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Diagnostic Imaging and Conservative Management of Zinner Syndrome in an Adolescent Male: A Case Report

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Abstract

Background: Zinner syndrome (ZS) is a rare congenital triad consisting of unilateral renal agenesis, an ipsilateral seminal vesicle cyst, and ejaculatory duct obstruction. While typically diagnosed in the second or third decade of life, it can manifest earlier during late adolescence. **Case Presentation:** A 17-year-old male presented with intermittent, vague pelvic discomfort and occasional dysuria. Physical examination was unremarkable. **Diagnostic Evaluation:** Transabdominal ultrasound (US) revealed right renal agenesis and a retrovesical cystic lesion. Magnetic Resonance Imaging (MRI) confirmed right renal agenesis and a cyst arising from the right seminal vesicle, consistent with Zinner syndrome. **Management:** Due to mild symptoms, a conservative approach was adopted with symptomatic analgesia and counseling. At the one-year follow-up, the patient remained stable with significant relief. **Conclusion:** Zinner syndrome should be considered in adolescent males with pelvic symptoms and unilateral renal agenesis. MRI is the gold standard for diagnosis. Conservative management with serial imaging is a safe alternative to surgery in minimally symptomatic cases.

Keywords

Zinner Syndrome, Renal Agenesis, Seminal Vesicle Cyst, Conservative Management, Adolescent Urology

1. Introduction

Zinner syndrome (ZS) is an exceedingly rare congenital malformation of the male genitourinary tract, first described by A. Zinner in 1914. Its estimated prevalence is approximately 0.00035% to 0.00046% [1]. The syndrome is defined by the clinical triad of unilateral renal agenesis, an ipsilateral seminal vesicle cyst, and ejaculatory duct obstruction [2].

1.1. Pathogenesis and Embryology

The pathogenesis of Zinner syndrome is rooted in a developmental insult to the mesonephric (Wolffian) duct between the 4th and 13th weeks of gestation [3]. This duct is the "blueprint" for the male reproductive tract, differentiating into the epididymis, vas deferens, seminal vesicles, and ejaculatory duct. Because the kidneys and the reproductive tract share this common origin, a localized insult results in a domino effect for every organ intended to grow from that specific side.

1.1.1. Renal Development and the Kidney Connection

In normal development, the ureteric bud sprouts from the distal mesonephric duct to interface with the metanephric blastema to form the kidney. In ZS, the failure of this bud to form or meet its target results in ipsilateral renal agenesis [3].

1.1.2. Duct Formation and the Reproductive Connection

Simultaneously, the malfunction of the mesonephric duct leads to atresia of the ejaculatory duct. Instead of draining properly into the urethra, secretions accumulate and get backed up. Over time, this pressure causes the seminal vesicle to dilate into a cyst [4].

1.2. Clinical Presentation and Symptoms

Symptoms tend to manifest with the beginning of sexual activity due to the accumulation of seminal fluid. Patients frequently present with local perineal, abdominal, or pelvic pain. Additional symptoms include dysuria, hematuria, and manifestations of epididymitis or prostatitis [5].

2. Case Presentation

A 17-year-old male presented with a history of intermittent, mild lower abdominal discomfort and occasional dysuria.

2.1. Clinical History and Physical Parameters

The patient's height was 172 cm and weight was 68 kg (BMI 23.0 kg/m^2). He denied hematospermia, painful ejaculation, or recurrent urinary tract infections (UTIs) [5].

Physical Examination

Physical examination of the abdomen and genitalia was unremarkable. The 13 cm cyst yielded no palpable masses due to its deep retrovesical location, shielded by the bony pelvis and bladder [6].

2.2. Renal Assessment and Lab Findings

Serum creatinine was 78 μmol/L and BUN was 5.1 mmol/L. The eGFR was calculated at 115 mL/min/1.73m^2 (Schwartz formula), indicating excellent renal reserve [6]. **Table 1** shows the chronological follow up of clinical and laboratory data of the patient.

Table 1. Longitudinal laboratory and clinical findings.

Parameter	Baseline	6-Month Follow-up	1-Year Follow-up	Reference Range
Serum Creatinine	78 μmol/L	90 μmol/L	86 μmol/L	62 - 106 μmol/L
BUN	5.1 mmol/L	3.0 mmol/L	4.1 mmol/L	2.7 - 7.1 mmol/L
Symptoms	Mild Pain	Mild/Occasional	Significant Relief	—
Cyst Size	13 × 8 × 6 cm	Stable	Stable	—

3. Diagnostic Imaging and Differential Diagnosis

In the diagnostic process of ZS, the first examination is usually ultrasonography. Transabdominal ultrasound revealed an empty right renal fossa and a retrovesical cystic lesion [7]. While CT scans can visualize the cysts modeling the bladder, MRI is the gold standard that most accurately depicts the anatomy of the male reproductive system.

3.1. MRI Confirmation

MRI confirmed right renal agenesis and a multilocular cystic lesion (13 × 8 × 6 cm) arising from the right seminal vesicle [7] (**Figures 1-4**).

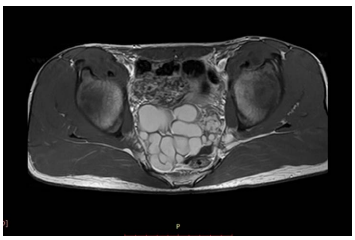

Figure 1. Pelvic mri of the pt shows multiloccular cystic lesion.

Figure 2. MRI abdomen and pelvis showing tubal elongation of the ipsilateral ureter.

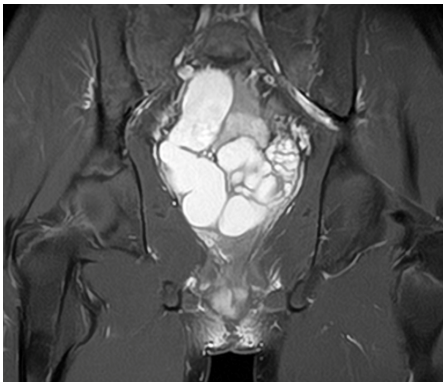

Figure 3. Multiloccular cystic lesion of the rt seminal vesicle.

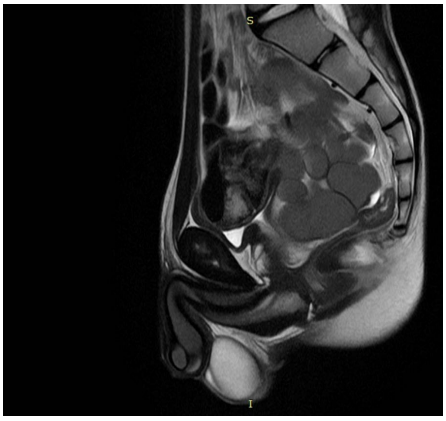

Figure 4. MRI of abdomen and pelvis showing multicystic semenial vesicle cyst.

3.2. Differential Diagnosis of Retrovesical Cysts

The diagnosis required distinguishing ZS from other lesions [8]:

- **Müllerian Duct Cyst:** Midline and non-communicating.
- **Prostatic Utricle Cyst:** Associated with hypospadias or undescended testes.
- **Ejaculatory Duct Cyst:** Smaller and intraprostatic.

4. Management and Outcome

The treatment of choice is not yet sharply decided; while it can be treated surgically, a conservative approach is often viable. In this case, the family opted for conservative management, supported by literature suggesting that size alone does not necessitate surgery in minimally symptomatic cases [6] [9].

4.1. Conservative Surveillance Protocol

The patient underwent biannual ultrasound and renal function tests. Surgical intervention (laparoscopic or robotic vesiculectomy) would only be triggered by intractable pain, recurrent infection, or bladder compression [9].

4.2. Follow-Up Outcome

At the one-year follow-up, the patient reported significant symptomatic relief. No

changes in cyst size or solitary kidney morphology were observed.

5. Discussion

The management of Zinner syndrome is evolving. While surgical excision was historically preferred, recent data suggest that conservative management is highly successful in stable, minimally symptomatic cases. For adolescents, avoiding surgery prevents risks of pelvic nerve injury or damage to the contralateral vas deferens [1] [10].

5.1. Management Strategy Comparison Seen in Table 2 between the Surgical and Conservative Management of Zinner Syndrome

Table 2. Comparison of management strategies in zinner syndrome.

Feature	Surgical Management	Conservative Management
Primary indication	Intractable pain, infection	Asymptomatic or mild symptoms
Advantages	Definitive mass removal	Avoids surgical/nerve risks
Disadvantages	Risk to bladder neck	Requires long-term surveillance

5.2. Limitations and Developmental Timeline

The one-year follow-up is relatively short for a congenital condition. Furthermore, a formal fertility workup was not performed due to the patient's age. As the patient reaches early adulthood (ages 18 - 25), we propose:

- **Ages 18 - 20:** Initiation of annual semen analysis and hormonal profiling.
- **Ages 20 - 25:** Annual MRI/US to monitor for sub-clinical cyst growth [10].

6. Conclusion

Zinner syndrome is a rare but vital differential diagnosis for adolescent males with pelvic symptoms and unilateral renal agenesis. Conservative management is a safe and effective strategy for patients without complications. MRI remains essential for both definitive diagnosis and long-term surveillance.

Ethical Statement

Consent was taken from the patient.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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