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Case Report

Unilateral complet duplication of the vas deferens: Cadaveric case report

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ABSTRACT

Duplication of the vas deferens is a rare congenital anomaly, and it can be complete or partial. It is usually discovered as an incidental finding during elective operations stich as a vasectomy, herniorrhaphy or varicocelectomy.

During the educational dissection of a 72-year-old cadaver, a complete vas deferens duplication was observed on the left. If a vas deferens duplication is not appropriately diagnosed, it can result in surgical complications or an unsuccessful vasectomy. Screening for renal agenesis should be performed in patients with duplication of the vas deferens.

1. Introduction

The vas deferens (VD) is a tubular structure that transports sperm from the epididymis to the ejaculatory ducts and is comprised of one each ducts on the right and on the left.

The duplication of the VD refers to the identification of a second VD on the same side.[1] The duplication of the VD is a rare congenital anomaly; it has been reported to occur in less than 0.05% of the general population.[2,3]

The diagnosis of duplication of the VD can be made by physical examination, however such a rare anomaly is not readily suspected, and therefore, rarely diagnosed during a routine physical examination.[2]

The duplication of the VD is most commonly identified during some urogenital surgical procedures such as vasectomy and varicocelectomy or during an inguinal hernia repair.[2–25] The recognition and interpretation of this anomaly is important to avoid iatrogenic injury to the VD during surgery as well as to prevent an ineffective vasectomy.

2. Case

During the educational dissection of a 72-year-old cadaver for student practice, a duplication of the VD was observed at the left inguinal canal level (Fig. 1A). The VDs were dissected from the testicle to the prostate. Two VDs were observed leaving the left epididymis (Fig. 1B and C). While the medial VD (MVD) on posterior of the testicle was thinner and straighter, the lateral VD (LVD) was thicker and tortuous in the beginning (Fig. 1B and C). The beginning diameters measured 1.48 mm for the MVD and 2.55 mm for the LVD at the point in which they separated from the epididymis. Then, both of the VDs proceeded together to the superficial inguinal ring (143.51 mm). After they exited from the deep inguinal ring, the MVD approached the prostate from the medial side after 122.50 mm and the LVD approached the prostate from the lateral side after 135.03 mm (Fig. 1D–F). During this course, the shortest distance between the MVD and the point that the ureter enters into the bladder, on the bladder's base level, was 0.65 mm; for the LVD, this was 3.17 mm (however, the cadaver's bladder was empty and contracted). Then, the MVD and LVD traveled with the seminal vesicle for 33.20 mm and 30.03 mm, respectively, and terminated at the base of the prostate. At the point where they terminated, the ampullary diameters of MVD and LVD measured 4.77 mm and 5.60 mm, respectively.

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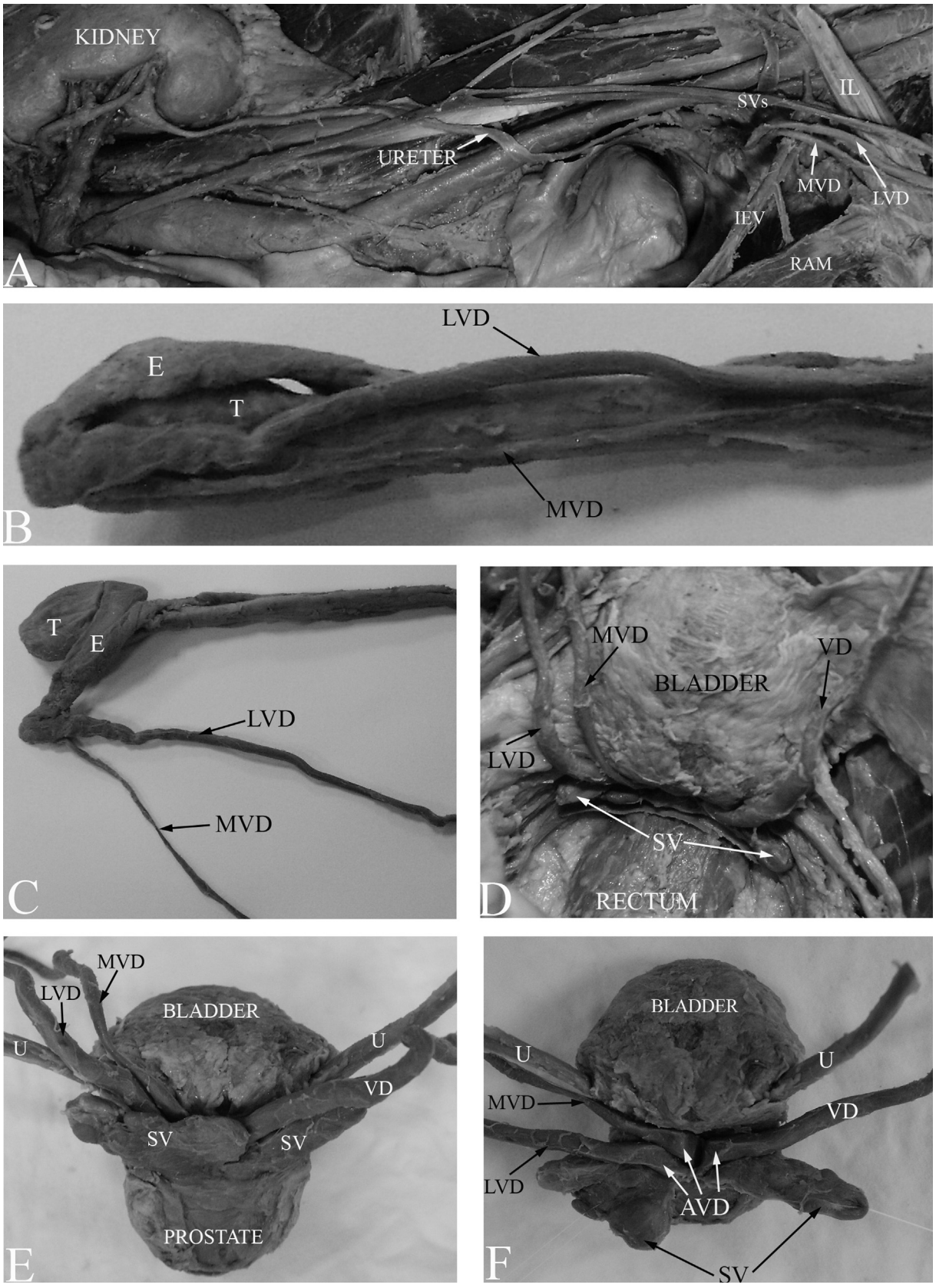

Fig. 1. (A–F) – Appearance of the duplicated vas deferens at the inguinal canal (A); testicle (B,C); bladder posterior (D); and prostate (E,F) levels. (AVD: Ampulla of Vas Deferens, E: Epididymis, IEV: Epigastric Vessels, IL: Inguinal Ligament, LVD: Lateral Vas Deferens, MVD: Medial Vas Deferens, RAM: Rectus Abdominis Muscle, SV: Seminal Vesicle, SVs: Spermatic Vessels, T: Testicle, U: Ureter, VD: Vas Deferens).

A single VD was observed on the right side (Fig. 1D–F).The appearance of the seminal vesicles was different. The left seminal vesicle was 32.30 mm in length, 23.63 mm in width and was triangular in shape; the right seminal vesicle was 35.10 mm in length, 9.98 mm in width, and had a cylindrical structure (Fig. 1F). No other urogenital system abnormalities were observed (Fig. 1A).

3. Discussion

The VD is the distal continuation of the epididymis. It starts as a muscular tube at the epididymal tail and is approximately 30–35 cm long. The VD transports sperm to the ejaculatory ducts. Initially, it runs along the posterior aspect of the testicle, medial to the epididymis. From the upper pole of the testicle, it ascends into the posterior part of the spermatic cord and traverses the inguinal canal to enter the pelvis. It runs retroperitoneally in the pelvis and finally joins with the duct of the seminal vesicle to form the ejaculatory duct.[26]

The epididymis, VD, seminal vesicles, and ejaculatory ducts originate from the mesonephric duct.[3,27] The VD develops from the central portion of the mesonephric duct and acquires a thick, muscular wall.[27] This central portion of the mesonephric duct is known as the proximal vas precursor. The proximal vas precursor occupies an intermediate position between the upper and common mesonephric ducts (CMDs) and differentiates into the VD and seminal vesicles. The more caudal CMD forms a ureteral bud that will enlarge to contact the metanephric blastema, resulting in the kidney and collecting system.[1,3,6]

Congenital VD anomalies are extremely rare; the overall incidence of VD anomalies in the general population is approximately less than 0.05%.[3] These anomalies are categorized as absence, ectopia, hypoplasia, duplication and diverticulum.[1,27]

The embryologic etiology of the duplication of the VD has not yet been clearly established. However, the following two theories are the most supported. The first theory suggests that the duplication of the VD may be due to duplication of the fetal mesonephric system. According to this theory, the VD develops from the central portion of the mesonephric (Wolffian) duct, which is termed the 'proximal vas precursor'. The duplication of the proximal vas precursor presumably gives rise to the duplication of the VD.[1,4] Another theory suggests that transverse division of the mesonephric duct during organogenesis results in duplication of the VD.[1,4,28] The duplication of the VD is said to be complete when the two VDs are totally separated from the tail of epididymis to the prostate. The duplication of the fetal mesonephric system presumably gives rise to the complete duplication of the VD.[3,29] Partial duplication occurs when VDs are separated for a short distance only. The duplication of the proximal vas precursor presumably gives rise to the partial duplication of the VD.[1,3]

In all previously reported cases, partial duplication occurred in 53% of the cases, and complete duplication occurred in in 47% of the cases.[8] In our case, there was a complete VD duplication because two VDs proceeded from the epididymis tail to the prostate.

Duplication of the VD and double VD are two different terms. According to Vohra and Morgentaler[1], the duplication of the VD is defined as a second VD within the spermatic cord, whereas double VD refers to an ectopic ureter draining into the ejaculatory system.

Liang et al.[8] has suggested 3 types of classification systems for poly-vasa deferentia. Type I is the classical duplicated VD (partial or complete), in which a second VD is identified in the spermatic cord with no polyorchidism. Type II is multiple VD associated with polyorchidism. Type III is false poly-vasa deferentia and represents a double VD, in which an ectopic ureter drains into the ejaculatory system (a double VD according to Vohra and Morgenthaler[1]).

When we evaluate our case using this classification system, it corresponds to a type I poly-vasa deferentia because there were two different VD without polyorchidism and an ectopic ureter.

Based on the literature, VD duplication is often incidentally found during an inguinal hernia repair,[5,6,8,9,15,16] undescended testicle surgery,[4,17–21] vasectomy,[7,14,22–24] vasectomy reversal,[12] varicocelectomy,[3,11] radical prostatectomy,[10] ectopic ureter surgery,[25] autopsy,[30] and cadaver studies,[31] and our case

A duplicated VD may be associated with other congenital abnormalities such as ipsilateral renal agenesis and cystic fibrosis.[1,9,25] There were no additional urogenital system abnormalities identified in our case.

The identification of the VD is necessary during operations such as orchiopexy, herniorrhaphy, vasectomy and varicocelectomy because injury to the VD is a recognized surgical complication of these operations. Injury to the VD during surgery may cause infertility, chronic pain, and spermatic granulomas.[5,7,13] The unidentified duplication of the VD can lead to a failure of procedures, such as vasectomy.[8]

Intra-operative Doppler can help differentiate the VD from other structures such as the spermatic arteries and veins.[8]

Conflicts of interest

All authors have none to declare

References

1. Vohra S, Morgentaler A. Congenital anomalies of the vas deferens, epididymis, and seminal vesicles. *Urology*. 1997;49:313–321.
2. Lee JN, Kim BS, Kim HT, Chung SK. A case of duplicated vas deferens found incidentally during varicocelectomy. *World J Mens Health*. 2013;31(3):268–271.
3. Akay F, Atug F, Turkeri L. Partial duplication of the vas deferens at the level of inguinal canal. *Int J Urol*. 2005;12:773–775.
4. Karaman A, Karaman I, Yağız B, Cavuşoğlu YH. Partial duplication of vas deferens: how important is it? *J Indian Assoc Pediatr Surg*. 2010;15:135–136.
5. Chintamani, Khandelwal R, Tandon M, Kumar Y. Isolated unilateral duplication of vas deferens, a surgical enigma: a case report and review of the literature. *Cases J*. 2009;2:167.
6. Binderow SR, Shah KD, Dolgin SE. True duplication of the vas deferens. *J Pediatr Surg*. 1993;28:269–270.
7. Carr R. Apparent bilateral duplication of the vas deferens. *Br J Urol*. 1993;71:354.
8. Liang MK, Subramanian A, Weedin J, Griffith DP, Awad SS. True duplication of the vas deferens: a case report and review of literature. *Int Urol Nephrol*. 2012;44:385–391.
9. Damle S, Cothren CC, Moore EE, Kim FJ. Double trouble: duplication of vas deferens encountered during inguinal hernia repair. *J Am Coll Surg*. 2005;201(1):141.
10. Shariat SF, Naderi AS, Miles B, Slawin KM. Anomalies of the wolffian duct derivatives encountered at radical prostatectomy. *Rev Urol*. 2005;7(2):75–80.
11. Erdemir F, Parlaktas BS, Yasar A, Uluocak N. Duplicated vas deferens: a rare congenital abnormality. *Kaohsiung J Med Sci*. 2008;24(4):210–211.
12. Khoudary KP, Morgentaler A. Partial duplication of the vas deferens. *J Urol*. 1998;159:988–989.
13. Mathe CP, Dunn G. Double vas deferens associated with solitary kidney. *J Urol*. 1948;59:461.
14. Coetzee T. Double vas deferens: a case report. *Br J Urol*. 1959;31:336–339.
15. Khaliq T, Malik ZI, Jamal S. True duplication of the vas deferens. *J Pak Med Assoc*. 1997;47(3):97–98.
16. Toltete-Velcek F, Leddomado E, Hansbrough F, Thelmo WL. Alleged resection of the vas deferens: medicolegal implications. *J Ped Surg*. 1988;23(1):21–23.
17. Kutiyanawala MA, Johnstone JMS. A double vas deferens. *Br J Urol*. 1998;81:647.
18. Mege JL, Sabatier-Laval E, Mure PY, et al. Malformations of wolffian duct derived male gential organs (epididymus, vas deferens, seminal vesicles, ejaculatory ducts). *Prog Urol*. 1997;7(2):262–269.
19. Barrack S. Crossed testicular ectopia with fused bilateral duplication of the vasa deferential: an unusual finding in crytporchidism. *E African Med J*. 1994;71(6):398–400.
20. Toltete-Velcek F, Bernstein MO, Hansbrough F. Crossed testicular ectopia with bilateral duplication of the vasa deferentia: an unusual finding in cryptorchidism. *J Ped Sur*. 1988;23(7):641–643.
21. Terawaki K, Satake R, Takano N, et al. A rare case of duplicated vas deferens and epididiymis. *J Ped Surg Case Rep*. 2014;2(12):541–543.
22. Hjarbaek J. Double vas deferens. *Ugeskr Laeg*. 1987;149:2154–2155.
23. Graveson RG. Double conjoining vas deferens. *Urology*. 1980;15(3):283–284.

24. Cetti R, Reuther K, Hansen JPH. Double vas deferens. *Ugeskr Laeg*. 1981;143:28.
25. Gravgaard E, Garsdal L, Moller SH. Double vas deferens and epididymis associated with ipsilateral renal agenesis simulating ectopic ureter opening into the seminal vesicle. *Scand J Urol Nephrol*. 1978;12:85–87.
26. Standring S, Borley NR, Collins P, et al. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 40th ed. London: Churchill Livingstone, Elsevier; 2008:1268–1269.
27. Luciano A, Themis M, Ana Raquel M, et al. Urogenital anomalies in human male fetuses. *Early Hum Dev*. 2004;79:41–47.
28. Wiedemann A, Jaussi R, Rabs U. Testicular torsion in testicular duplication: Kasuistik und Literaturubersicht. *Urologe A*. 2005;44:162–165.
29. Amelar RD, Dubin L, Walsh PC. Embryology, anatomy and physiology of the male reproductive tract. In: Amelar RD, Dubin L, Walsh PC, eds. *Male Infertility*. Philadelphia: W. B. Saunders; 1977:p26.
30. Mysorekar VR. Accessory vas deferens a case report. *Br J Urol*. 1976;48(1):82.
31. Sirasanagandla SR, Nayak SB, Jetti R, Bhat KM. Unilateral duplication of vas deferens: a cadaveric case report. *Anat Cell Biol*. 2013;46(1):79–81.