

Anatomy of ureter of a Holstein-Friesian cow: a case study

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Abstract

Knowledge of the anatomy of the ureter is essential during manipulation of pelvic organs and surgery of animals. The study was conducted macroscopically to understand the anatomy of ureter of a Holstein-Friesian cow (2 years old). The ureters, paired muscular ducts, were originated with four roots, course retroperitoneally along the roof of abdomen and opened at the dorsal surface of urinary bladder near its neck obliquely. The entire ureter had a fairly even caliber except its origin. The average length and diameter of ureters were 77 cm and 0.9 cm respectively.

Keywords: Anatomy, ureter, Holstein-Friesian cow.

Introduction

Ureters are important in the homeostasis of farm animals as they play role in excretion of metabolic waste products and toxins (http://en.wikivet.net/urinary_system). An understanding of the anatomic relations of the ureters is critical to the practice of urology, as well as to the disciplines of gynecologic, vascular, and general surgery. The ureter serves as a critical landmark and is intimately involved with other vessels and organs, making accidental ureteral injury with a dreaded consequence of surgery (Anderson *et al.*, 2007; Brooks, 2007). Knowledge of the anatomy of the ureter is essential during manipulation of pelvic organs and surgery. Stricture or stenosis of ureter or ureter with small diameter can block the flow of urine. Eventually, the kidney may stop functioning because of the back pressure and could develop hydronephrosis (<http://en.wikipedia.org/wiki/ureter>). Anatomical (length and diameter) and functional abnormalities of the ureter may develop the vesicoureteral reflux (abnormal backward movement of urine) (<https://www.inkling.com/urolgy>). Smooth muscle contraction of ureter and ureteral peristalsis are essential for urine transport from kidney to the urinary bladder (Hashitani *et al.*, 2009). Considering the importance of pelvicalyceal anatomy (study on upper urinary tract) in farm animals, the study was designed to understand the anatomy of ureter of cattle.

Materials and methods

The study was conducted on a Holstein-Friesian cow (2 years old). The gross study was made by close eye inspection and length and diameter of ureter were measured by measuring tape.

Results and discussion

The ureters were paired muscular ducts with narrow lumina that carry urine from the kidneys to the bladder (Fig. 1) same as described by Anderson *et al.*, 2007 and Brooks, 2007. The length of the intramuscular course guards against reflux of urine into the ureter when the pressure raised within urinary bladder (Dyce *et al.*, 2002). I found four roots of ureters (Fig. 2). In most domestic species, the ureter begins in a common expansion, the

renal pelvis, into which all papillary ducts open. In cattle however, the ureter was formed by a coming together of the short passages (roots) that lead from the calices that enclose the individual renal papillae. My finding supports the observation by Dyce *et al.*, 2002. Each root may drain urine from separate lobe of kidney as bovine kidneys are multipyramidal type and lobulated (Getty, 1975; Dyce *et al.*, 2002; Carvalho *et al.*, 2009). The remaining tubular part of each ureter had a fairly even calibre. The length and diameter of ureters were 77 cm and 0.9 cm respectively (Fig. 3). The length and diameter were larger than as described by Getty, 1975 (Length 70 cm and diameter 6-8 mm, as horse) and Ghosh, 1995 (Length 60 cm and diameter 6-8 mm). They were retroperitoneal and followed a course along the abdominal roof. On reaching the pelvic cavity, the ureters bend medially to enter the broad ligament in cow. This carried the ureters over the dorsal surface of the bladder, into which they opened near the neck obliquely (Fig. 4). The ureters can therefore be divided into abdominal and pelvic portions. The findings conform to the findings of Getty, 1975, Ghosh, 1995 and Dyce *et al.*, 2002.

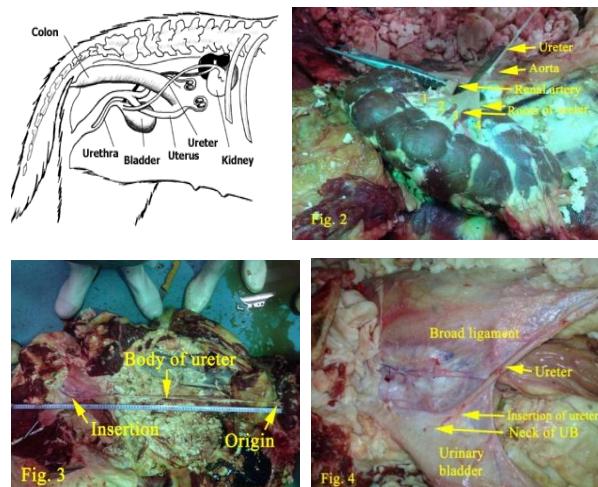


Fig. 1: Schematic diagram of urinary system of female animal.

Fig. 2: Roots of ureter of cow.

Fig. 3: Length of ureter of cow.

Fig. 4: Opening of ureter in urinary bladder of cow.

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Conclusion

The ureters were originated with four roots, course retroperitoneally along the roof of abdomen and opened at the dorsal surface of urinary bladder near its neck obliquely.

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