally, the genitourinary system can be divided into two distinct parts: the reproductive and urinary components. The relationship between the two is closely related in embryology and anatomy. Both develop from the intermediate mesoderm in the posterior abdominal wall, and the two systems are initially connected to the cloaca. The intermediate mesoderm then develops into the urogenital ridge, from which the Wolffian

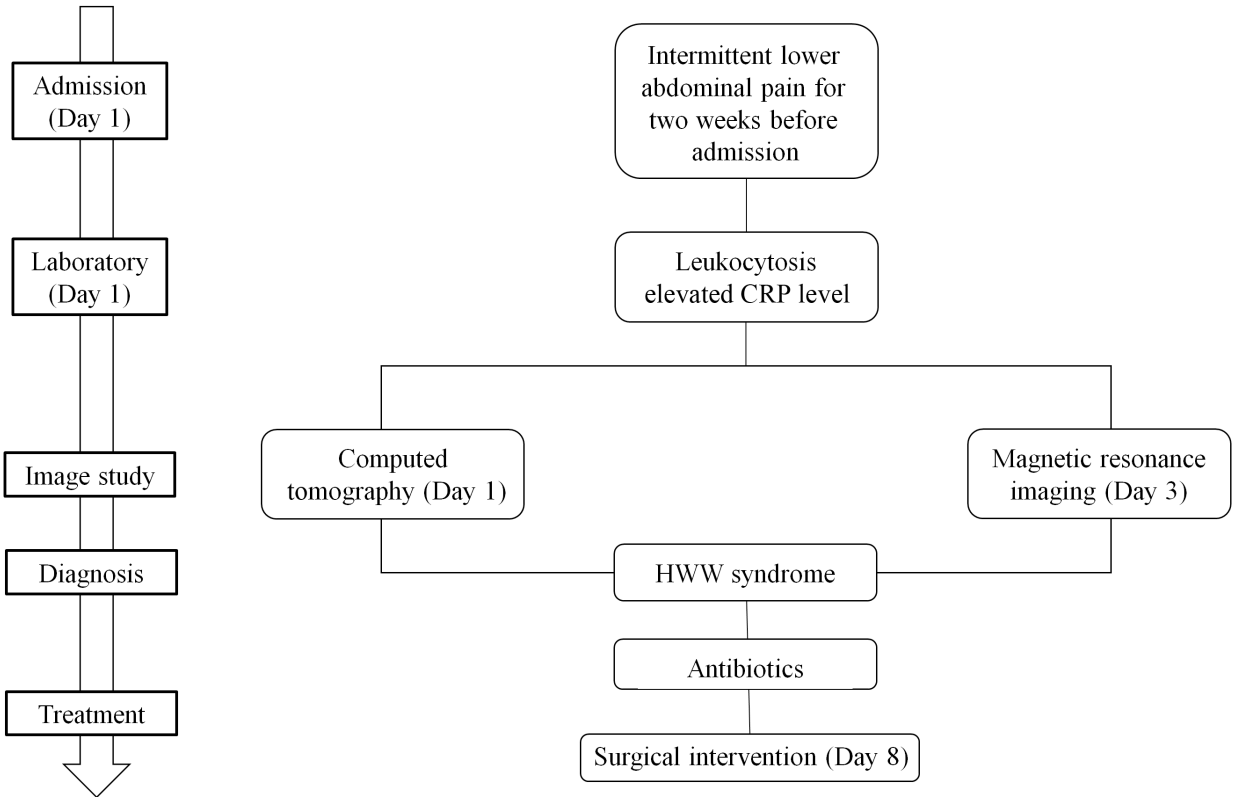

Fig. 3 Flow chart summarizing clinical course of the patient

(mesonephric) and Müllerian (paramesonephric) ducts differentiate. The reproductive and lower urinary tracts are derived from these two paired urogenital structures, which fuse to form the uterovaginal canal. This then develops into reproductive organs including uterine tubes, uterus and the upper two thirds of the vagina.[2,6]

Müllerian duct anomalies from incomplete differentiation of Müllerian ducts may result in uterus didelphys and obstructed hemivagina.[3,6] HWW syndrome is related to these developmental anomalies of Müllerian ducts.

Moreover, the urogenital ridge also develops into the pronephros, mesonephros and metanephros. The ureteric bud, which dorsally sprouts from the mesonephric (Wolffian) duct at its opening in the urogenital sinus, then evolves into the ureter and grows into the metanephrogenic blastema. Failure of the ureteric bud to develop into the metanephrogenic blastema results in renal hypoplasia or agenesis.[2,7] Furthermore, the classification of renal cysts in fetus and children is mainly based on whether they are of genetic or non-genetic origins. Genetic diseases include autosomal recessive polycystic kidney disease (ARPKD), autosomal dominant polycystic kidney disease (ADPKD), glomerulocystic kidney diseases, cystic dysplasia, and medullary cystic dysplasia associated with different syndromes, whereas non-genetic diseases comprise renal obstructive dysplasia, multicystic dysplastic kidney, localized cystic dysplasia, simple cyst, multilocular cyst, cystic tumor, and cysts associated with chronic dialysis.[8] There was no family history of ARPKD or ADPKG and there was also neither renal obstructive dysplasia nor dialysis history in this patient. In addition, renal cysts may stem from genetic diseases, non-hereditary fetal malformation, or rare acquired conditions.[9] Hence, most renal cysts are believed to originate from abnormal urinary tract development. The combination of urinary and reproductive tract abnormalities of HWW syndrome can be

explained by the close relationship between the development of urinary and internal genital systems during embryogenesis.

HWW syndrome is a malformation of the reproductive and urinary structures. Other abnormal findings in the urinary system such as contralateral duplex kidneys and duplication of ureters have also been reported and considered to be variants of HWW syndrome.[10]

In this case, the patient had HWW syndrome accompanied by renal cysts. To the best of our knowledge, this is the first report on HWW syndrome combined with renal cysts. Because of the close relationship between the urinary and reproductive systems during embryogenesis and no family history of renal cysts for this patient, the presence of renal cysts in this patient is considered to be a variant of HWW syndrome.

Acknowledgments

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Disclosure

The authors declare no conflict of interest and no financial disclosure.

References

1. Matsubara Y, Matsubara K, Fujioka T, et al: Diagnosis and treatment of Wunderlich syndrome. Int J Gynaecol Obstet 2007;99:132-3.
2. Orazi C, Lucchetti MC, Schingo PM, et al: Herlyn-Werner-Wunderlich syndrome: uterus didelphys, blind hemivagina and ipsilateral renal agenesis. Sonographic and MR findings in 11 cases. Pediatr Radiol 2007;37:657-65.
3. Del Vescovo R, Battisti S, Di Paola V, et al: Herlyn-Werner-Wunderlich syndrome: MRI findings, radiological guide (two cases and literature review), and differential diagnosis. BMC Med Imaging 2012;12:4.
4. Gholoum S, Puligandla PS, Hui T, et al: Management and outcome of patients with combined vaginal septum, bifid uterus, and ipsilateral renal agenesis (Herlyn-Werner-Wunderlich syndrome). J Pediatr Surg 2006;41: 987-92.
5. Sanghvi Y, Shastri P, Mane SB, et al: Prepubertal presentation of Herlyn-Werner-Wunderlich syndrome: a case report. J Pediatr Surg 2011; 46:1277-80.
6. Acién P, Acién M, Sánchez-Ferrer M: Complex malformations of the female genital tract. New types and revision of classification. Hum Reprod 2004;19:2377-84.
7. Kamba T, Higashi S, Kamoto T, et al: Failure of ureteric bud invasion: a new model of renal agenesis in mice. Am J Pathol 2001;159:2347-53.
8. Fred E., Avni, Michelle Hall: Renal cystic diseases in children: new concepts. Pediatr Radiol 2010; 40:939-46.
9. Cramer MT, Guay-Woodford LM: Cystic kidney disease: a primer. Adv Chronic Kidney Dis 2015;22:297-305.
10. Zhou Y, Fu X, Qian H, et al: A Herlyn-Werner-Wunderlich syndrome variant with ipsilateral renal absence and a contralateral duplex collecting system in a 26-year-old female. Gynecol Obstet Invest 2014;77:137-40.