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Literature Review

Primary Vaginal Stones in Pediatric Patients: A Review of Literature

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Abstract

Introduction: Calculi, or stones are hard deposits that can precipitate in various anatomical regions. Colpolithiasis or vaginal stones are seldom seen in the clinical practice making the diagnosis and management challenging. Based on their pathophysiology, they can be classified into primary and secondary stones. It is noteworthy that many of the cases described in the literature belong to the pediatric category. Therefore, a special focus on pediatric cases is warranted in this review. We will be tackling the pathophysiology of vaginal stones in pediatric patients and focus on the adaptation of minimal invasive procedures in the management.

Methods: A systematic review was conducted using PubMed, Scopus, and Web of Science databases up to January 2025. Data on demographics, causes, clinical features, diagnostics, and treatments were extracted and synthesized. Case reports and case series were assessed using the CARE guidelines to ensure relevance and quality. This review relied on publicly available data and did not require ethical approval.

Discussion: In opposition to secondary stones primary stones crystallize in the absence of a nidus. In fact, urine stagnation is the cornerstone for primary stone formation. Factors contributing to urine stasis in the vagina include prolonged immobilization and urogenital anatomical abnormalities. Prolonged immobilization was linked to patients with neurological disorders whereas anatomical abnormalities were predominantly described as vaginal outlet obstruction and urethrovaginal fistula. Transvaginal extraction of stones has been mainly adapted for treatment in pediatric patients and it is preferred over the trans abdominal approach as it is less invasive and carries fewer risks.

Conclusion: Primary vaginal stones are seldom described. They are multifactorial as multiple factors play a role in their pathogenesis such as urinary stasis, urinary incontinence, and infection. They are often seen among the pediatric population with neurological disorders or with urogenital anomalies either congenital or acquired. Their management is still not well-established, but there is a tendency toward safer endourological methods more suitable for pediatrics and patients with specific needs.

Keywords: Vaginal Stone, Colpolithiasis, Pediatrics, Endourology

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Introduction

Calculi, or stones are hard deposits that can precipitate in various anatomical regions such as the kidneys, urinary bladder, prostate, pancreas, gallbladder, and salivary glands.

Colpolithiasis, or vaginal stones, are rarely encountered in clinical practice, making the diagnosis challenging. Based on their pathophysiology, they can be categorized into primary and secondary stones. Urinary stasis is the primary determinant in the formation of primary vaginal stones, whereas the presence of a vaginal nidus such as a mesh, sutures, intrauterine device, surgical gauze, and more is associated with the development of secondary vaginal stones. [1]

Notably, numerous cases described in the literature belong to the pediatric population. A literature review on vaginal stones in pediatrics is crucial for understanding rare presentations, improving early diagnosis, guiding age-appropriate management, and identifying risk factors in children.

Methods

A systematic review was conducted using PubMed, Scopus, and Web of Science databases up to January 2025. Search terms included vaginal stones, primary colpolithiasis, pediatric vaginal stones, neurogenic bladder, and urogenital anomalies.

Inclusion Criteria: Studies focused on primary vaginal stones in pediatric patients, discussing etiology, clinical presentation, or management.

Exclusion Criteria: Studies on secondary vaginal stones or adult-only cases.

Data on demographics, causes, clinical features, diagnostics, and treatments were extracted and synthesized. Case reports and case series were assessed using the CARE guidelines to ensure relevance and quality. This review relied on publicly available data and did not require ethical approval.

Discussion

Definition and epidemiology

Primary vaginal stones occur without the presence of a nidus. Their development is attributed to urinary stasis, which creates an environment conducive to stone formation [2]. Primary vaginal stones are rare, particularly in pediatric populations, with most cases reported in children with underlying neurological conditions or urogenital anomalies. Their exact prevalence is unknown due to the scarcity of documented cases and their often subtle and non-specific clinical presentation.

Etiology and pathophysiology

Factors promoting urinary pooling and stagnation in the vagina can be divided into two categories: patient immobilization and urogenital anatomical abnormalities.

Prolonged immobilization

Prolonged immobilization, often observed in extended recumbent position, has been linked to primary vaginal stones. In the pediatric cases described in the literature, this position was attributed to neurological disorders such as cerebral palsy, spina bifida.

Concurrently with prolonged recumbent position promoting stasis, the urinary pooling is the key for primary vaginal stones formation. [3] Nevertheless, neurogenic bladder dysfunction has been frequently linked to neurological disorders, especially in the pediatric population as it is a major source of urological morbidities. [4] In fact, it is behind the constant leakage of urine into the vaginal vault of these disabled patients, due to detrusor overactivity represented by urge incontinence. [5] Moreover, reduced bladder capacity may contribute to this leakage.

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We examined 9 pediatric cases in the literature of primary vaginal stones described in patients with neurological disabilities and prolonged immobilization. [Table 1]

Urogenital Anatomical Abnormalities

Urogenital anatomical anomalies like vesicovaginal fistula, ectopic vaginal ureter, imperforated hymen, and vaginal outlet obstruction can be the cornerstone for primary vaginal stone formation. [5] These conditions result in a continuous urinary flow into the vaginal vault, creating the initial factor of urinary pooling along with concurrent vaginal stenosis, which promotes stasis.

Ectopic ureters drain into a region apart from their usual opening place in the trigone. Eton et al described a case of 4-year-old with 3 cm vaginal calculus attributed to an ectopic ureter opening into the left vaginal fornix. [6]
Partial vaginal outlet obstruction (PVOO) is a distinct etiology that is usually presents in children's post-surgical interventions. Two cases were described in the context of bladder exstrophy treated with primary closure by Plaire and Venet resulting in a vaginal introitus that is anteriorly displaced and stenotic. [7,8] The positioning of the vaginal orifice and its stenosis often accompany bladder exstrophy. This, coupled with narrowing of the vulval opening, might lead to urinary stasis within the vagina, chronic infections, and subsequent calculus formation.
Another case of PVOO described by Plaire of a child with history of vaginoplasty where vaginal introitus was clearly narrowed and appears to have caused urinary stasis.
Urethrovaginal and vesicovaginal fistulas lead to direct pooling of urine into the vagina, creating favorable conditions for stasis and stone formation. Chen et Al and Liu et Al described similar cases of vesicovaginal and urethrovaginal fistulas respectively associated with PVOO as a result of pelvic trauma necessitating surgical correction. [9,10]

On the other hand, congenital fistulas can occur as Ogyzkurt et Al described a case of a 6 years old with a congenital urethrovaginal fistula and imperforated hymen creating the two factors conducive for stone formation. [11] Gunes et al described a case of 11-year-old with spontaneous passage of multiple stones from her vagina. The authors attributed this occurrence to retrograde filling of the vagina with urine in association with annular hymen and wide vaginal orifice, but the pathophysiology remains unclear. [12] In the subject of urogenital sinus (UGS) anomaly, the urine can reflux from the common channel leading to urinary stagnation and bacterial proliferation in the vagina. Ranawaka described a case of 3-year-old with UGS anomaly characterized by duplication of the uterus and vagina. This anomaly resulted in the presence of a stone in one of the hemivaginae with a narrowed channel. [13] We describe nine pediatric cases of primary vaginal stones in patients with urogenital abnormalities. [Table 2]

Stone Composition

Most of the vaginal stones reported comprised struvite, a crystal composed of magnesium ammonium phosphate. Struvite stones are referred to as infection stones since they are strongly associated with urinary tract infections with urea-splitting organisms. Deposition of struvite stones occurs only when ammonia production is elevated in an alkaline environment. This condition arises primarily from infections with urea-producing organisms, like Proteus mirabilis, Klebsiella pneumoniae, Corynebacterium species, or Ureaplasma urealyticum. The enzyme urease breaks down urea into ammonia, which, in turn, increases the availability of ammonium in an alkaline medium. [14] This highlights the fundamental role of infection in the formation of vaginal stones.

Clinical presentation

The clinical presentation of primary vaginal stones is often vague and non-specific, ranging from incidental findings to unspecific

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symptoms such as abdominal discomfort, decreased appetite, fever, and urinary tract infection. [15] Typically, the patient has a long-standing history of urinary incontinence and recurrent urinary tract infections. In addition, the diminished ability to express symptoms in these patients further complicates the diagnostic process.

Diagnosis

Primary vaginal stones are typically diagnosed through clinical examination and imaging studies. Abdominal X-rays or ultrasound can identify calculi, while a gynecological examination may confirm their presence in the vaginal vault. [15]

Management

Regarding the management of these stones in the disabled pediatric population, the transvaginal approach was mainly applied.

1.Conventional Techniques:

Transvaginal extraction of the stones using Kocher forceps has been widely adopted especially in pediatric cases. This procedure is usually performed under general anesthesia and sometimes is accompanied by episiotomy or hymenal incision therefore causing trauma and injury to the genital area. [7,16,17]

2.Endourological Methods:

Jasper et Al adopted a novel technique by disintegrating the stone in the vagina using an ultrasonic device under direct visualization by a nephroscope. [18] Chamma et Al successfully fragmented a huge vaginal stone in a 28-year-old cerebral palsy patient using ultrasonic device and nephroscope without any sequential damage. [15] Jo et al. attempted to employ Holmium laser lithotripsy to fragment the stone but failed due to its large size (9.3cm). [5] However, this technique might be applicable for smaller stones in the pediatric group. Whether using ultrasonic, laser device, or Lithoclast, these techniques carry out a safer and less invasive profile thus representing a paradigm shift in the management of these stones particularly in patients with special needs. Additionally, considering the use of estrogens to prepare the vagina for such interventions may be a viable consideration. [7]

Although, transvaginal extraction is the mainstay for management, the transperitoneal approach may be warranted in complicated cases of fistulae, where the interposition of a peritoneal pro mental flap between the bladder or urethra and the vagina is the optimal treatment option. [25] In patients with urogenital defects, we advocate vaginoscopy prior to major genitourinary reconstructive surgeries to rule out the presence of any calculus.

Preventive strategies

1.Management of Urinary incontinence: Bladder training, medications, Botox injections, and intermittent catheterization can reduce urine leakage.

2.Infection control: Suppressive antibiotic regimens may prevent recurrent UTIs and reduce the risk of stone formation.

Limitations

The review has several limitations, including a small number of pediatric cases that may not represent the broader population. The lack of standardized diagnostic criteria and variability in study methodologies contribute to inconsistencies in case identification and treatment. Most studies lack long-term follow-up, limiting the assessment of recurrence and outcomes. Additionally, reporting bias and the absence of large cohort studies or randomized trials hinder the ability to draw definitive conclusions. Preventive strategies were also not deeply explored.

Conclusion

Primary vaginal stones are seldom described. They are multifactorial as multiple

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factors play a role in their pathogenesis such as urinary stasis, urinary incontinence, and infection. They are often seen among the pediatric population with neurological disorders or with urogenital anomalies either congenital or acquired. Their management is still not well-established, but there is a tendency toward safer endourological methods more suitable for pediatrics and patients with specific needs. Preventive strategies targeting urinary incontinence and infections are critical to reduce recurrence. Further studies are required to establish the most effective management protocols and assess the safety of emerging technologies.

References

1- Navani S, Tessier PA. A primary vaginal stone. British Journal of Radiology. 1970;43(507):222-223. PMID: 5436361. https://doi.org/10.1259/0007-1285-43-507-222

2- Lin CJ, Chen CP, Wu CH, Chen HY, Hsu HH. Huge primary vaginal stone in a recumbent woman. Taiwanese Journal of Obstetrics and Gynecology. 2005;44(1):80-82. http://dx.doi.org/10.1016/S1028-4559(09)60114-5

3- Marciniak C, O'Shea SA, Lee J, et al. Urinary incontinence in adults with cerebral palsy: Prevalence, type, and effects on participation. PM&R. 2013;6(2):110-120. PMID: 23978464. https://doi.org/10.1016/j.pmrj.2013.07.012

4- Ozturk M, Oktem F, Kisioglu. Bladder and bowel control in children with cerebral palsy: case-control study. Croatian Medical Journal. 2006;47(2):264-270. PMID: 16625691.

5- Jo JY, Lee SM, Shin JK, Choi WJ, Cho IA. Huge vaginal stone: Case report and review of the literature. Frontiers in Surgery. 2022;9. PMID: 35846952. https://doi.org/10.3389/fsurg.2022.937371

6-Eton B. Vaginal calculus in a child. Bjog. 1956;63(1):93-95. PMID: 13295869. https://doi.org/10.1111/j.1471-0528.1956.tb05441.x

7- Plaire JC, Snodgrass WT, Grady RW, Mitchell ME. Vaginal calculi secondary to partial vaginal outlet obstruction in pediatric patients. J Urol. 2000;164(1):132-133. PMID: 10840445.

8- Venet C, Clapuyt Ph, Wese FX. Vaginal stone in a teenager. British Journal of Urology. 1997;79(5):804-805. https://doi.org/10.1046/j.1464-410x.1997.00193.x

9-Chen S, Ge R, Zhu L, et al. Giant Primary Vaginal Calculus Secondary to Vesicovaginal Fistula with Partial Vaginal Outlet Obstruction in a 12-Year-old Girl. Urology. 2011;78(4):908-910. PMID: 21420153. https://doi.org/10.1016/j.urology.2011.01.026

10-Liu B, Huang X, Lu J, Zhang Z, Wang P, Huang Z. Vaginal calculi secondary to urethrovaginal fistula with vaginal stenosis in a 14-year-old girl. Urological Research. 2008;36(1):73-75. PMID: 18172633. https://doi.org/10.1007/s00240-007-0129-x

11-Oguzkurt P, Ince E, Ezer SS, Temiz A, Demir S, Hicsonmez A. Primary vaginal calculus secondary to urethrovaginal fistula with imperforate hymen in a 6-year-old girl. Journal of Pediatric Surgery. 2009;44(7):e11-e13. PMID: 19573644. https://doi.org/10.1016/j.jpedsurg.2009.03.040

12- Gunes A, Uygun I. Is every stone urinary stone a rare case of stone. Pediatric Urology Case Reports. 2014;1(2):18. http://dx.doi.org/10.14534/PUCR.201424453

13-Ranawaka RS, Goyal A, Shabani A, Hennayake S, Dickson AP, Cervellione RM. Novel approach to vaginal calculus in a girl with urogenital sinus anomaly. Journal of Pediatric Surgery. 2020;55(9):e4-e5. PMID: 25783409. https://doi.org/10.1016/j.jpedsurg.2012.07.033

14- Trinchieri A. Urinary calculi and infection. Urologia. 2014;81(2):93-98. PMID: 24874306. https://doi.org/10.5301/uro.5000073

15-Chamma L, Ballout I, Ali BA, Awad R, Issa

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H, Moussa M. Huge primary vaginal stone in cerebral palsy patient. Urology Case Reports. 2023;51:102621. PMID: 38089558. https://doi.org/10.1016/j.eucr.2023.102621

16- Petrillo CR, Borrelli M, Botelho C. Primary vaginal calculus in a patient with meningomyelocele. Arch Phys Med Rehabil. 1981;62(5):227-229. PMID: 7235912.

17- Sant GR, Conley GR, Klauber GT. Vaginal calculus in female with myelodysplasia. Urology. 1983;22(3):294-296. https://doi.org/10.1016/s0090-4295(83)80020-x. PMID: 6353734.

18- Jaspers JW, Kuppens SM, Van Zundert AA, De Wildt MJ. Vaginal stones in a 5-Year-Old Girl: A Novel Approach of Removal. Journal of Pediatric & Adolescent Gynecology. 2010;23(1):e23-e25. PMID: 19643641. https://doi.org/10.1016/j.jpag.2009.05.006

19- Altaweel WM, Rajih E, Alkhudair W. Interposition flaps in vesicovaginal fistula repairs can optimize cure rate. Urol Ann. 2013 Oct;5(4):270-2. PMID: 24311909; PMCID: PMC3835987. https://doi.org/10.4103/0974-7796.120305

20- Miller NL. Primary vaginal stones. Obstet Gynecol. 1973;41(3):459-460. PMID: 4688264.

21- Bissada NK, Hanash KA. Primary vaginal stones. Urology. 1983;21(5):512-513. https://doi.org/10.1016/0090-4295(83)90054-7

22- Yoshimura T, Nagata Y, Matsuura K, Okamura H. Primary vaginal stone in an 11-Year-Old recumbent girl. Gynecologic and Obstetric Investigation. 2000;50(1):64-66. PMID: 10895032. https://doi.org/10.1159/000010283

23- Cetinkurşun S, Surer I, Demirbag S, Oztürk H. A primary vaginal stone in a disabled child. Obstet Gynecol. 2001;98(5 Pt 2):978-979. PMID: 11704230.

24- Urbanowicz W, Szymik-Kantorowicz S, Sulisławski J, Wolnicki M. CASE REPORT Primary vaginal stone in a disabled child. Central European Journal of Urology. 2010;63:187-189. http://dx.doi.org/10.1016/S0029-7844(01)01548-4

25-Tokgöz Y, Erdem AO, Özbey BC, Terlemez S. A rare reason in a child with feeding intolerance: Intravaginal struvite stone. The Turkish Journal of Pediatrics. 2018;60(1):86-88. PMID: 30102485. https://doi.org/10.24953/turkjped.2018.01.013

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