Taiwanese Journal of Obstetrics & Gynecology 57 (2018) 171–174

Contents lists available at ScienceDirect

Taiwanese Journal of Obstetrics & Gynecology

journal homepage: www.tjog-online.com

Research Letter

Application of SIS (saline infusion sonohysterography) in diagnosis of perforated transverse vaginal septum

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ARTICLE INFO

Article history:
Accepted 25 July 2017

Dear Editor,

Transverse vaginal septum (TVS) is one of the rarest anomalies of female reproductive tract, and its incidence is reported to be 1 out of 70,000 [1]. The septum can occur at any level in the vagina – approximately 46% being found in the upper vagina, 40% in the mid vagina and 14% in the lower vagina [2,3].

Complete or imperforated TVS presents clinically apparent. Unlike imperforated TVS, incomplete or perforated TVS, which allows partial vaginal flow, presents as an incidental finding but has been shown to result in hypomenorrhea, dysmenorrhea, dyspareunia, infertility, or issues with vaginal childbirth [4].

Magnetic resonance imaging (MRI) is a reliable method of imaging vaginal anomalies. However, in cases of the lack of fluid accumulation due to incomplete vaginal septum, thin septum, or high septum, diagnosis of TVS may be quite difficult. I published the first case before, but I got the new one [5].

Therefore, we want to present my experience with saline infusion sonohysterography (SIS) as a diagnostic tool to predict the location and thickness of TVS needed to initiate an effective management.

The techniques

To perform SIS, the patient was placed in a dorsal lithotomy position, and the vagina was prepped with povidone-iodine (Betadine). An 8 Fr Foley catheter was advanced until the balloon had crossed the aperture. And then the balloon was inflated with 1 ml of normal saline to fix catheter into the proximal vagina. The speculum was withdrawn and the ultrasound probe was reintroduced. Around 5 ml saline is instilled into the proximal vagina under ultrasound guidance to distend the proximal vagina and delineate the cervix and TVS. It is necessary to pull the Foley catheter down to prevent water leakage via the perforation of septum during injection.

Case 1

The patient is a 23-year-old gravida 0 para 0 woman who presents with a history of progressively worsening dysmenorrhea since menarche.

Speculum examination revealed a 4 cm blind, short vaginal canal of normal caliber with 2 mm pinpoint opening hole that was thought to be a stenotic cervix. SIS revealed that TVS located in the upper one third of the vagina is 7 mm thick and 15 mm in diameter and also demonstrated a normal cervix (Fig. 1A). MRI confirmed the diagnosis of TVS with a normal cervix and uterus.

Under the general anesthesia, the septum was resected using a cruciate incision, followed by continuous 2-0 vicryl sutures of the septum edges.

Histopathologically, the fibrous-tissue septum contained abundant blood vessels, small bundle of smooth muscle and nerve. TVS was lined on either side by stratified squamous epithelium and the opposite side showed no epithelium. There was no endometriosis on the septum.

Case 2

A 35-year-old gravida 0 para 0 woman, newly married, presented to our clinic for a presumptive diagnosis of cervical anomaly. At the age of 14, she underwent laparotomic bilateral salpingectomy for both pyosalpinx. At that time, speculum examination revealed a pinhole opening at the apex and no visualization of the cervix, were considered to be a cervical anomaly.

No genital pathology was detected in MRI. Speculum examination revealed a 7 cm blind vaginal canal of normal caliber, which had a 2 mm aperture at the apex.

As above mentioned, SIS was performed (Fig. 1B). SIS revealed that the center of the septum was 5 mm thick and the edge was over 10 mm. TVS was located just below the cervix, wrapped the cervix like a funnel-shaped vault (Fig. 2).

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https://doi.org/10.1016/j.tjog.2017.12.032

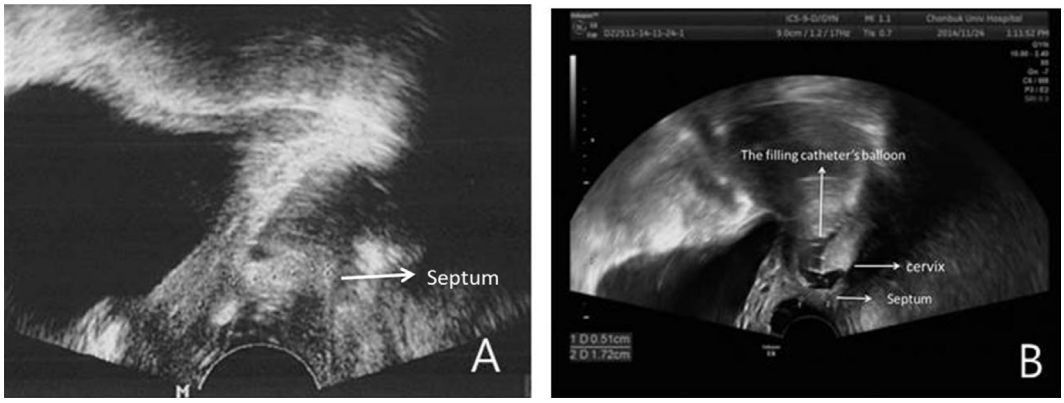

Fig. 1. Saline infusion sonohysterography findings, (A) A transverse vaginal septum is noted. (B) SIS showing the filling catheter's balloon, placed through the septum hole, septum, and cervix proximal to transverse vaginal septum. The posterior lip of cervix was slightly moved back due to catheter's balloon.

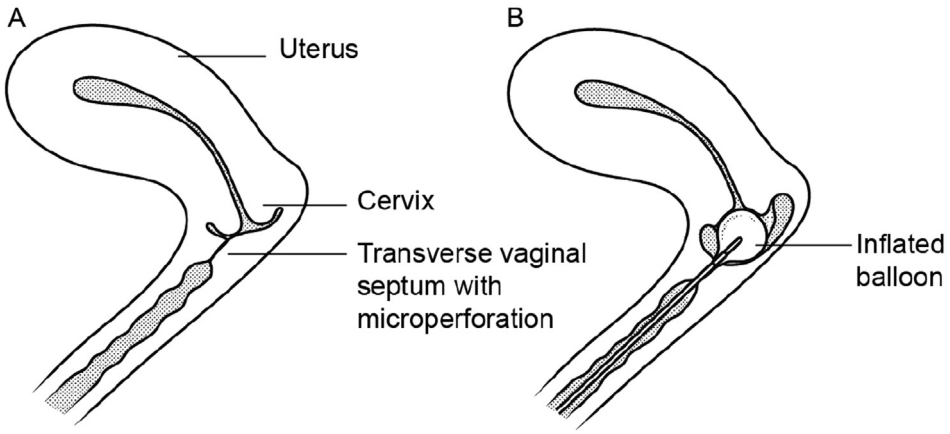

Fig. 2. Schematic illustration of SIS findings, case 2. Before (**A**) and after (**B**) SIS.

Surgical management under the diagnosis of TVS was determined. Because of its high position and thick edges, the septum was excised in pieces using a cutting electrode. After resection of the septum, a normal cervix was noted (Fig. 3). Histologic analysis showed a result similar to case 1. The septum was composed of connective tissue stroma, lined by stratified squamous epithelium on the upper surface of septum, and no epithelium on the under surface was seen. The stroma contained smooth muscle fibers and abundant blood vessels. Nerve bundles were not seen. There was no endometriosis on the septum (Fig. 4).

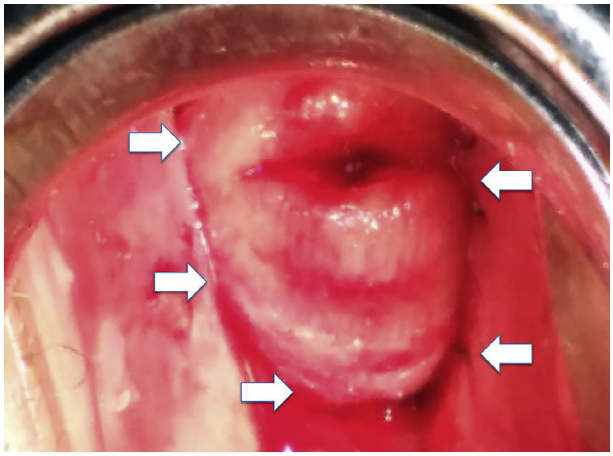

Fig. 3. Postoperative view of cervix and the resection margin (arrows) following excision of transverse vaginal septum.

A unifying theory regarding the origin of TVS has remained elusive, but several theories have arisen to account for the pathogenesis.

TVS may be due to failure of canalization of the primitive vaginal plate, or incomplete union of urogenital sinus and Müllerian ducts [6–8]. However, in this view, there are disagreements with the different septal location, the presence of smooth muscle bundles, and transitional epithelial lined gland-like structures within the septum [9].

Kanagasuntheram and Dassanayake proposed that abnormal proliferation of the mesoderm surrounding the vaginal epithelial plate accounts for the various locations and multiplicities in some cases of vaginal septum [6,10]. The different septal locations and the presence of smooth muscle bundles, vessels, and connective tissue within the septum are consistent with this theory, but epithelial transformation of the septum cannot be fully explained. Bowman and Scott proposed that TVS by an inflammatory process or by trauma from a foreign body in the vagina might occur secondarily. However, it is not certain that these factors lead to the formation of a perfect septum with a normal-sized lumen immediately above and below the obstructing membrane [6,11].

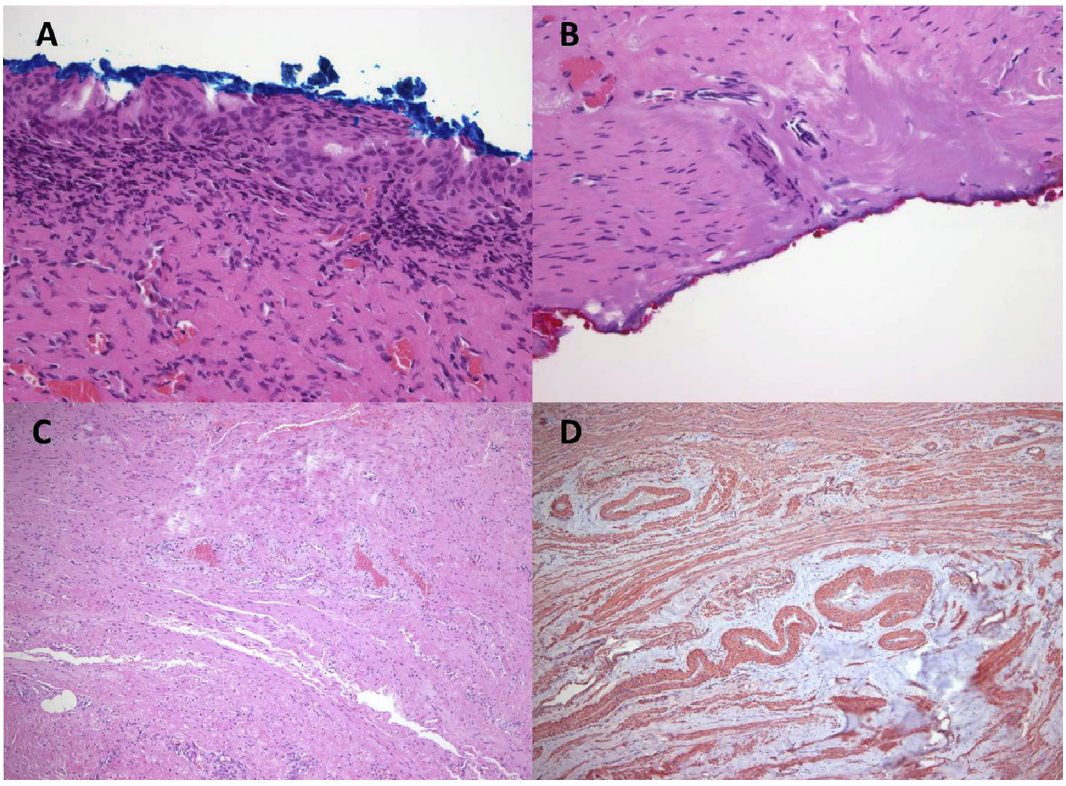

Fig. 4. Histologic slides of transverse vaginal septum. (A) The septum was lined by stratified squamous epithelium on the upper surface of septum, marked in blue (H&E, ×400). (B) On the under surface of septum, no epithelium was seen, marked in red (H&E, ×400). (C) Fibous tissue, smooth muscle fibers, and blood vessels were within the stroma (H&E, ×100). (D) Smooth muscle fibers and smooth muscle cells in the walls of blood vessels were strongly positive (Actin, ×100).

Kurita have suggested that TVS may develop via an abnormal proliferation and ingrowth of vaginal stromal wall because neither the perforation of vaginal plate or fusion of sinus and Müllerian vaginae occurs in normal development of vagina [7]. My cases favor Kanagasuntheram and Dassanayake' view. However, the developmental etiology of TVS due to the multiplicity of histologic patterns and the variety of covering epithelia remains elusive, with suggesting a multifactorial mechanism.

The presenting symptoms are related to imperforated or perforated type of septum. Imperforated septum may result in hydrometrocolpos in the neonate, or later on in the adolescent may present with abdominal pain, and abdominal mass [6]. A resultant menstrual outflow obstruction resulting in hematocolpometra may lead to develop severe endometriosis [12].

In perforated type, the patient may be asymptomatic or appear as dyspareunia, dysmenorrhea, and sterility [6]. Nichols et al. [4] reported a case of a patient with normal menses for 4 years followed by secondary amenorrhea due to complete obstruction of previously perforated TVS. As in my second case, if the viscous menstrual fluid is not draining adequately through the hole of septum, the perforation will allow the possibility of ascending infection. For this reason, in perforated as well as imperforated TVS, correct diagnosis is critical to prevention of adverse sequelae, such as the development of endometriosis or the formation of tuboovarian abscess, pyohematocolpos [12].

Radiologic techniques such as ultrasound or MRI may be a useful technique to delineate the septum and its thickness preoperatively. Although MRI is a highly sensitive and specific tool for evaluating pelvic structures, in cases of the lack of fluid accumulation due to incomplete septum, thin septum (2–3 mm), or high septum as my second case, MRI may provide limited assessment with regard to TVS [13].

In that office hysteroscopy allows direct inspection of the cervix, office hysteroscopy in the diagnosis of perforated TVS may be the best diagnostic method. But, hysteroscopy cannot detect the thickness of the septum. Moreover, as my second case, in case of no space between the cervix and the septum, distension problem due to rigidity of the septum occurs and then hysteroscopy is failed. Thus, my two cases suggest that SIS can replace hysteroscopy as a method of diagnosing TVS.

In my cases, SIS provided important additional information such as the thickness and location of the septum as well as the presence or absence of the cervix to differentiate between TVS and congenital absence of the cervix. However, this approach to detect TVS with microperforation might have some limits in these conditions such as multiple holes and a large sized hole. Further experiences will be required. TVS is rarely associated with urinary tract anomalies, but the evaluation should be performed [4,12].

Excision of TVS is the treatment of choice. A thin septum can be excised with an end-to-end anastomosis of vaginal mucosa, especially if located low in the vagina [2]. A thick septum may require vaginal dilatation followed by a Y-plasty or Z-plasty technique to prevent postoperative scar constriction and vaginal stenosis stricture formation from concentric scarring at the anastomotic site [2,4,14,15]. Careful follow-up after surgery is mandatory.

In conclusion, the diagnosis of perforated TVS solely based on MRI should be cautioned. In addition, SIS is as good as office hysteroscopy at detecting perforated TVS. I want to present our experience with SIS as a diagnostic tool to predict the thickness and location of septum needed to initiate an effective TVS management.

Conflicts of interest statement

No conflict of interest is declared by the authors.

Acknowledgements

None.

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