



Review Article

Vaginal septum in women: A review of diagnosis, management, and obstetric outcomes

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ABSTRACT

Congenital anomalies of the female genital tract, such as vaginal septa, arise from disruptions in Müllerian ducts and urogenital sinus development. Vaginal septa, including longitudinal and transverse types, are rare and often remain undiagnosed due to asymptomatic presentation. However, they can lead to significant complications such as dyspareunia, infertility, and obstructed labor. This narrative review aims to provide a detailed overview of the clinical presentation, diagnosis, and management of vaginal septum, with a particular focus on the challenges encountered during pregnancy and labor. A systematic search of PubMed, Web of Science, Scopus, and Embase identified 34 relevant articles, including 16 case reports detailing labor outcomes in women with vaginal septum. The review highlights that timely diagnosis through pelvic examination and imaging, such as magnetic resonance imaging or ultrasound, can prevent labor complications. Management options range from conservative observation in asymptomatic cases to surgical resection, which can be performed intrapartum or before delivery to facilitate vaginal birth. The presence of associated anomalies, including uterine malformations and renal agenesis, underscores the need for thorough evaluation. Postoperative outcomes are generally favorable, though careful surgical planning is essential to avoid complications such as restenosis or infection. Clinicians should remain highly vigilant for women with unexplained infertility, menstrual abnormalities, or labor obstruction. Early identification and individualized management of vaginal septum can optimize obstetric outcomes and preserve reproductive function. Future research should aim to improve early detection methods, refine surgical techniques, and investigate the genetic and embryological basis of these rare anomalies.

KEYWORDS: *Hysteroscopy, Longitudinal vaginal septum, Obstructed labor, Resection, Ultrasound*

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INTRODUCTION

The uterus, cervix, and upper vagina develop through vertical fusion of the caudal portions of the Müllerian (paramesonephric) ducts [1]. In contrast, the lower vagina develops from the sinovaginal bulbs derived from the urogenital sinus [2]. Errors at any stage of female genital tract development, such as failure of canalization, fusion, migration, and cellular differentiation, can lead to congenital structural anomalies [3].

Approximately 4%–6.9% of females are affected by genital tract anomalies [4]. Congenital uterine and Müllerian duct anomalies have an estimated incidence of 0.001%–10% [5,6]. Vaginal anomalies are rare and have an unknown incidence [7]. Owing to many asymptomatic and unidentified cases, the actual prevalence of these structural anomalies cannot be accurately determined.

Longitudinal vaginal septum is a rare type of vaginal malformation, resulting from the total resorption failure of the Müllerian ducts [8]. It is commonly associated with uterine anomalies, including uterine didelphys or a septate uterus [8]. Patients may experience septum tears during sex or tampon placement, difficulty in inserting tampons, prolonged bleeding, or dyspareunia [7].

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However, it is often asymptomatic and discovered during routine examinations or vaginal delivery (VD) [5]. Surgical treatment, specifically resection of the septum, is unnecessary for asymptomatic individuals; however, it can facilitate subsequent VD [5]. It is typically discovered due to clinical signs, such as difficulty in inserting tampons, persistent bleeding, or dyspareunia [5,7]. While congenital vaginal anomalies are uncommon, their impact on labor – particularly when unrecognized until delivery – can be profound and potentially life-threatening [9-11]. In rare cases, labor against an unrecognized vaginal obstruction has resulted in posterior cul-de-sac rupture and intra-abdominal delivery, causing significant maternal and fetal morbidity, including hemorrhage and infection [9]. Failure to recognize these anomalies before or during labor can also result in severe soft-tissue injury, postpartum hemorrhage, and sepsis. In neonates and infants, missed diagnosis of vaginal obstruction may cause hydrometrocolpos, urinary and intestinal obstruction, and overwhelming infection, which can be fatal [10,11].

This narrative review endeavors to present a thorough overview of vaginal septum, an uncommon congenital anomaly arising from disruptions in the Müllerian ducts and urogenital sinus development. By highlighting the diagnostic and management challenges associated with vaginal septum – particularly during pregnancy and labor – this review seeks to raise clinical awareness of its potential impact on reproductive outcomes. Through the discussion of current diagnostic approaches, management strategies, and illustrative clinical cases, this review stresses the need for thorough pelvic assessment in women presenting with a history of Müllerian anomalies or unexplained infertility. Ultimately, this review aims to guide clinicians in early recognition, timely intervention, and individualized care to optimize maternal and fetal outcomes while preserving reproductive function.

METHODS

Strategy of search

Relevant studies published from the inception of each database until February 20, 2025, were identified through systematic searches of PubMed, Web of Science, Scopus, and Embase. Details of the search approach are summarized in Table 1. Throughout the review process, adherence to the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines was maintained [12].

Criteria of inclusion and exclusion

This systematic review included studies involving pregnant individuals with transverse or longitudinal vaginal septum who experienced obstructed labor. The keyword was “vaginal septum and obstructed labor.” Synonyms and related terms were incorporated to broaden the search scope, and the reference lists of pertinent studies were reviewed. Eligible articles were observational studies, case reports, or case series reporting on diagnosis, management, and maternal or neonatal outcomes related to labor obstruction caused by vaginal septum. Only peer-reviewed, English-language publications were included. Studies were excluded if they focused on nonobstetric cases, other causes of obstructed labor, surgical

Table 1: Search strategy

Items	Specification
Timeframe	From inception to February 20, 2025
Database	PubMed, Web of Science, Scopus, and Embase
Term used in search	“Vaginal septum or vaginal anomalies and obstructed labor”
Inclusion and exclusion criteria	English-language articles indexed in the SCI
Process of selection	The titles and abstracts are evaluated by two independent reviewers to determine eligibility

SCI: Science Citation Index

techniques without labor context, review articles, editorials, conference abstracts without case details, or animal studies.

The process of selection

A comprehensive assessment was undertaken of all studies retrieved through the search. Titles and abstracts were initially screened by two independent reviewers to determine relevance and eligibility according to predefined inclusion and exclusion criteria. Full-text articles were obtained for any studies meeting the preliminary criteria or lacking sufficient information in the abstract. Discrepancies between the two reviewers were addressed through discussion or, when necessary, resolved with input from a third reviewer to achieve consensus. Through this rigorous process, only studies with an appropriate focus on vaginal septum-related obstructed labor and acceptable methodological quality were included in the final analysis.

RESULTS

The results of screening

Initially, 90 articles were retrieved from the databases, with six removed due to duplication. The remaining 84 articles were screened by title and abstract, resulting in the exclusion of 50 for irrelevance. The remaining 34 articles were then assessed against the exclusion criteria, and none were excluded. Ultimately, 34 articles fulfilled the inclusion criteria and were incorporated into the review [Figure 1].

Case reports and literature review

Table 2 summarizes 14 reported cases of vaginal septum during pregnancy, with patients aged 15–40 years, mostly nulliparous and often without significant prior medical history. Septum types varied, including longitudinal, transverse, microperforate hymen, and obstructed hemivagina, with many associated anomalies such as uterine malformations or renal agenesis. Treatments ranged from septal excision and dilation to resection during labor, with the timing of intervention influencing delivery outcomes. Among these cases, cesarean section (CS) was performed in 7, VD occurred in 6 (some after intrapartum or postpartum septal resection), and one case ended in abortion due to early pregnancy intervention. Most vaginal septa were detected intrapartum, with earlier diagnoses occasionally made during pregnancy, postpartum, or after multiple CSs. Resection performed before or during labor generally enabled VD, whereas unresected or delayed resections often resulted in CS. Early diagnosis and individualized surgical management appear crucial in optimizing obstetric outcomes.

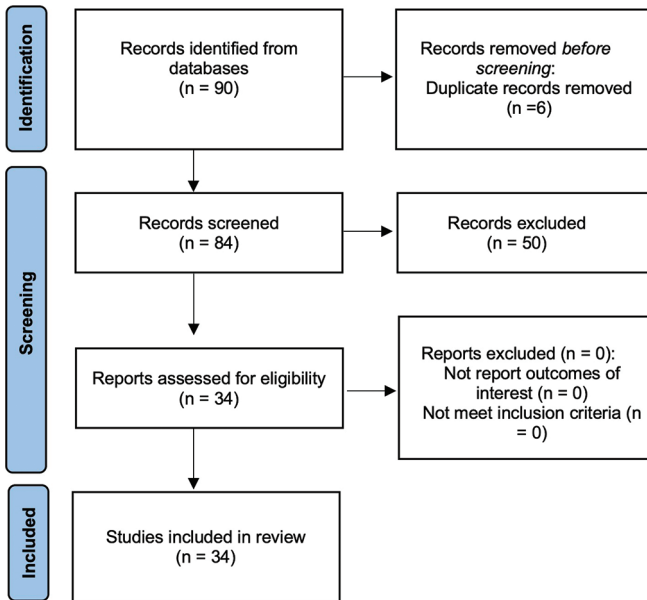


Figure 1: Study flow chart

DISCUSSION

Incidence

Within the female genital tract, rare congenital anomalies include vaginal septa, with reported incidences ranging from 0.16% to 10% in the general population [26]. Transverse vaginal septa have an estimated incidence of 1 in 72,000 [13]. Vertical lower and transverse vaginal septa constitute rare congenital anomalies that can cause obstructed labor if undiagnosed before pregnancy [14,27]. A study on Sprague Dawley rats found an unusually high 6% incidence of vaginal septa, which were associated with mucus accumulation, bacterial infection, and dystocia [28].

Congenital malformation

The uterine corpus, cervix, and upper portion of the vagina originate from the vertical fusion of the caudal segments of the Müllerian (paramesonephric) ducts [1]. In contrast, the sinovaginal bulbs give rise to the vagina, which is a derivative of the urogenital sinus [2]. Disruptions at any stage of female genital tract development, including failure of cellular differentiation, migration, fusion, or canalization, may result in congenital structural anomalies [3].

The vaginal septum may result from failure of integration and subsequent canalization of Müllerian ducts and the urogenital sinus [27]. The transverse vaginal septum, another Müllerian anomaly, arises from the incomplete union of the Müllerian ducts and the vaginal plate [29]. However, a previous study proposed that the vagina forms entirely from the urogenital sinus, with septa arising from the incomplete breakdown of this tissue [30].

Symptoms

The vaginal septa, whether transverse or longitudinal, can present with various symptoms or remain asymptomatic [27,31]. The common manifestations include lower abdominal pain, often cyclic and linked to menstruation in cases of obstructing septa, and menstrual irregularities

such as primary amenorrhea, progressive dysmenorrhea, and hematocolpos or hematometocolpos [27,31-33]. Sexual dysfunction is also frequent, with reports of dyspareunia, apareunia, failed coital penetration, and bleeding during initial intercourse [32]. In addition, the affected individuals may experience infertility, pregnancy loss, lower abdominal swelling, and discomfort when using tampons [27,31]. Longitudinal septa are often associated with uterine malformations, whereas transverse septa can lead to hematocolpos and labor complications [27,32].

Diagnosis

In some cases, vaginal septa are first discovered during pregnancy [13]. The diagnosis often occurs during labor, particularly in settings with poor health-seeking behavior [27]. Vaginal septa can impede fetal descent, necessitating surgical intervention or cesarean delivery [14,34].

The diagnostic techniques for vaginal septa include bimanual vaginal examination, speculum examination, and ultrasonography [5,29,35]. Hydrosonovaginography, a nonionizing technique that uses saline as a contrast medium, offers improved visualization of the female genital tract anatomy [29].

Sonocolpography, a novel technique, has shown potential for detecting the complete transverse vaginal septum and planning treatment [36]. Sonocolpography involves introducing a water-filled, lubricated balloon into the vaginal pouch and performing transabdominal ultrasound (US) before and after insertion to assess the upper genital tract, blind vaginal pouch, and balloon-pouch relationship [36]. For septa, atresia, and aplasia, the diagnostic accuracies were 95.5%, 86.4%, and 90.9%, respectively [36]. With conventional transabdominal sonography, sensitivity, specificity, and diagnostic accuracy were 50%, 83.3%, and 77.2%, respectively [36]. Hydrosonovaginography, using saline as a contrast medium, offers improved visualization of the female genital tract anatomy, including the vaginal septa [29]. In cases of congenital vaginal oblique septum syndrome (CVOS), US can effectively identify key features such as a double uterus, hematocolpos masses, and ipsilateral renal agenesis. This imaging modality has proven useful for classifying CVOS types and guiding surgical interventions [37]. All 21 cases were diagnosed with CVOS preoperatively based on US imaging characteristics (accuracy 100%) [37]. These studies collectively highlight the importance of US techniques for the accurate diagnosis and characterization of the vaginal septum and its associated anomalies. US diagnostic sensitivity and specificity may vary with the vaginal septum type and the technique applied.

Magnetic resonance image (MRI) is instrumental in diagnosing and classifying vaginal septa, which are rare Müllerian duct anomalies. MRI accurately identifies the transverse vaginal septa, which are often overlooked until adolescence, and aids in surgical planning [38,39]. For oblique vaginal septum syndrome, MRI demonstrates high accuracy in preoperative diagnosis and classification, correlating with surgical findings in most cases [40]. In 17 out of 19 patients, the preoperative MRI classification was consistent with surgical

Table 2: Overview of previously reported cases

Author, year of publication	Age (years)	Parity	Past medical history	Pregnancy weeks	Vaginal septum direction	Treatment	Delivery outcome
Gibson, 2003 [13]	21	0	NA	13+6	Transverse septum over the upper vagina (diagnosed at 12 weeks of pregnancy)	Excised transverse upper vaginal septum (done at 3 months after evacuation)	Abortion (by evacuation)
Ventolini <i>et al.</i> , 2006 [14]	23	0	Cervical dysplasia	36	Vertical vaginal septum (noted at cervix dilated to 7 cm)	NA	CS (due to being considered unsafe to cut the vaginal septum)
Shavell <i>et al.</i> , 2009 [15]	19	0	Right nephrectomy secondary to multicystic dysplastic kidney disease	34+4	Complete septate uterus (noted at CS), longitudinal vaginal septum, and obstructed right hemivagina (noted by MRI at 9 months postpartum)	NA	CS (due to failed induction of labor at 34+4 weeks)
Malhotra <i>et al.</i> , 2013 [16]	29	0	NA	39	Transverse vaginal septum with a pinpoint septal opening (diagnosed during labor)	NA	CS (emergent CS due to the finding of a vaginal septum)
de França Neto <i>et al.</i> , 2014 [5]	15	0	NA	37	Longitudinal vaginal septum (diagnosed at the cervix, dilated to 4 cm by palpation)	Septoplasty was performed during the second stage of labor	VD
Tahlan <i>et al.</i> , 2014 [17]	22	0	Dyspareunia	32	Longitudinal septum (diagnosed during labor)	Resection (during labor)	VD (breech)
Zivković <i>et al.</i> , 2014 [18]	30	0	Right kidney agenesis, hysteroscopic resection of the uterine septum	41	Obstructed hemivagina (diagnosed after delivery)	Complete wall of this obstructed hemivagina was resected (after delivery)	VD
Gomathi <i>et al.</i> , 2015 [19]	20	0	NA	39	Longitudinal vaginal septum (diagnosed during labor)	NA	CS (due to obstructed labor)
Abraham and Manjula, 2018 [20]	22	0	NA	38	Partial transverse vaginal septum (at active labor stage)	NA	CS (emergent CS due to the finding of a vaginal septum)
Baños Cándenas <i>et al.</i> , 2019 [21]	37	0	Uterus bicorni unicollis	39+6	Right hemivagina (diagnosed at 30 years old by MRI)	NA	VD
Dorji <i>et al.</i> , 2022 [22]	28	2	Uterus didelphys	38	Longitudinal vaginal septum (diagnosed post the 3 rd CS per vaginal examination)	No	CS (previous CS×2, this time was emergent CS due to labor pain)
Amail <i>et al.</i> , 2023 [23]	21	0	Intermittent dyspareunia	38	Longitudinal vaginal septum (diagnosed at cervix dilated to 3 cm)	Resection of the septum (before VD)	VD
Rai <i>et al.</i> , 2023 [24]	20	0	NA	39+6	Longitudinal vaginal septum (diagnosed at cervical full dilation)	Resected (after VD)	VD
Peslkhani <i>et al.</i> , 2025 [25]	40	NA	Low vaginal septum noted at 13-year-old complete obstructed vagina	39	NA	Resection of the synechia	CS

NA: Nonavailable, CS: Cesarean section, VD: Vaginal delivery, MRI: Magnetic resonance image

findings (accuracy: 89.4%) [40]. MRI effectively detects and classifies transverse vaginal septa, revealing associated anomalies such as uterus didelphys [41]. MRI is valuable for assessing the extent of Müllerian anomalies and supporting surgical planning in patients with longitudinal vaginal

septa, identifying associated conditions such as congenitally absent kidneys and uterine didelphys [42]. The above two case reports ($n = 3$) also showed that MRI could accurately diagnose a vaginal septum (accuracy: 100%) [41,42]. Overall, MRI is an excellent diagnostic tool for various types of

vaginal septa and provides detailed anatomical information essential for appropriate management.

Three-dimensional US (3D-US) plays a significant role in diagnosing a vaginal septum by providing multiplanar and volumetric imaging that allows precise visualization of vaginal anatomy and associated Müllerian anomalies [43]. 3D-US enables the identification of the location, extent, and morphology of a vaginal septum, including associated findings such as blind hemivagina or double cervix, which are critical for surgical planning and management [43,44]. The technique is particularly useful when combined with adjuncts such as vaginal gel or saline infusion, which enhance delineation of the septum and adjacent structures. 3D-US has demonstrated high diagnostic concordance with MRI and clinical examination for vaginal anomalies, with the added advantages of accessibility, lower cost, and avoidance of radiation or contrast exposure [43-45]. Overall, the diagnostic efficiency was high, with a kappa value of 0.84 (95% CI: 0.62–1.00) compared with clinical examination [43]. In cases of complex or occult vaginal septa, 3D-US can clarify anatomy when conventional 2D-US or clinical examination is inconclusive [44,46]. In summary, 3D-US is an accurate, noninvasive, and practical imaging modality for diagnosing a vaginal septum, guiding both preoperative assessment and postoperative follow-up, and is recommended as a first-line imaging tool in the evaluation of suspected vaginal septa and related Müllerian anomalies.

Diagnosis challenge and clinical tips

Diagnosing a vaginal septum can be difficult to detect owing to its often subtle or silent presentation, particularly in cases of longitudinal or low transverse septa. Many patients remain undiagnosed until adolescence or even labor, when complications such as obstructed delivery, dyspareunia, or abnormal menstruation occur. Imaging techniques such as US and MRI may miss or misinterpret the anomaly, especially when no overt symptoms are present. In addition, vaginal septa may coexist with other Müllerian anomalies (e.g. uterus didelphys and septate uterus), which can complicate accurate diagnosis. In several reported cases, the diagnosis was first made during labor, leading to urgent CSs or surgical intervention.

Clinicians should remain highly alert, especially when evaluating women presenting with difficult intercourse, tampon insertion issues, or abnormal bleeding patterns. A thorough pelvic examination is crucial, particularly in nulliparous women with irregular cycles or infertility. Imaging with MRI or 3D-US can aid in diagnosis, and renal imaging is essential due to the embryological link between renal and Müllerian anomalies. In pregnant patients, early identification of a vaginal septum allows for proper delivery planning; if detected intrapartum, resection may be feasible, but severe obstruction often necessitates CS. Proactive diagnosis and individualized management can prevent complications and improve outcomes.

Flowchart of diagnosis

We have illustrated the diagnosis flowchart in Figure 2.

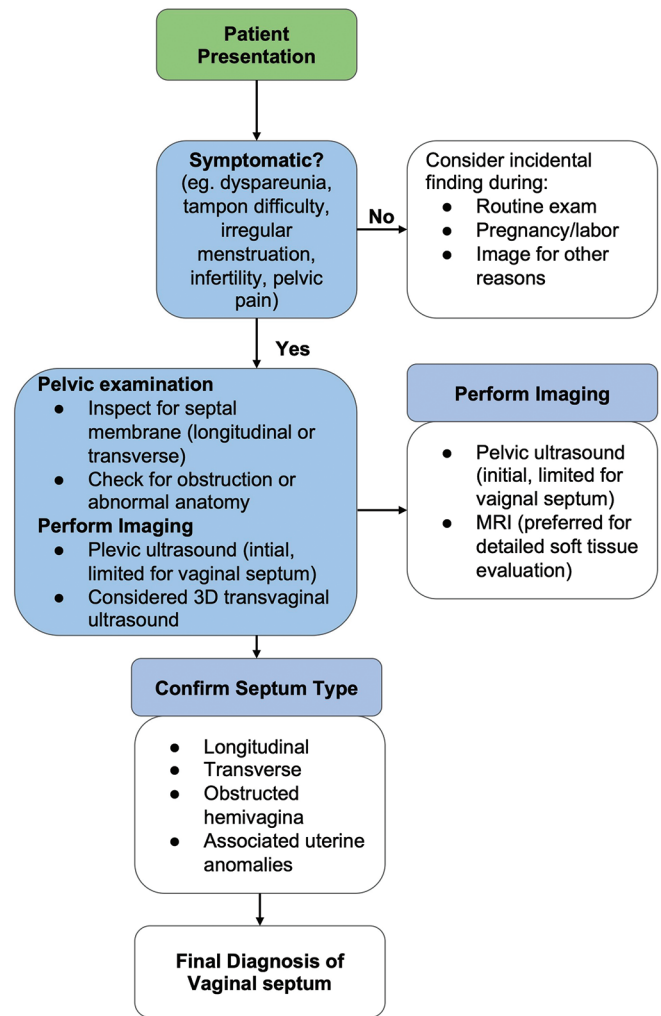


Figure 2: Flowchart of diagnosis

Management

Surgery

Although surgery may not be required in asymptomatic patients, it can facilitate subsequent VD [5,7]. Labor obstruction by the vaginal septum can be resolved by septum resection in the second stage of labor, thus avoiding a CS.

Successful management of the vaginal septa through surgical intervention has been reported, with patients subsequently having normal sexual lives, menstrual cycles, and successful pregnancies [31]. The management typically involves septoplasty, which can be performed during labor to facilitate delivery [5,23].

The management is primarily surgical, with various approaches including double cross plasty, hysteroscopic resection, and perineal or abdominoperineal routes [27,47,48]. The double cross plasty technique has shown favorable results, with no restenosis reported in a 20-year review [47]. Another approach is the interdigitating Y-plasty, which is effective for thin septa without the need for tissue excision [49]. For thicker septa or partial vaginal aplasia, the push-through technique may be preferred over the pull-through method to prevent constriction with the

recommended postoperative mold treatment [50]. These techniques can also be applied to other Müllerian anomalies, including a septate uterus with a longitudinal vaginal septum and cervical duplication [51].

Hysteroscopic management of the vaginal septa has emerged as an effective and safe treatment option for various Müllerian anomalies. In addition, hysteroscopic management is a minimally invasive option for patients [48]. This minimally invasive approach can be used to treat longitudinal vaginal septa, uterine septa with a double cervix, and an obstructed hemivagina [48,52,53]. This technique preserves the integrity of the hymen in vaginal patients and provides excellent visualization [48]. It has shown success in resolving symptoms such as dysmenorrhea, hematometra, and dyspareunia [48,52]. Hysteroscopic septum resection has also been associated with improved obstetric outcomes, with one study reporting a decrease in miscarriage rates from 77.4% to 18.2% and an increase in uncomplicated delivery rates from 6.5% to 77.3% [54]. Advancements in hysteroscopic technology and surgical procedures have enhanced the feasibility and effectiveness of this approach for treating complex Müllerian anomalies [53].

Postoperative complications

Postoperative complications include reobstruction and vaginal stenosis; however, most patients experience successful outcomes [27]. Two cases of significant bleeding 2 weeks after using a LigaSure device to resect a longitudinal vaginal septum have been reported, suggesting potentially inadequate hemostasis [55]. Alternative techniques, such as using a harmonic scalpel, have shown potential for safe and effective resection, even in patients receiving anticoagulants [56]. A study of 22 patients with complete vaginal and uterine septa found that resection improved dyspareunia and dysmenorrhea without compromising the reproductive outcomes, although the miscarriage rates remained high [57].

Postoperative infections, including sepsis and pyosalpinx, have been reported in patients with obstructive Müllerian anomalies, notably among individuals with prolonged menstrual obstruction and hematosalpinx [58].

These findings highlight the need for careful consideration of surgical techniques and potential complications of longitudinal vaginal septum resection.

Obstetric complications

The effect of the vaginal septum on reproductive outcomes remains unclear, with some studies reporting persistently high postoperative miscarriage rates [57]. In cases diagnosed during labor, septoplasty can be performed to facilitate VD [5,24]. Despite potential complications, successful vaginal deliveries have been reported in women with undiagnosed septa [24]. Postdelivery follow-up with imaging studies is recommended to identify any associated abnormalities [5].

There can be severe complications if left untreated, particularly in obstructing septa [33]. In addition, vaginal septa have the potential to cause obstructed labor and may lead to tearing during delivery [33]. Previous case reports have suggested successful VD after septal incision [5,17,59].

To prevent complications, it is recommended that patients presenting with a transverse vaginal septum during labor, especially those with a history of infertility, should undergo a prophylactic CS [16].

Strengths and Limitations

The main strength of this narrative review lies in its comprehensive synthesis of current knowledge on the diagnosis, management, and obstetric implications of vaginal septum – a rare but clinically significant congenital anomaly. By systematically identifying and analyzing 34 relevant studies, including 16 detailed case reports, this review highlights the variability in clinical presentation and management approaches, offering practical guidance for clinicians. The inclusion of real-world case examples enhances the clinical relevance, while the discussion of advanced diagnostic modalities such as MRI and hysteroscopic techniques provides valuable insights for improving patient care. In addition, the review underscores the importance of early detection and multidisciplinary management, which are essential for optimizing reproductive outcomes and preventing labor complications.

This review is limited by the inherent nature of the available literature, which consists predominantly of case reports and small case series, reflecting the rarity of vaginal septum and the lack of large-scale studies. The absence of robust comparative or longitudinal data restricts the ability to establish conclusive findings about the optimal management strategies, long-term reproductive outcomes, or standardized surgical approaches. Moreover, publication bias may be present, as severe or unusual cases are more likely to be reported, potentially overestimating the frequency of complications. The reliance on English-language studies may also exclude relevant findings from non-English literature. Future research involving multicenter registries is required to close these gaps and develop evidence-based guidelines for the diagnosis and management of vaginal septum.

CONCLUSION

A partial uterine septum accompanied by a longitudinal vaginal septum and normal cervix is rare. To improve early detection, clinicians should perform routine pelvic examinations during antenatal visits for all primigravida to rule out lower genital abnormalities. Prompt diagnosis and adequate therapy are vital to avert complications and guarantee positive outcomes in affected individuals.

Future research on the vaginal septum can focus on uncovering the underlying embryological and genetic mechanisms contributing to its development, including potential gene mutations associated with Müllerian anomalies. Advancements in diagnostic tools, such as high-resolution MRI and 3D-US, could enhance early and accurate detection. Additional studies are required to examine the outcomes of long-term reproduction and optimize surgical techniques to preserve fertility and improve quality of life.

Data availability statement

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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Conflicts of interest

Dr. Dah-Ching Ding, an editorial board member at *Tzu Chi Medical Journal*, had no role in the peer review process of or decision to publish this article. The other authors declared no conflicts of interest in writing this paper.

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