

Grass awn in the urinary bladder of a 5-month-old mixed-breed dog: A case report

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Summary

Grass awn foreign body-related disease is common in dogs throughout Poland, typically affecting the ears and subcutaneous tissue, but the presence of grass awns in the urinary bladder is a rare pathology in veterinary medicine. The diagnosis of foreign bodies in the urinary tract is challenging because their signs overlap with those of urinary tract infections. Hence, patients with grass awns in the urethra or urinary bladder can easily be misdiagnosed and mistreated. It is worth considering the potential presence of a plant foreign body in the urinary tract in the case of sudden hematuria and abdominal discomfort, especially in the spring and summer. Quick diagnosis and surgery treatment are essential to protect the patient from severe complications. The purpose of this report is to present the diagnosis and treatment of a dog with hematuria and abdominal discomfort which was diagnosed with a foreign body (a grass awn) in the urinary bladder.

Keywords: dog, foreign body, grass awn, urinary bladder

Grass awns are most often found in the external auditory canal, conjunctiva, nasal and oral cavities or in the subcutaneous tissue (5). They can cause local purulent inflammation and abscess formation. The shape of the grass awn facilitates tissue penetration and prevents backward movement, resulting in unidirectional migration (5). In this study, we present the diagnosis and treatment of a dog with hematuria and abdominal discomfort, which was diagnosed with a foreign body (a grass awn) in the urinary bladder. The diagnosis of foreign bodies in the urinary tract is challenging. They can cause hematuria, dysuria, and acute urinary retention. Since the signs of grass awns in the urethra or urinary bladder overlap with those of urinary tract infections, patients can easily be misdiagnosed and mistreated, which results in further complications (9). The diagnosis is supported by good medical history, focused physical examination, and imaging tests.

Case description

Clinical exam findings and diagnostic aids. A 5-month-old uncastrated male mix-breed dog weighing 4 kg from the Poznań suburbs was admitted to our veterinary clinic with a history of sudden vocalization, discomfort, and hematuria.

According to the anamnesis, the signs occurred suddenly, after a walk a few hours earlier. At the time of the clinical examination, the patient was not diagnosed with any chronic diseases and was not receiving any medications or supplements on a regular basis. As a result of the physical examination performed in our clinic, the urinary bladder was found to be moderately painful, and the presence of fresh blood in the area of the urethral opening was observed. The condition of the patient was assessed as good.

An ultrasound examination of the urinary tract was performed with Sonoscape S-50 (Sonomedical, Poznań, Poland) and a micro-convex transducer (7.5 MHz). The presence of a foreign body in the bladder was revealed, with an image characteristic of a plant foreign body in the form of two oblique hyperechoic lines and an anechoic space in the middle, measuring up to 28 mm in length and up to 4 mm in width. The bladder wall was regular, 0.8-1 mm thick. The image of the urethra opening and the urethra itself available for examination were normal. The prostate gland was homogeneous, of normal shape and size. The kidneys were of normal size and appearance. No urine crystals or urolith were found in the lumen of the urinary bladder. On the basis of the medical history, clinical examination, and ultrasonography, the condition was tentatively diagnosed as a bladder foreign body, and the patient was referred for surgery.

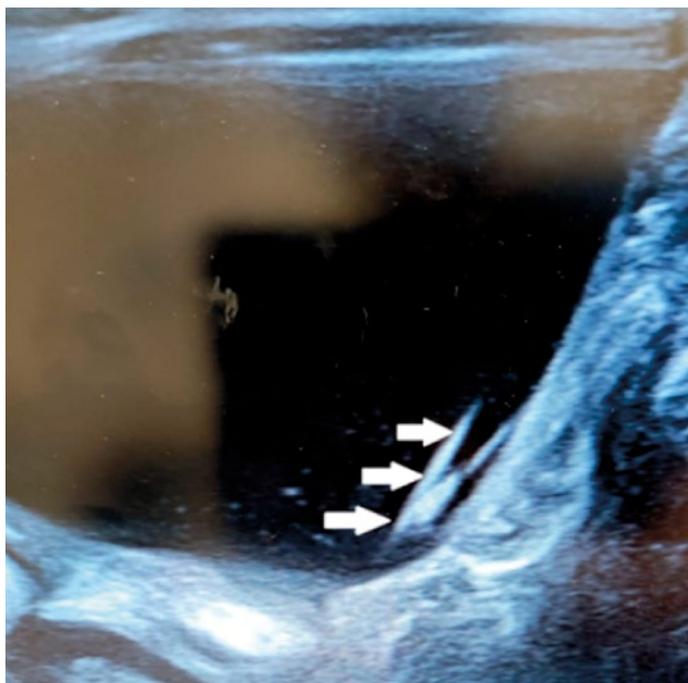


Fig. 1. A foreign body (a grass awn) in the form of two V-shaped lines and an anechoic space in the middle was found in the bladder lumen (white arrows)

Surgery and treatment. Food (but not water) was withheld from the dog for 12 hours before anesthesia and surgery. The dog was sedated with a combination of Dexmedetomidine hydrochloride (Dexdomitor; Zoetis; Warsaw, Poland), 125 $\mu\text{g}/\text{m}^2$, ketamine (Bioketan; Vetoquinol Biowet; Gorzów Wielkopolski, Poland), 2 mg/kg BW (body weight), IM, and a loading dose of fentanyl (Fentadon; Eurovet Animal Health BV; Bladel, Netherlands), 3 mcg/kg BW, IV. Anesthesia was induced with propofol (Scanofol; Scanvet; Gniezno, Poland), 6 mg/kg BW, IV. After tracheal intubation, anaesthesia was maintained with isoflurane (Iso-vet; Piramal Critical Care; Voorschoten, Netherlands) in 100% oxygen in a semi-closed circle system, and a constant rate infusion of fentanyl, 2 $\mu\text{g}/\text{kg}$ BW/h, was used for analgesia.

Preoperative bladder catheterization and lavage with 1% povidone-iodine were performed. The animal was taken into dorsal recumbency, then the midline coeliotomy was performed, extending from the umbilicus to the pubis. After the bladder was secured, a stab incision was made into the apex of the bladder, and reddish urine was aspirated. The inside of the organ was visualized and inspected. The bladder wall

was approximately 0.8 mm thick, and slight bleeding was visible in a small area of the bladder mucosa. A plant foreign body was found and removed. Next, the bladder was rinsed, and the patency of the urethra was checked. The cystotomy was closed with simple interrupted 3/0 polyglactin sutures. The surgical wound was closed by 3-layer suturing: the muscular layer, then the subcutaneous tissue, and finally the skin were closed in separate layers. The surgical procedure, anesthesia, and recovery from anesthesia were without complications. After regaining consciousness, the patient was discharged from the hospital in a stable condition.

Postoperative treatment included antibiotic therapy (amoxicillin with clavulonic acid; 12.5 mg/kg BW every 12 h for 10 days; Synergal; Scanvet; Gniezno, Poland) and analgesic management (meloxicam at an initial dose of 0.2 mg/kg BW and then 0.1 mg/kg BW every 24 h for 4 days; Loxicom Oral Dog; Norbrook Laboratories Limited; Newry, United States). The owner was recommended to limit the movement of the animal until the sutures were removed, to protect the wound from self-injury using an Elizabethan collar, and to clean the wound daily with an antiseptic. The patient appeared for a follow-up visit three days after the procedure. The owner reported no disturbing symptoms. Clinical examination showed no abnormalities. The next follow-up visit took place twelve days after the surgical procedure. No abnormalities were observed in the clinical examination either. Non-absorbable sutures were removed during the follow-up visit. The patient fully recovered.

Discussion

Foreign bodies in the urinary tract are often reported in human patients (9). The majority of these cases are self-inflicted, mainly associated with autoerotism, psychiatric disorders, and drug intoxication (9). In veterinary medicine, foreign objects affecting the urinary tract have only rarely been documented in dogs and cats (1, 3, 4, 8, 14). In addition to grass awns (5), foreign bodies reported in the urinary bladder of animals also include air gun pellets (1), hair (4), and even a popsicle stick (14). Problematic grasses in Europe include wild barley (*Hordeum murinum*) and wild oats (*Avena fatua*) (10).

Foreign bodies can invade the urinary bladder by retrograde movement up the urethra (13), by iatrogenic mechanisms (during surgery or urinary tract instrumentation), by a transabdominal route (migration from the skin) (8), or by a transvesical route (migration from other abdominal structures) (13, 14). Rarely, grass awns can travel for long distances through the respiratory or digestive system to more distant places, but the probability of arriving into the lumen of the urinary bladder by this path is small. The urinary bladder

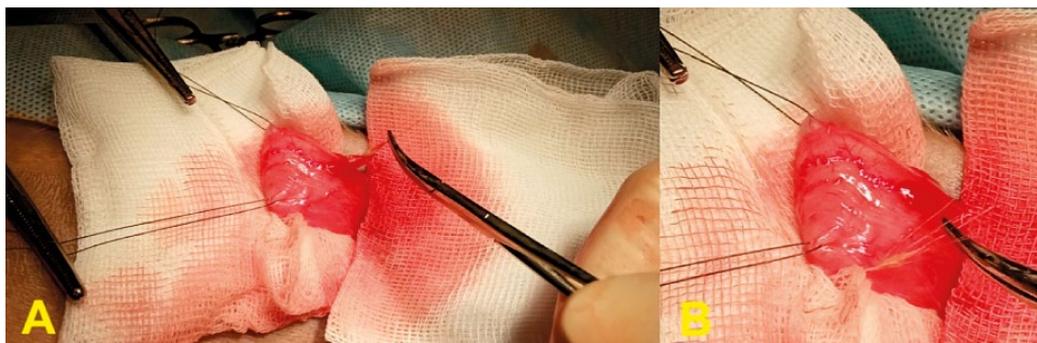


Fig. 2. A, B: A 3-cm-long foreign body (a grass awn) in the bladder lumen observed during cystotomy

is not directly adjacent to the digestive or respiratory organs. The problem of migrating plant foreign bodies is more common in dogs, especially hunting dogs and long-haired dogs, regularly exposed to plants that have awns capable of penetrating skin (5). However, in the case described, the mixed-breed dog was living in a suburban area. According to the anamnesis, the dog did not undergo any surgical procedures, catheterization, or cystocentesis before, and it seems unlikely that the awn was introduced iatrogenically.

Plant awns can invade animals' bodies via numerous entry points, including the skin (from the fur/hair), sinus, nose (by inhalation), or oral cavity (by ingestion). Plant awn structure includes tips with angled barbs and serrations. This unique feature facilitates the passage of the awn in a single direction precipitated by body motion. The migration of a grass awn usually follows the path of least resistance (6). In the case described here, the grass awn travelled along the urethra and entered the lumen of the bladder through the urethra's lumen. The signs occurred suddenly, and the time from the first vocalization and the appearance of hematuria to the diagnosis was a maximum of several hours. Migration through the skin or digestive tract would require much more time. Moreover, there were no visible perforations or adhesions characteristic of foreign body migration through the bladder wall. If migration is retrograde up the urethra, as it seems to have been in this case, it is practically impossible for a grass awn to be expelled during micturition because of its "open umbrella" shape (13).

Ultrasonography is a useful tool for the detection of foreign bodies in the lumen of the urinary tract, making it possible to quickly diagnose the patient and avoid unpleasant, chronic complications. It has been suggested to be superior to conventional and contrast radiography for locating grass awns (5). Grass awns are easy to identify in the ultrasound image. They are usually visible as hyperechoic, linear formations, sometimes forming the shape of the letter V (5). A spindle-shaped awn may have two to three linear echogenic interfaces. Occasionally, an acoustic shadow may be visible in the saggital imaging plane (5), but it was not visible in this case, probably because of the small size of the object. The grass awn formed V-shaped lines with an anechoic space in the middle in the ultrasound examination and was slightly smaller in the ultrasound image than in reality. A diagnostic method that deserves attention in the diagnosis and management of foreign bodies in the urinary bladder is cystoscopy. This technique is usually used to visually assess the lower urinary tract if routine diagnostic evaluation (such as urinalysis, blood work, radiography, or ultrasonography) does not yield a definitive diagnosis for the cause of a patient's lower urinary tract disease. It can also be used for non-invasive removal of some foreign bodies from the urinary bladder (e.g. small urinary stones, pilobezoars) through the urethral lumen (11). Cystoscopy is considered

a minimally invasive procedure and induces minimal trauma in the urinary tract when performed correctly (11). However, this diagnostic method requires the use of specialized equipment that is not available in most veterinary facilities. Secondary iatrogenic injury to the lower urinary tract cannot be excluded, and, in a patient with a foreign body in the bladder, even a mild trauma could result in significant hemorrhage, potentially blood loss, and the formation of obstructive urethral blood clots (11). Moreover, due to the peculiar structure of the grass awn, attempts to remove it during cystoscopy may also result in obstruction of the urethra. It is more difficult to remove a foreign body from the urethra than from the urinary bladder. Due to the above and the fact that diagnosis was possible on the basis of the ultrasound examination, cystoscopy was not performed in this case.

Foreign objects in the urinary bladder may promote bacterial proliferation by altering the defense mechanisms of the urinary tract (2). The most frequently described complications due to the presence of a foreign body in the bladder are purulent cystitis and the formation of stones and crystals. The stones formed in this process are usually composed of struvite (8), cystine (3), and calcium oxalates (7). Moreover, unretrieved foreign bodies may cause intermittent urinary obstruction depending on the size and position of the object, cystitis, bladder wall erosion, and penetration of the bladder wall (12). In the case described here, immediate diagnosis and surgical treatment led to a quick recovery of the dog and prevented complications.

The presence of foreign bodies, including grass awns, in the urinary bladder is a rare pathology in veterinary medicine. In this case, the use of ultrasonography made it possible to diagnose a plant foreign body in the urinary bladder of a young dog. Grass awns may reach places where they are not usually identified and therefore may be omitted as the cause in the differential diagnosis. It is worth considering the potential presence of a plant foreign body in the urinary tract in the case of sudden hematuria and abdominal discomfort, especially in the spring and summer. The quick reaction of the animal's owner, as well as the smooth diagnosis and treatment, made it possible to protect the patient from severe complications.

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