

B mode ultrasonography for diagnosis of urethral calculi in buffalo bulls

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ABSTRACT

Study was performed to evaluate B mode ultrasonography for diagnosis of site of urethral obstruction in male buffalo bulls presented with complaint of anuria or dysuria. Ten animals were included in the study. Pre and post scrotal urethra were scanned. Ultrasonography was able to detect pre-scrotal obstruction in 6 animals. Hyperechoic density within urethra, with anechoic acoustic shadow and dilatation of urethra proximal to the site of obstruction indicated urethral obstruction by calculi. In other 4 animals, no calculi were detected ultrasonographically. In these animals post-scrotal urethrotomy was performed and calculi were retrieved. Superficial placement and a relatively fixed anatomical location of pre-scrotal urethra were found helpful in localizing the pre-scrotal urethral calculi. Ultrasonographic examination was found helpful in detecting the obstruction by prescrotal urethral calculi and may improve the chances of successful surgical treatment of urethral calculi in buffalo bulls.

Key words: Buffalo bulls, Calculi, Ultrasonography, Urethra

Urolithiasis is the formation of stones within the urinary tract. Multiple pathophysiologic processes may result in increased concentration of less soluble crystalloids in the urine, which may result in their subsequent lodgment in the urethra (Osborne and Kruger 1984, Radostitis *et al.* 2008). Urolithiasis is a major cause of concern in cattle and buffalo bulls and is responsible for heavy economic losses to animal owners. Quick and accurate diagnostic protocols are important for devising the treatment strategy. Imaging modalities like ultrasonography and radiography have been used for diagnosis of canine urolithiasis. Diagnosis of exact location of urethral calculi could be useful in bovine as it can guide a surgeon about the appropriate surgical technique to be adopted. However, reports of localization of urethral calculi are not very common in most of the animal species. In bovine, the diagnosis of obstructive urolithiasis is generally made from history, clinical appearance and per rectal examination of the animal. In absence of any confirmatory diagnostic tool it is a routine practice to explore urethra at the level of sigmoid flexure by post-scrotal incision. In case of non retrieval of calculi at sigmoid flexure region the pre-scrotal incision is attempted. The

present study was performed to evaluate the use of ultrasonography to locate the urethral calculi, so that the exact site of calculi lodgment could be identified. The ultrasonographic diagnosis may be able to guide the surgeon to make incision at appropriate site.

MATERIALS AND METHODS

The study was conducted in 10 male buffalo bulls varying from 1.5–6 years of age. Animals were presented to the university teaching hospital with complaint of anuria or dysuria for 2–6 days. Animals were restrained in lateral recumbency with upper hind leg retracted cranially and secured so as to get full exposure of urethra. Pre and post-scrotal urethra were examined for the presence of calculi with the help of Wipro GE ultrasound machine using 7–12 MHz linear variable frequency transducer. Urethra was scanned transversely and longitudinally for the presence of any hyperechoic structure, acoustic shadow, urethral pulsation and presence of fluid column in urethra. After locating the site of obstruction surgical management was done by performing pre or post-scrotal urethrotomy under local infiltration of 2% lignocaine HCl.

RESULTS AND DISCUSSION

Animals in study were male buffaloes of younger to middle age group varying from 1.5–6 years. Three animals had partial obstruction with history of dribbling of urine and straining while urinating since 3–6 days. Other 7 animals had complete urethral obstruction since 2–3 days. One animal had rectal prolapse owing to straining while

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attempting to urinate. All the animals were intact males which were kept for breeding or for draft purpose. Rectal examination revealed intact urinary bladder in all the animals. Sonographic examination in lateral recumbency after restraining upper limb cranially revealed hyperechoic densities of variable sizes accompanied by acoustic shadow indicating the presence of calculi in pre-scrotal urethra of six animals (Fig 1–3). The lumen of urethra proximal to the site of obstruction was distended, while lumen distal to the obstruction site was collapsed (Figs 1, 3). Pulsations were noticed in urethra proximal to the site of obstruction. Ultrasonographically, the size of calculi varied from 0.5–0.98 cm (0.68 ± 0.07) X 0.68 – 0.95 cm (0.84 ± 0.39). In these animals, standard midline pre-scrotal urethrotomy in lateral recumbency was performed to remove the obstruction. In 50 animals, the calculus could not be located ultrasonographically in either pre or post-scrotal urethra. The urethral lumen in pre-scrotal region was collapsed. In these animals, post-scrotal urethrotomy was performed and calculi were removed from sigmoid flexure region at the level of insertion of retractor peni muscles (Fig. 4).

B-mode ultrasonography was able to detect calculi in all the 6 animals suffering from pre-scrotal obstruction, which was later confirmed by pre-scrotal urethrotomy procedure at the site of calculi localization. Hyperechoic densities within urethra with anechoic acoustic shadow and dilatation of urethra, proximal to the site of obstruction are indicative of obstruction by lodgment of urethral calculi/calculus. Similar sonographic features of canine urethral calculi was reported by Mattoon (2013). Ultrasonography is often recommended as first diagnostic imaging modality in patients with haematuria or dysuria. Reports on sonographic evaluation of urinary bladder in bovine calves are available (Magda 2006, Makhdooni and Shiekh 2008, Khan *et al.* 2013). However, there is paucity of literature

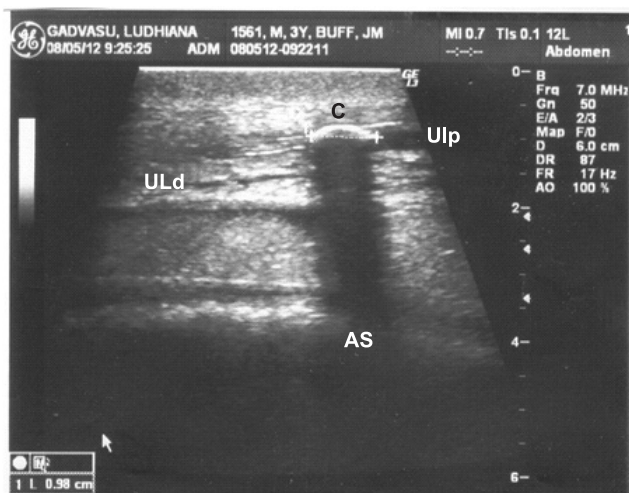


Fig. 1. Longitudinal sonograph of pre-scrotal urethra in buffalo bull, showing presence of 0.98 cm diameter hyperechoic density along with acoustic shadow (AS) indicating presence of calculus (C). The urethral lumen (ULp) proximal to obstruction site is distended due to accumulation of urine, while distal lumen of urethra (ULd) is collapsed.

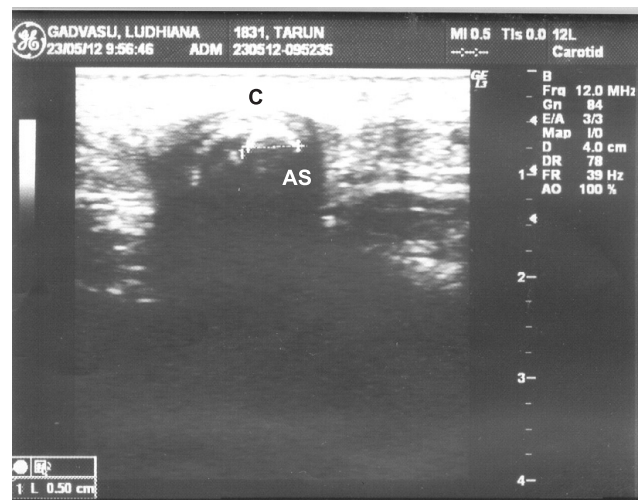


Fig. 2. Cross section of pre-scrotal urethra in buffalo bull showing presence of 0.50 cm diameter hyperechoic density along with acoustic shadow (AS) indicating presence of calculus (C).

on sonographic evaluation of urethra for the diagnosis of urethral calculi in buffalo bulls. Urethral obstruction was detected ultrasonographically from urethral pulsation and urethral dilatation in front of the seat of obstruction.

Accurate localization of the site of calculi lodgment is important as it decides the treatment protocol to be adopted. Long and narrow urethra and presence of sigmoid flexure makes the male urethra prone to calculi lodgment in ruminants. Sigmoid flexure at the site of insertion of retractor peni muscles is the most common site of urethral obstruction in male bovine (Loretiet *et al.* 2003). In a report about 68% of calculi were recovered from sigmoid flexure of the bovine (Gera and Nigam 1979). However, in the present study on buffalo bulls, pre-scrotal urethra was a more common site of calculi lodgment (60%; 6/10).



Fig. 3. Longitudinal section of pre-scrotal urethra in buffalo bull showing presence of hyperechoic density along with acoustic shadow (AS) indicating presence of calculus (C). The urethral lumen distal (ULd) to obstruction site is distended due to accumulation of urine, while urethral lumen proximal to obstruction (ULp) is collapsed.



Fig. 4. Surgical retrieval of urethral calculus in a buffalo bull.

Ultrasonographic detection of the site of obstruction is helpful in avoiding unnecessary post-scrotal incision which is a routine practice for the treatment of bovine urethral obstruction. Superficial placement and a relatively fixed anatomical location of pre-scrotal urethra might have helped in localizing the calculi lodged in pre-scrotal urethra. However, deep location of urethra and presence of sigmoid flexure may be responsible for inability to detect the calculi ultrasonographically in the post-scrotal region.

Pre-operative ultrasound scanning of urethra may help localization of the pre-scrotal urethral calculi, avoids unnecessary post-scrotal incisions and improves the chances of successful treatment of obstructive urolithiasis in buffalo bulls.

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