Ectopic ureter - a leaky problem no matter how you look at it!

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Ectopic ureter is the most commonly reported anomaly of the urinary tract in horses. It has been previously described in 21 horses (Ordidge 1976; Rossdale and Ricketts 1980; Christie et al. 1981; Modransky et al. 1983; Houlton et al. 1987; Sullins et al. 1988; MacAllister and Perdue 1990; Pringle et al. 1990; Blikslager et al. 1992; Squire and Adams 1992; Odenkirchen et al. 1994; Tech and Weiler 1996; Jansson and Thafner 1999; Tomlinson et al. 2001; Getman et al. 2005; Cokelaere et al. 2007; Coleman et al. 2011) and the author has seen 5 additional cases. Ninety-two per cent have been fillies but this gender predisposition may be biased because urine entering the pelvic urethra in males may pass retrograde into the bladder. The condition was unilateral in 17 (left in 11 cases; right in 5 cases and not specified in one case) and bilateral in 9. Intermittent urinary incontinence is usually recognised from shortly after birth but presentation for evaluation can be delayed for months to years. Affected foals should also be examined for other anomalies as 2 foals appeared to have an abnormal urethral sphincter (Calder and Adams 1992) and one was a cryptorchid (Christie et al. 1981). In dogs with ectopic ureter, urodynamic procedures including cystometry to evaluate bladder capacity and detrusor function and urethral pressure profilometry to assess the urethral sphincter are routinely recommended prior to surgery because the most common post operative complication is persistent incontinence (Lane et al. 1995). Cystometry has been performed prior to surgery in a few foals to document detrusor function (Christie et al. 1981; Squire and Adams 1992) and is worthy of consideration in future cases.

As technology has advanced over the past several decades, our ability to image ectopic ureter has expanded from plain and contrast radiography to ultrasonography and high resolution videoendoscopy and, most recently, to computed tomographic (CT) imaging capabilities. Reviewing reports of ectopic ureter in horses over the past 40 years, the evolution of these imaging modalities can clearly be recognised. In this issue, Coleman et al. (2011) describe, for the first time, CT imaging of a unilateral ectopic ureter in a 4-month-old Quarter Horse filly. Careful reading of previous reports of ectopic ureter in horses finds a common theme of frustration with diagnostic imaging modalities, perhaps with the exception of endoscopy. Abdominal radiographs following i.v. contrast administration (i.e. pyelography) may allow visualisation of both kidneys and documentation of distended, tortuous ureters in young foals (Christie et al. 1981; Modransky et al. 1983; Houlton et al. 1987; Sullins et al. 1988; Blikslager et al. 1992; Squire and Adams 1992; Tomlinson et al. 2001). Although these techniques provided better detail of the distal course of both the normal and ectopic ureters has been limited and, in most reports, i.v. pyelography has produced inconclusive results. Consequently, this author no longer recommends this imaging procedure, with the exception of Miniature Horse foals.

In order to improve radiographic visualisation of contrast agent in the bladder and ureters, retrograde contrast studies, as well as pyelography in which contrast material is injected directly into the renal pelvis with transabdominal ultrasonographic guidance, were also used to improve imaging of equine ectopic ureter (Christie et al. 1981; Modransky et al. 1983; Houlton et al. 1987; Sullins et al. 1988; Blikslager et al. 1992; Squire and Adams 1992; Tomlinson et al. 2001). Although these techniques provided better detail of the course of ectopic ureters, close reading of case reports reveals that specific information about the location of ectopic ureteral openings is rarely acquired, due to overlap of the contrast enhanced bladder and ureters. Further, whether or not information gleaned from contrast radiographic studies impacted the surgical treatment of affected horses was not addressed in many of these reports. Thus, these
procedures appear to have limited advantages over
intravenous pyelography and are not deemed worthy of
pursuit in most cases.

With introduction of high resolution videoendoscopic
equipment to equine practice, identification of ectopic
ureteral openings near the urethral papilla became possible
(Sullins et al. 1988; MacAllister and Perdue 1990; Pringle et al.
1990; Blikslager et al. 1992; Odenkirchen et al. 1994; Jansson
and Thøfner 1999; Getman et al. 2005; Cokelaere et al. 2007).
In some reports, dyes (e.g. phenol red, fluorescein or indigo
carmine) were also administered i.v. to discolour urine in order
to better localise the ectopic openings (Sullins et al. 1988;
Pringle et al. 1990; Blikslager et al. 1992; Jansson and Thøfner
1999). However, the limitation of endoscopy is that it provides
little information about the ureter beyond a malpositioned
distal opening. Thus, imaging of the upper urinary tract is still
needed to evaluate possible renal agenesis, hydronephrosis
and hydroureter. Transabdominal ultrasonography has
advanced to become the preferred imaging tool for this
examination as it is noninvasive, relatively inexpensive and
may only require sedation (Tomlinson et al. 2001; Cokelaere
et al. 2007).

In dogs, cystoscopy remains the procedure of choice
for diagnosis of ectopic ureter (McLoughlin and Chew
2000; Cannizzo et al. 2003). However, endoscopy is
typically combined with radiography or ultrasonography
to further evaluate the upper urinary tract before surgical
correction. Recently, CT imaging has also been used for
evaluation of kidneys and ureters in dogs with ectopic
ureter. In a report of 24 dogs with suspected ectopic ureter,
CT imaging was superior to contrast radiographic
imaging for establishment of a diagnosis of ureteral ectopia
(Samii et al. 2004). Similarly, contrast-enhanced CT imaging
is considered the most sensitive imaging modality for
diagnosis of ectopic ureter in children with incontinence
(Hanson et al. 2007).

Surgical exploration (or necropsy) both confirms the
diagnosis and allows direct visualisation of the course of
abnormal ureters. As a consequence, surgery and
necropsy examination are the ‘gold standards’ to which
imaging results must be compared. Of interest, in the study
comparing the accuracy of contrast radiographic
imaging and cystoscopy in dogs, cystoscopy had the best combination of positive
and negative predictive values for diagnosis of ectopic ureter
(Samii et al. 2004).

In the case described by Coleman et al. (2011), CT
imaging helped identify the position, route and
termination of an ectopic left ureter and ureterocele
prior to surgery, prompting a decision for unilateral
nephrectomy over ureterocystotomy. Further, because CT
imaging was performed before cystoscopy, the authors
concluded that the diagnostic yield of cystoscopy was
surpassed by prior CT imaging. These authors also state that
CT results were similar to surgical findings.

An important question to consider is whether or not
the case would have been managed differently without
the CT results. Surgical exploration would likely still
have been pursued and a decision of nephrectomy or
ureterocystotomy could have been made at surgery.
Performing the CT prior to surgery required an additional
episode of general anaesthesia, not to mention
the expense. In current challenging economic times,
one has to question whether the information provided
by CT imaging was of great enough value to offset
the associated risks and costs of performing the
procedure. Clearly, a single case report cannot
address this question and the true value of CT imaging of
ectopic ureter can only be determined after a larger
series of cases has been examined with this imaging modality.

Finally, an important goal of imaging would be to
assess renal structure and possibly function. Although
CT imaging clearly outlined the course of the abnormal
ureter and ureterocele in the report by Coleman
et al. (2011), it is noteworthy that neither transabdominal
ultrasonographic or CT imaging definitively demonstrated
that the left kidney was abnormal. Because the goal
should always be preservation of renal functional mass for
the patient, it would be useful in the future to determine
whether CT imaging may facilitate advancement of
laparoscopic or endouroscopic treatment of ectopic
ureter in horses, as is becoming the standard treatment in
dogs (Berent et al. 2008; Smith et al. 2010).

Author’s declaration of interests
No conflicts of interest have been declared.

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