A rare abnormality of ejaculatory duct opening in the bladder trigone in a 33-year-old male associated with primary infertility: Case report and literature review

Ahmed Albakr | Mohamed Arafa | Ahmad Majzoub | Walid El Ansari | Mamon Qasem | Sami Al Said | Haitham Elbardisi

1Urology Department, Hamad Medical Corporation, Doha, Qatar
2Andrology Department, Cairo University, Cairo, Egypt
3Urology department, Weill Cornell Medicine-Qatar, Doha, Qatar
4American Center for Reproductive Medicine, Cleveland Clinic, Cleveland, Ohio, USA
5Department of Surgery, Hamad Medical Corporation, Doha, Qatar
6College of Medicine, Qatar University, Doha, Qatar
7Department of Radiology, Hamad Medical Corporation, Doha, Qatar

Correspondence
Ahmed Albakr, Urology Department, Hamad Medical Corporation, Doha, Qatar.
Email: ahmedalbakr@gmail.com

Abstract
Genitourinary anomalies constitute a large proportion of congenital malformations. However seminal tract anomalies, particularly ejaculatory duct (ED) anomalies are very rare and little information exists on the topic. We are reporting a very rare case of bilateral ectopic EDs opening in the bladder trigone in a 33-year-old gentleman presenting for evaluation for primary infertility. The patient's semen analysis showed low-ejaculate-volume, fructose negative, acidic pH and azoospermia. His hormonal profile was normal. Cystoscopy revealed an empty posterior urethra, and the verumontanum and the openings of the EDs could not be identified in the posterior urethra. The ED openings were found inside the bladder trigone. Vasography combined with cystoscopy confirmed the opening of the ED in the trigone following Intra-vasal injection of methylene blue. Our patient had a successful intracytoplasmic sperm injection using testicular spermatozoa that resulted in a healthy baby boy. We also did a formal literature review through PUBMED, MEDLINE and Google Scholar with the search term (ectopic ED). Search results were filtered to exclude vas deferens ectopia. Our literature search revealed five studies comprising 24 patients with ectopic EDs. Mean age at diagnosis was 29.88 ± 12.88 years. The most common presenting symptom was hemospermia. The ectopic EDs most commonly opened in a midline cyst (21 cases), bladder trigone (1 case), or bladder neck (1 case). The most common management used for symptomatic patients with ectopic EDs opening in the midline cyst was through transurethral fenestration. In conclusion, ectopic ED openings in the bladder trigone are very rare. Management varies by case depending on the presentation, anatomy of underlying anomaly, associated complication/s and desire for fertility.

KEYWORDS
congenital malformation, ectopia, ejaculatory duct, infertility
1 | INTRODUCTION

Ectopic seminal tract opening (ESTO) is a rare urogenital anomaly (Tanagho, 1976). Ectopia can be related to the vas deferens (VD) opening or—more rarely—due to an ectopic ejaculatory duct (ED) opening (Tanagho, 1976). The incidence of ESTO is unknown, yet it is usually associated with other congenital anomalies, for example congenital imperforate anus, hypospadias and cryptorchidism (Hicks et al., 1989), ipsilateral renal dysplasia (Wang et al., 2009) and vesicoureteral reflux (Kajbafzadeh & Payabvash, 2006).

Embryologically, the ureters develop as out-budding from the caudal end of the mesonephric duct to reach the metanephros and ascend cranially (Tanagho, 1976). While the bladder is developing, the distal ureter separates from the mesonephric duct, which migrates caudally to join the posterior urethra (Tanagho, 1976). Between weeks 8 and 12 of gestation, the epididymis, rete testis, vas deferens, seminal vesicles and EDs start to develop from the mesonephric duct in response to the testosterone produced by the fetal testis. As long as the seminal ducts, the ureter and the bladder trigone all have a mesonephric origin, congenital anomalies that connect all of them are expected.

We report a 33-year-old male with ESTO associated with primary infertility. Unique about this case is that the ectopic openings of the bilateral EDs were in the bladder trigone. We also undertook a review of the literature on similar published cases. Only 24 cases of ectopic openings of EDs have been reported in the literature to date. However, ectopic openings of the bilateral EDs in the bladder trigone have only been reported once in previous publications.

1.1 | Presentation of case

A 33-year-old Syrian gentleman presented to our Infertility Clinic at Hamad Medical Corporation (largest tertiary hospital in the state of Qatar) complaining of primary infertility since more than 1 year and low volume ejaculate since puberty. Past medical and surgical history of the patient revealed no chronic medical conditions. The patient did not report any lower urinary tract symptoms, repeated urinary tract infection nor significant testicular pain denoting epididymitis or epididymo-orchitis. The family history showed no history of infertility in the patient’s family and no consanguinity. The patient reported good libido and erectile functions but stated that since puberty, semen volume had always been low with both intercourse and masturbation. His wife was a healthy 26-year-old lady with regular menstrual history. Upon examination, the patient showed well-developed secondary sexual characters. Scrotal examination was unremarkable with bilateral normal sized testes, normal epididymis bilaterally, vas deferens could be palpated on both sides with no defects or lesions and no varicocele was found on both sides.

Semen analysis showed azoospermia with low volume ejaculate (0.5 ml), and acidic pH, and fructose negative. Post-orgasmic urine was repeated twice and showed no spermatozoa. The hormonal profile (luteinizing hormone, follicular stimulating hormone, testosterone) was within normal ranges. Obstructive azoospermia secondary to ED obstruction was suspected. MRI of the pelvis with contrast showed a small-sized prostate (approximate volume of 3.9 cc) with a small cystic structure superior to the prostate (Figure 1A–C). Both seminal vesicles were partially distended; however, assessment of vas deferens and EDs was limited due to thick image sections (Figure 2A,B).

Accordingly, the patient was diagnosed with ED obstruction and the patient was counselled for a trial of transurethral resection of EDs and deroofing of the prostatic cyst and he agreed to go on with the procedure. On day of surgery, with the patient under full anaesthesia and in the lithotomy position, left testicular percutaneous sperm aspiration was done as the first step. Fresh examination of the sample revealed many motile and immotile spermatozoa. The sample was sent for cryopreservation. Obstructive azoospermia was confirmed, thus, we proceeded with cystoscopy, which revealed an empty posterior urethra, and the verumontanum and both EDs openings could not be found. The urinary bladder trigone showed a small cystic structure lying near the midline with two small openings on its surface (Figure 3). Through a scrotal incision the left vas deferens was exposed and cannulated. The microscopic examination of the aspirated fluid from the vas deferens showed no spermatozoa. Antegrade left vasography with contrast under fluoroscopy was then decided to detect the functional anatomy of the ED and it showed contrast filling the distended left seminal vesicle and then passing into the bladder denoting opening of ED into the bladder (Figure 4). Vasography was repeated using methylene blue, and under the cystoscopic vision, methylene blue was seen coming from the cystic structure at the bladder trigone (Figure 3). The procedure was aborted at this stage. Histopathology report showed normal spermatogenesis with 25 spermatozoa per tubule. The results were discussed with the patient, and he was advised that the congenital anomaly he is having cannot be repaired by any intervention, and that for fertility, he could proceed with percutaneous epididymal or testicular sperm aspiration and intracytoplasmic sperm injection (ICSI). The patient underwent ICSI using the sperm frozen from the testicular biopsy. His wife was successfully pregnant from the first ICSI trial.

1.2 | Review of literature

We conducted a formal literature review and searched electronic databases including PUBMED, MEDLINE and Google Scholar for published articles of all types of ectopic ED. For the search, the keywords used were ‘ectopic ejaculatory duct’ [Title/Abstract], The medical subject headings (MeSH) terms used were ejaculatory duct [All Fields] AND (‘ectopic’ [MeSH Terms]; ejaculatory duct [All Fields]) AND (‘congenital’ [MeSH Terms]; ejaculatory duct [All Fields]) AND (‘anomaly’ [MeSH Terms]; ejaculatory duct [All Fields]) AND (‘anomalies’ [MeSH Terms]; ejaculatory duct [All Fields]) AND (‘congenital AND anomaly’ [MeSH Terms]; ejaculatory duct [All Fields]) AND (‘congenital AND anomalies’ [MeSH Terms]; ejaculatory duct [All Fields]) AND (‘ectopia’ AND ‘anomaly’ [MeSH Terms]). Search results were filtered to exclude vas deferens ectopia. The search returned four case reports and a case series comprising 24 cases of ectopic EDs (Table 1).
RESULTS

Our literature search revealed five studies comprising 24 patients with ectopic EDs (Table 1). Four of the studies were case reports and only one by Hong Fei et al. was a retrospective case series containing 20 cases that the authors collected over a period of 30 years. Mean age at diagnosis was 29.88 ± 12.88 years. The most common presenting symptom was hemospermia. The ectopic EDs most commonly opened in a midline cyst (21 cases), bladder trigone (1 case) or bladder neck (1 case). The most common management used for symptomatic patients with ectopic EDs opening in the midline cyst was through transurethral fenestration.

DISCUSSION

To the best of our knowledge, this is the second reported case of bilateral ectopic openings of the EDs into the bladder trigone reported in the English literature; and the first case of bilateral ectopic ED openings in the bladder trigone in an adult male presenting with primary infertility. In addition, we provide the findings of our literature review of published cases of ectopic openings of EDs (Table 1). We identified 24 such published cases (Khunovich et al., 2020; Lin et al., 2012; Reisman, 1977; Wang et al., 2009; Wu et al., 2020); of which only one reported case was of bilateral ectopic EDs openings in the bladder trigone observed in a 3-year-old child (Khunovich et al., 2020). Hence, to our knowledge, our case is the second ever reported of bilateral ectopia of EDs openings in the bladder trigone; and the first observed in an adult associated with primary infertility.

In terms of the anomaly, the literature review we undertook (Table 1) depicts that ectopic EDs most commonly open in the midline cyst, raising suspicion of an enlarged prostatic utricle (Lin et al., 2012; Wu et al., 2020). In a few rare cases, the ectopic ED invades the bladder trigone, bladder neck and urethra (Reisman, 1977; Wang et al., 2009; Wu et al., 2020). One patient had the ED ending in a large cystic dead-end, compressing the bladder and the contralateral ED (Wang et al., 2009). However, bilateral EDs opening into the bladder trigone was only reported once (Khunovich et al., 2020). Some ESTO classifications have been suggested, premised on the seminal tract segment involved, the ED segment opening ectopically, the ESTO
location in the enlarged prostatic utricle (EPU), and the relationship between the ED or vas opening and the contralateral seminal tract (Wu et al., 2020). Interestingly, all the ESTO classification were restricted to ectopic openings of either VD or ED into the EPU without approaching ureteric or vesical ectopia (Wu et al., 2020). Hence, it is worth for the urologist to have an index of suspicion and search for other anomalies when encountered with a case of ectopic ED.

In terms of age, our case was 33-year-old adult with no chronic medical conditions, supporting Table 1, where the mean age at the time of diagnosis of ED ectopia was calculated to be 29.88 ± 12.88 years. In terms of geographical and ethnic distribution, our case (Syrian) is the first reported case of Arab ethnicity and from a Middle Eastern population. Previous reported cases were mainly from China (Lin et al., 2012; Wang et al., 2009; Wu et al., 2020), with one case from each of the USA and Israel (Khunovich et al., 2020; Reisman, 1977). Hence, urologists need to be more aware of the condition and to report cases of EDs ectopia, worldwide and more specifically in the Middle East region so that a proper prevalence can be computed.

Regarding presentation, our patient presented with primary infertility, in agreement with the literature, where a case series reported infertility among 7 of the 20 adult cases of ectopic EDs (Wu et al., 2020). Interestingly, our patient had no hemospermia, which is quite common among such cases (Lin et al., 2012; Wang et al., 2009; Wu et al., 2020), being reported among 14 of 20 cases of ectopic EDs (Wu 2019). Other presentations for patients with ectopic ED include perineal pain (Wu et al., 2020), recurrent epididymitis (Khunovich et al., 2020; Reisman, 1977), or incidentally discovered during routine evaluation for other congenital anomalies such as hypospadias (Wu 2019). While it is difficult to speculate the reason for absence of recurrent epididymitis and hemospermia in our patient, we assume that incomplete obstruction and absence of urinary tract infections can be the causes.
| Author | Age | Presentation | Vasography | Cystoscopy | Diagnosis | Associated anomalies | Treatment |
|--------|-----|--------------|------------|------------|-----------|----------------------|-----------|
| Current case, Qatar | 33 | 1ry infertility | Contrast passing into the bladder; methylene blue seen coming from the ectopic ED opening structure at UBT | VM/both EDs openings not found, small cystic structure in UBT | Bilateral E ED opening into UBT | None for E EDs; PESA and (ICSI) for primary infertility |
| Reisman, 1977 | 13 | Epididymitis | Contrast material extravasating at R epididymis; right SV not be demonstrated | Ectopic opening in prostatic urethra near bladder neck | E ED opening into bladder neck | Selective R epididymectomy + PV |
| Wang et al., 2009 | 33 | Dysuria, perineal pain | L dilated ED with dead end + ectopic SV | E ED invading bladder | L renal agenesis, absent L SV, L ureter, dysplastic L T | Open exploration + surgical excision + L vas ligation |
| Lin et al., 2012 | 28 | Hemospermia, perinial pain | Two communicating cystic structures at termination of L ED; contralateral ED compressed, vas ampulla dilated | Small cystic dilatation connected to larger cystic dilatation | EO of cystic dilatation of ejaculatory duct into enlarged prostatic utricle | TU deroofing |
| Wu et al., 2020 | 31 | Hemospermia + infertility | EO of L middle segment of ED into EPU body | EO of L ED into EPU body | | TU fenestration of utricle + CR |
| | 30 | Hemospermia | EO of EPS of R ED into EPU body; normal opening of L ED | EO of (EPS) of R ED into EPU body | | TU fenestration of utricle |
| | 32 | Hemospermia | EO of L DS of ED into body of EPU | EO of L DS of ED into EPU body | | TU fenestration of utricle |
| | 41 | Hemospermia | EO of L DS of ED into EPU neck; Normal opening of R ED | EO opening of L DS of ED into EPU neck | | TU fenestration of utricle |
| | 30 | Infertility | EO of L DS of ED into EPU neck | EO of L DS of ED into EPU neck | Dysplastic right SV | NA |
| | 38 | Infertility | EO of bilateral DS of ED into EPU body | EO of bilateral DS of ED into EPU body | | TU fenestration of utricle |
| | 16 | Small penis, hypospadias | EO of R DS of ED into urethra; dysplasia of L UD | Opening of right ED into urethra | EO of R DS of ED into urethra; L UD dysplasia | Hypospadias, small penis | NA |
| | 48 | Hemospermia | EO of bilateral DS of ED into EPU body | Visible EPU | EO of bilateral DS of ED into neck of EPU + Intracystic calculus | | |
| | 46 | Hemopemria | EO of left DS of ED into EPU body; normal opening on R side | Normal opening on right side | EO of L DS of ED into EPU body + intra-cystic calculus | | |
| | 27 | Hemospermia | NA | Mid line cyst | EO of bilateral DS of ED into EPU neck + intra-cystic calculus | | |
| | 35 | Infertility, perineal pain after ejaculation | EO of bilateral DS of ED into MDC body; no contrast in urethra | Cyst not seen | EO of bilateral DS of ED into MDC body | | |

(Continues)
| Author | Age | Presentation | Vasography | Cystoscopy | Diagnosis | Associated anomalies | Treatment |
|--------|-----|--------------|------------|------------|-----------|----------------------|-----------|
|        | 30  | Infertility  | EO of bilateral DS of ED into MDC body; no contrast in urethra | Via puncturing cyst under UC: visible SV \(\geq\) Fluid \(\geq\) Necrospermia | EO of bilateral DS of ED into body of MDC | | TU fenestration of MDC |
|        | 46  | Hemospermia  | EO of left DS of ED into EPU bottom; normal R ED | EPU (12 × 10 mm), visible VD and SM | EO of L DS of ED into EPU bottom | | TU fenestration of utricle |
|        | 47  | Hemospermia  | EO of EPS of R ED into EPU bottom | EPU (12 × 10 mm); visible VD and SM | ED into EPU bottom | | TU fenestration of utricle + CR |
|        | 31  | Infertility  | EO of R MS of ED into EPU body; normal left ED | | EO of R MS of ED into EPU body | | TU fenestration of utricle |
|        | 45  | Hemospermia  | EO of left MS of ED into body of EPU; Normal right ED | Contrast passing retrograde into L VD and SV | EO of L MS of ED into body of EPU | | TU fenestration of utricle + CR |
|        | 28  | Hemospermia  | EO of R ED and EPS of L ED into EPU bottom; R SM agenesis; L SM dysplasia | Contrasting passing retrograde into L VD and SV | EO of R ED and EPS of L ED into EPU bottom, agenesis of R seminal vesicle; L SM dysplasia | Absent R SV; dysplasia of L SV | TU fenestration of utricle |
|        | 26  | Infertility  | EO of L ED into EPU bottom + dysplastic L SV and right VD | | EO of L ED into EPU bottom, L SM & R VD dysplasia | | TU fenestration of utricle |
|        | 35  | Hemospermia  | EO of R ED into bottom of EPU | Contrast agent retrograding into larger cyst and R SM | EO of L DS of ED into neck of EPU dysplastic right VD | | TU fenestration of utricle |
|        | 39  | Hemospermia  | EO of EPS of right ED into EPU bottom; normal L ED opening | | EO of EPS of R ED into EPU bottom | | TU fenestration of utricle |

Khunovich et al., 2020

| Recurrent epididymoorchitis | Bilateral ED opening in tubular structure at bladder trigone | Bilateral E ED opening into trigone | Anorectal malformation | Deflux injection into dilated EDO |

Abbreviations: 1ry: primary; CR: calculus removal; ED: ejaculatory duct; EO: ectopic opening; ICSI: intracytoplasmic sperm injection; L: left; MDC: Mullerian duct cyst; NA: not applicable; PESA: percutaneous epididymal sperm aspiration; PV: partial vasectomy; R: right; SV: seminal vesicle; T: testis; UBT urinary bladder trigone; VM: verumontanum.
Management of ectopic ED/s opening in a midline cyst, traditionally, the most common management option for smaller cysts has been transurethral fenestration of the cyst (Table 1) (Lin et al., 2012; Wu et al., 2020). Open and laparoscopic excision has been successfully undertaken for larger and symptomatic cysts (Wang et al., 2009; Wu et al., 2020). Interestingly, in a patient with ectopic ED associated with recurrent epididymitis, submucosal ‘Deflux’ injection in the dilated ectopic intravesical opening of the ED has been conducted with satisfactory results (Khunovich et al., 2020). As our patient had no symptoms other than primary infertility, no surgical intervention was directed to the congenital anomaly itself. However, the medical advice was to proceed with an assisted reproductive technique in order to gain fertility. We assume that the patent ectopic opening of the ED into the trigone in this patient was associated with repeated minor infections that may have resulted in secondary obstruction at the epididymal or testicular level which could explain why no spermatozoa was found in the post-orgasmic urine or vasal aspirate.

4 | CONCLUSION

We report the first case of bilateral ectopia of EDs openings in the bladder trigone associated with primary infertility. Diagnosis of such cases is not straightforward and is usually established during TURED procedure. Management of such rare anomaly varies in a case-by-case manner depending on the mode of presentation, underlying anomaly, associated complication/s and the desire for fertility. Surgical intervention is not always feasible as in the current case.

ACKNOWLEDGEMENT

Open access funding provided by the Qatar National Library.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Approved by Surgical Research Center, Hamad Medical Corporation reference number (Ref: SR/RE/2022/026).

INFORMED CONSENT

Written consent for the publication of the clinical details of this case report is waived according to the HMC surgical research department.

ORCID

Ahmed Albakr https://orcid.org/0000-0001-5321-1707
Mohamed Arafa https://orcid.org/0000-0003-0107-8857
Ahmad Majzoub https://orcid.org/0000-0001-7423-6241

REFERENCES

Hicks, C. M., Skoog, S. J., & Done, S. (1989). Ectopic vas deferens, imperforate anus and hypospadias: A new triad. The Journal of Urology, 141(3), 586–588. https://doi.org/10.1016/s0022-5347(17)40902-5
Kajbafzadeh, A. M., & Payabvash, S. (2006). Endoscopic treatment of vesico-vasal and vesicoureteral reflux in infants with persisting mesonephric duct. The Journal of Urology, 176(6 Pt 1), 2657–2662. https://doi.org/10.1016/j.juro.2006.08.027
Khunovich, D., Sivan, B., Sidi, A., & Ben Meir, D. (2020). Ectopic intravesical ejaculatory ducts: Case report of bulking agent injection for treatment of recurrent epididymitis in a patient with anorectal malformation. Urology, 140, 162–164. https://doi.org/10.1016/j.urology.2020.02.003
Lin, J. Z., Wu, H. F., Wang, J. C., Le, M. Z., Yu, H. B., & Zhou, H. T. (2012). Ectopic opening of cystic dilatation of the ejaculatory duct into enlarged prostatic urethre. Journal of Andrology, 33(4), 574–577. https://doi.org/10.2164/jandrol.111.014233
Reisman, D. D. (1977). Epididymitis owing to ectopic ejaculatory duct: A case report. The Journal of Urology, 117(4), 540–541. https://doi.org/10.1016/s0022-5347(17)58527-4
Tanagho, E. A. (1976). Embryologic basis for lower ureteral anomalies: A hypothesis. Urology, 7(5), 451–464. https://doi.org/10.1016/0090-4295(76)90179-5
Wang, F., Wu, H. F., & Yang, J. (2009). The ejaculatory duct ectopically invading the bladder with multiple congenital malformations of the homolateral urogenital system: A report of a rare case and an embryological review. Asian Journal of Andrology, 11(3), 379–384. https://doi.org/10.1007/s12531-008-0036-x
Wu, H. F., Zhu, J. G., Lin, J. Z., Shi, G. D., Yu, J. Q., Xu, W. Z., & Yu, H. B. (2020). A 30-year retrospective study of rare ectopic seminal tract opening cases. Asian Journal of Andrology, 22(3), 287–291. https://doi.org/10.4103/aja.aja_63_19

How to cite this article: Albakr, A., Arafa, M., Majzoub, A., El Ansari, W., Qasem, M., Al Said, S., & Elbardisi, H. (2022). A rare abnormality of ejaculatory duct opening in the bladder trigone in a 33-year-old male associated with primary infertility: Case report and literature review. Andrologia, 54(11), e14627. https://doi.org/10.1111/and.14627