Case Report

Herlyn-Werner-Wunderlich Syndrome Emphasizes Ultrasonographic and MR Findings: A Case Report and Review of the Literatures

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Herlyn-Werner-Wunderlich (HWW) syndrome is a rare developmental anomaly that is consists of uterus didelphys with obstructed hemivagina and ipsilateral renal agenesis. This rare entity is the spectrum of Mullerian duct anomalies (MDA) accompanied by developmental anomaly of one of Wolffian ducts. The present report demonstrated HWW syndrome and reviewed literatures in term of embryological etiology, clinical manifestation, radiographic findings and surgical management. In this case report is a 11-year-old girl presented with chronic pelvic pain. She had menarche at the age of 10 and her menstrual cycles were regular with moderate dysmenorrhea. Physical examination revealed palpable pelvic mass with tenderness. Transabdominal ultrasonography (US) and Magnetic resonance imaging (MRI) demonstrated uterine didelphys with right-sided hematometrocolpos and absent right kidney. Right hematosalpinx was also detected due to distal tubal occlusion from adhesion. These preoperative images can verify all of the features of this syndrome and correctly anticipated diagnosis was achieved. The patient underwent laparoscopic right tubal drainage with lysis of pelvic adhesion and hysteroscopic resection of vaginal septum. Her symptoms were improved uneventfully. In conclusion, HWW syndrome exhibits unique clinical presentation with characteristic radiographic findings and symptom can be relieved dramatically after receiving appropriate surgical management.

Keywords: *Herlyn-Werner-Wunderlich syndrome, Uterine didelphys, hemivagina, MR findings and Ultrasonographic findings*

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Uterus didelphys with obstructed hemivagina and ipsilateral renal agenesis is rare and specific entity referred to Herlyn-Werner-Wunderlich (HWW) syndrome[1]. In the general population, the reported incidence of this anomaly is 0.1-3.8% but the true incidence is still unknown[2-4]. This might be attributable to unrecognized diagnosis or undetected in asymptomatic prepubertal adolescent. The diagnosis of this condition is usually achieved shortly after menarche with progressive pelvic pain and palpable mass due to hematometrocolpos. Ultrasonography (US) and Magnetic resonance imaging (MRI) extremely play a role in precise diagnosis and surgical planning. HWW is the least common anomaly of Mullerian ducts, but yields the best prognosis with early diagnosis and appropriate surgical procedure[3-5].

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Case Report

An 11-year-old girl was admitted to the hospital with chronic pelvic pain for 2 months. She had no associated nausea, vomiting or diarrhea. She had menarche at the age of 10 and her menstrual cycles were regular with moderate dysmenorrhea. The physical examination revealed no abnormal findings except palpable pelvic mass with tenderness.

The transabdominal US was obtained which revealed divergence of uterine horns. There was complex cystic mass with low-level echoic content which was in continuity with right endometrial cavity. These findings were suggestive of uterine anomaly with right hematometrocolpos (Fig. 1). Right kidney was not identified.

The subsequent MRI of lower abdomen showed complete duplication of uterine horns with two separate cervices without communication of endometrial cavities which is compatible with uterine didelphys. There was blood-filled in markedly distended right hemivagina (severe hematocolpos) and minimal distended right endometrial cavity (mild

hematometra) (Fig. 2A, 2B). Sagittal T2-weighted images demonstrated thin vaginal septum at mid part of right hemivagina (Fig 2C). MRI also demonstrated right hematosalpinx which was shown as large tubular cystic lesion with thin incomplete internal septation (Fig 2D). Absence of the right kidney was also confirmed (Fig 2E). Both ovaries appeared normal size with several small follicles. The patient was diagnosed as uterine didelphys associated with obstructed right hemivagina and right renal agenesis.

The patient underwent laparoscopy for right tubal drainage and lysis of pelvic adhesion in addition to hysteroscopic resection of vaginal septum. Postoperative course was uneventful with rapid relief of symptom.

Discussion

Embryologically, the female reproductive organ and urinary tract derives from two pairs of Mullerian ducts (paramesonephric) and two pairs of Wolffian ducts (mesonephric). The two pairs of upper portion of Mullerian ducts remain separately to develop fallopian tubes while lower portions fuse to create uterus, cervix and upper vagina which are defined as lateral fusion. The lateral fusion disorder of Mullerian ducts cause various types of uterine anomalies that are classified into seven classes by the American Fertility Society[4-6]. A range of uterine anomalies can encounter as a result of the non-development or failure of the lateral fusion of Mullerian ducts, such as agenesis, hypoplasia unicornuate, didelphys, bicornuate, septate and arcuate uterus[1,5]. In the different embryologic origin, lower part of vagina originates from urogenital sinus that fuses the caudal end of Mullerian ducts to form vaginal plate which is defined as vertical fusion[3,7-9]. Then vaginal plate eventually undergoes canalization leaving a single uterovaginal canal. Disorder of vertical fusion and impair canalization of vaginal plate cause remain transverse vaginal septum whereas disorder of lateral fusion remains longitudinal vaginal septum dividing vagina into two parallel cavities (Fig. 3)[5,7-9]. This process explains the frequent association of vaginal sepum with Mullerian duct anomalies (MDA)[8].

The Wolffian ducts create kidneys and

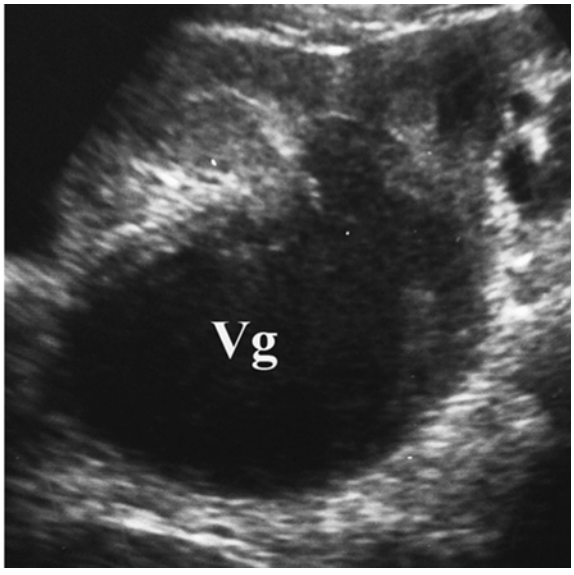

Fig. 1 Transabdominal US demonstrates wide divergence of endometrial cavities and distended right hemivagina appearing as cystic mass with low-level-echo (Vg)

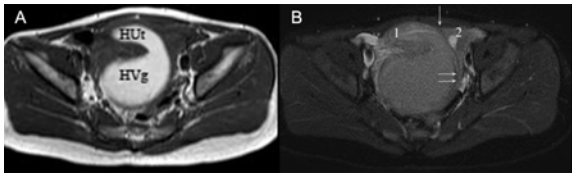

Fig. 2AB Axial MR images of uterine didelphys with hematometrocolpos on T1-weighted (A) and T2-weighted images (B) show two uterine horns are widely splayed (single arrow) without endome trial communication. Hematocolpos (HVg) and hematometra (HUt) appear as hypersignal intensity on T1-weighted and intermediate signal intensity on T2-weighted image. There is longitudinal vaginal septum separating two vaginal cavities (double arrows). 1 = right uterine horn, 2 = left uterine horn

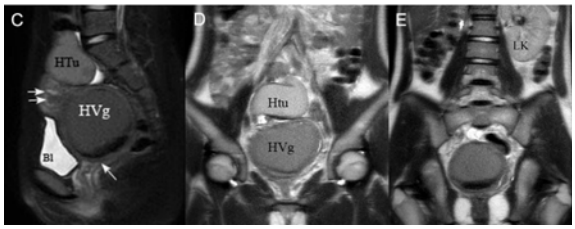

Fig. 2C-E Sagittal (C) and coronal (D) T2-weighted images show thin low signal intensity of transverse vaginal septum (single arrow) resulting in hematocolpos (HVg) and continuity to right endometrial cavity (double arrow). Hematosalpinx (HTu) appears as blood-filled elongated cystic structure at upper part of uterine fundus. Coronal T2-weighted image (E) shows absence of the right kidney and hypertrophy of the left kidney (LK).

stimulate lateral fusion of Mullerian ducts. Consequently, urinary tract anomaly are commonly associated with MDA[6]. A developmental anomaly of one of the Wolffian ducts may be the cause of the unilateral renal agenesis[4,10]. Other types of urinary tract anomaly such as ectopic opening of the ureter with renal hypoplasia, cystic renal dysplasia, horseshoe kidney, crossed renal ectopy and duplicated collecting systems had also been described[4-6]. Among these urinary tract anomalies, renal agenesis is the most common associated with MDA[10]. Renal agenesis may be isolated or may be the part of a multisystem syndrome. Isolated unilateral renal agenesis occurs in 0.93-1.8 per 1,000 autopsies and is usually diagnosed on an incidental imaging examination[11]. Renal agenesis was observed in 30% of MDA[6,12]. Although any type of MDA can be accompany with renal anomalies, increased association in patients with uterus didelphys compared with other kinds of MDA was reported[10,12]. Li S et al reported 81% of the patients with uterine didelphys accompanied with renal agenesis, which particularly were observed in the setting with obstructing transverse hemivaginal septum[12].

Typically this rare condition is discovered at puberty with chronic progressive pelvic pain shortly after menarche. Hematometrocolpos from accumulated retrograde menstrual blood in obstructed hemivagina

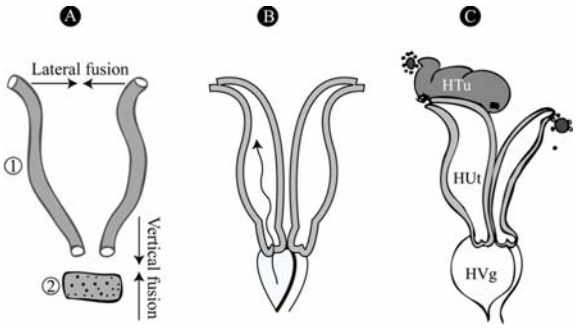

Fig. 3A-C Demonstrates development of Mullerian ducts and vaginal plate. (A) two paired Mullerian ducts (1) fuse in the midline to form uterus, cervix and the upper two-thirds of vagina (lateral fusion). The lower third of vagina is formed by fusion of urogenital sinus (2) with the Mullerian system (vertical fusion). (B) Disorder of lateral and vertical fusions create uterine anomaly and vaginal septum causing retrograde menstrual blood in obstructed right hemivagina. (C) depicts right-sided hematometrocolpos (HUt and HVg) with right hydrosalpinx (HTu)

is often clinically presented as pelvic mass. Various clinical symptoms have been reported in prior studies such as dysmenorrhea, paravaginal mass, foul-smelling discharge and intermenstrual bleeding[1-4,10-14] Diagnosis may be delayed if presence of uterine or vaginal communication. These patients usually present with foul-smelling vaginal discharge. Consequently, time of diagnosis is vary, range from 2 to 104 weeks and age of diagnosis range from only few months to 10 years after menarche[2,3]. The patient in the present study was diagnosed 1 year after menarche. She has regular menstrual cycle which can be encountered if only one uterine horn is obstructed. She presented with palpable pelvic mass with progressive chronic pelvic pain as a result of hematometrocolpos.

The US is the most frequently used modality for initial imaging which can depict hematometrocolpos, manifested as distended vaginal and endometrium with low-level echos[2,3].

Previous study reported that US allowed detection and characterization of uterine anomalies with accuracy of 90-92%, particularly with the use of three dimensional techniques[15]. In addition, it can evaluate the presence and appearance of kidneys which provide the clue in diagnosis of this syndrome.

MRI is considered to be the gold standard for radiologic diagnosis of pelvic anomalies. It is extremely useful in classification of uterine anomalies with accuracy of 100%, sensitivity of 100% and specificity of 83-100%[2,3]. MRI permits confidently differentiating between didelphys uterus from bicornuate bicollis. The presence of two separate cervices without any communication between two endometrial cavities and preservation of endometrial-myometrial zonal width in each uterus are used to excluded the diagnosis of bicornuate uterus[3,10,15-17]. In addition, longitudinal or transverse vaginal septum is always presented in didelphys uterus with or without obstruction[7-9,17].

Furthermore, the multiplanar capability of MR benefits delineating the distortion of normal anatomy by hematometrocolpos and demonstrates the level of vaginal septal obstruction that is important for surgical planning[17]. At MRI, hematometrocolpos is characterized by increased signal intensity on T1-weighted images and variable signal intensity on T2-weighted images, due to variable stage of retained blood component[16]. Marked distension of vagina by hematocolpos with less striking mild dilated uterine cavity that could be explained by increased distensibility of thin vaginal wall compare to muscular myometrium[5]. MRI also presents hematosalpinx which

is shown as high signal intensity fluid-filled tubular shape structure on T1-weighted images, arising from lateral margin of upper uterus. It might be attributable to peritubal adhesion from longstanding retrograde menstruation and accumulation of blood in fallopian tube, such as in the present case[18]. Phupong V et al reported two cases of this rare entity which proposed about clinical presentation and surgical procedure[19]. In the authors' best knowledge, there is no update report in Thailand that emphasizes the usefulness of advanced imaging modality to provide the correct diagnosis of this complex anomaly. The present study might be merit to the physicians to recognize the great benefit of radiologic modalities and radiologist to be familiar with radiographic findings of this condition.

As a result of unrecognized and delay diagnosis, delayed consequences develop such as endometriosis, pelvic infection and adhesion from retrograde blood through fallopian tube into abdominal cavity. This may reduce reproductive capacity which solely uterine didelphys itself is not significantly decreased fertility[2-7,18-20]. A great awareness of this syndrome should lead to prompt diagnosis, allowing for early and appropriate surgical treatment. Transvaginal resection of as much of obstructed vaginal septum is the appropriate surgical intervention. Resection can be successful with preservation of hymen. The additional laparoscopy should be performed in the patients with further complication such as endometriosis, pelvic infection and adhesion[2,20].

Conclusion

The present report proposes a rare case of Herlyn-Werner-Wunderlich. US is suitable for initial imaging to detect uterine abnormality and hematometrocolpos. MRI is the most accurate modality for diagnosis this complex anomalies. Prompt surgical removal of vaginal septum permits rapid symptomatic relief. Early and accurate diagnosis is mandatory because delay treatment causes increased incidence of endometriosis, infertility and obstetric complication.

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Potential conflicts of interest

None.

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รายงานผู้ป่วยและทบทวนวรรณกรรมเรื่องกลุ่มอาการเฮอลิน-เวอร์เนอร์-วันเดอร์ลิช ด้วยการวินิจฉัย โดยการใช้ภาพอัลตร้าซาวด์และเอ็มอาร์ไอ

วิรณา อ่างทอง, มัทนา วิเศษศรีพงษ์, อรศิริ อมรวิทยาชาญ, วิทย์ วราวิทย์

กลุ่มอาการเฮอลิน-เวอร์เนอร์-วันเดอร์ลิช เป็นโรคที่เกิดจากการพัฒนาการที่ผิดปกติของ Mullerian ducts และ Wolffian ducts ซึ่งประกอบด้วย ภาวะมดลูกที่ผิดปกติชนิดไดเดลฟี่ร่วมกับภาวะอุดกั้นของปากมดลูกข้างใดข้างหนึ่ง และภาวะไม่มีไตแต่กำเนิดข้างใดข้างหนึ่ง คณะผู้นิพนธ์ได้รายงานผู้ป่วยโรคเฮอลิน-เวอร์เนอร์-วันเดอร์ลิช รวมทั้งทบทวนบทความอันเกี่ยวข้องกับสาเหตุ อาการแสดง การวินิจฉัยด้วยภาพทางรังสี และการรักษาโดยการผ่าตัดของกลุ่มอาการนี้ รายงานฉบับนี้เป็นผู้ป่วยหญิงอายุ 11 ปี มาพบแพทย์ด้วยอาการปวดท้องน้อยเรื้อรัง ผู้ป่วยเริ่มมีประจำเดือนครั้งแรก เมื่ออายุ 10 ปี โดยมีรอบเดือนที่ปกติ และสม่ำเสมอร่วมกับมีอาการปวดประจำเดือนร่วมด้วย ตรวจร่างกายคลำพบก้อนที่ท้องน้อยและกดเจ็บบริเวณก้อน ผู้ป่วยได้รับการตรวจอัลตร้าซาวด์และเอ็มอาร์ไอส่วนท้องน้อยพบภาวะมดลูกผิดปกติชนิดไดเดลฟี่ เลือดคั่งในโพรงมดลูกและปากมดลูกข้างขวา ร่วมกับเลือดคั่งในปีกมดลูกข้างขวาอันเนื่องมาจากภาวะอุดกั้นทางเดินปีกมดลูกส่วนปลายจากพังผืด ภาพรังสีวินิจฉัยก่อนการผ่าตัดสามารถแสดงรอยโรค และให้การวินิจฉัยกลุ่มอาการนี้ได้อย่างถูกต้อง หลังจากนั้นผู้ป่วยได้รับการรักษาโดยการสลายพังผืดและระบายปีกมดลูกโดยการผ่าตัดชนิดส่องกล้อง ร่วมกับการตัดแผ่นกั้นที่บริเวณปากมดลูกออก อาการปวดท้องน้อยและปวดประจำเดือนทุเลาลงหลังจากได้รับการรักษาโดยการผ่าตัด โดยสรุปผู้ป่วยเฮอลิน-เวอร์เนอร์-วันเดอร์ลิชจะแสดงอาการและมีลักษณะภาพรังสีวิทยาที่จำเพาะ นอกจากนี้อาการของผู้ป่วยจะทุเลาลงเมื่อได้รับการรักษาที่เหมาะสม ดังนั้นแพทย์ผู้ดูแลควรตระหนักถึงความสำคัญ ของการวินิจฉัยและการรักษาที่ถูกต้องเพื่อป้องกันภาวะแทรกซ้อนที่ตามมา