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CASE REPORT

Companion or pet animals

Urinary incontinence in a male dog with an ectopic ureterocoele remnant associated with ipsilateral renal agenesis and cryptorchidism

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Abstract

A 2-year-old, male, neutered labrador retriever with a previous diagnosis of left renal agenesis and left cryptorchidism presented for investigation of mild intermittent urinary incontinence. Abdominal ultrasound, intravenous urography and retrograde positive-contrast urethrocystography were performed, identifying an unusual fluid-filled structure, confluent with the left side of the prostate gland. Histopathological diagnosis, following surgical excision, was an ectopic ureterocoele remnant. Urinary incontinence temporarily improved following surgery, but subsequently recurred. A presumptive diagnosis of urethral sphincter mechanism incompetence, in addition to the ectopic ureterocoele remnant was given. Dogs with renal agenesis typically have an absent ipsilateral ureter; however, this report demonstrates an ipsilateral ectopic ureterocoele remnant, a condition rarely reported in veterinary medicine. Multiple ipsilateral genitourinary deformities should be suspected and investigated in animals presenting with any urogenital developmental abnormality. Clinical significance of ectopic ureterocoele remnant in male dogs with urinary incontinence should however be carefully evaluated, and other causes (e.g., urethral sphincter mechanism incompetence) should be considered.

KEYWORDS

diagnostic imaging, dogs, soft tissue surgery, urinary tract, urology

BACKGROUND

Urinary incontinence can be described as involuntary escape of urine during the storage phase of micturition, and can be characterised as congenital or acquired. Differentials for congenital urinary incontinence in male dogs include ectopic ureters and a range of other anatomical abnormalities.[1] Acquired urinary conditions that have been described in male dogs with urinary incontinence include urethral sphincter mechanism incompetence (USMI).[1,2] Renal agenesis (RA) is the absence of one or both kidneys, with the ureter usually also absent.[3] Little information regarding RA with an ipsilateral ectopic ureter exists in the veterinary literature; a description is found in only two case reports in dogs.[4,5] Our case report outlines the presentation, diagnostic approach and treatment of a male dog that presented with urinary incontinence and multiple ipsilateral congenital genitourinary abnormalities. It provides useful information in the clinical approach and treatment of this rare condition.

CASE PRESENTATION

A 2-year-old, 33 kg, male, neutered labrador retriever presented to the surgery service at a university teaching hospital with a 2-month history of mild urinary incontinence. The owner reported that urinary incontinence occurred when the dog was lying down and/or asleep. The dog was able to urinate normally outside. The dog had previously presented to the same referral hospital 8 months previously for laparoscopic removal of a left cryptorchid testicle. Ultrasound examination to assess the abnormally positioned left testicle before castration incidentally revealed concurrent left RA. At this time, the prostate was normal in size and homogenous in echogenicity. No other abnormalities were detected

on ultrasound. The dog had no other relevant medical history.

INVESTIGATIONS

Physical examination at the time of presentation was unremarkable, including abdominal palpation and examination of the penis and prepuce. Haematology and biochemistry were within normal reference intervals, urinalysis was unremarkable and urine culture was negative. Ultrasound of the urinary tract identified a 'cyst-like' structure, measuring 18 × 26 × 17 mm, within the parenchyma at the left side of the prostate filled with anechoic fluid (Figure 1). This could be followed cranially into a small blind-ended tubular structure with anechoic contents. The prostate was smaller in size in comparison to the previous study, with an otherwise homogenous echogenicity. No left kidney or ureter was identified, as per the previous ultrasound. The right kidney was smoothly marginated with good corticomedullary distinction, and was increased in size (length 7.5 cm), likely due to compensatory hypertrophy, secondary to left RA. The right ureter was seen entering the bladder trigone in a normal position.

The dog was sedated with intravenous (IV) medetomidine (Sedator, Dechra; 0.005 mg/kg) and butorphanol (Torbugesic, Zoetis UK; 0.2 mg/kg). An IV urogram was performed by injecting 2 mL/kg of iohexol (Omnipaque 300 mg/mL; Bayer Pharmaceuticals) administered as an IV bolus, followed by multiple radiographic exposures at previously published timepoints.[6,7] A positive-contrast retrograde urethrocystogram was performed by diluting the iohexol 1:1 with saline to make a 150 mg/mL contrast solution, of which 5 mL/kg was administered in a retrograde manner, via an 8 Fr Foley catheter placed into the distal urethra. Continuous images were obtained via fluoroscopic examination during this study. The IV urogram resulted in progressive opacification of the fluid-filled structure with time following the initial injection (Figure 2). No abnormalities of the right kidney, ureter or urinary bladder were noted. The retrograde urethrocystogram confirmed a connection between the urethra and the fluid-filled structure, with progressive opacification of the structure with the application of increasing retrograde pressure (a moderate amount of pressure was required to fill the prostatic lesion). The prostatic urethra was uniform in diameter.

DIFFERENTIAL DIAGNOSIS

Based on the patient's signalment, imaging, history of urinary incontinence, left cryptorchidism and RA, the following differentials were considered most likely: persistent Müllerian duct (uterus masculinus), ectopic ureteral remnant and prostatic cyst. Concurrent USMI was also a differential diagnosis.

TREATMENT

The patient presented 2 months later for re-evaluation of his ongoing urinary incontinence and surgical excision of the abnormal 'cyst-like' lesion. An abdominal ultrasound was repeated before surgery, which confirmed persistence of the abnormal structure, with no significant change from previous imaging.

Surgical intervention was elected due to the presumption that the dog's urinary incontinence may be partially or wholly caused by the passive voiding of the abnormal prostatic cavitary lesion. Anaesthetic management included premedication with methadone (Comfortan, Dechra; 0.2 mg/kg) and medetomidine (0.001 mg/kg IV) before induction with IV propofol (Propofol, Abbott; 2 mg/kg). Anaesthesia was maintained with inhalational isoflurane. A transversus abdominis plane block was performed using bupivacaine (2 mg/kg). Perioperative support included use of isotonic crystalloid fluid therapy (Aquapharm 11, Animalcare; 5 mL/kg/h IV) with cefuroxime (Zinacef, GlaxoSmithKline; 20 mg/kg IV every 90 minutes). Additional analgesia included paracetamol (15 mg/kg IV), ketamine boluses (Anasketin, Dechra; 0.5 mg/kg IV as needed) and methadone (0.1 mg/kg IV as needed).

The patient was placed in dorsal recumbency, and a caudal exploratory laparotomy was performed. A fluid-filled oval structure, narrowing cranially to a blind-ending tube was identified on the left dorsolateral aspect of the prostate, consistent with the pre-operative imaging findings. A 22-gauge IV catheter was inserted into the lumen of the structure, which revealed yellow fluid consistent with the appearance of urine; however, this was not confirmed with biochemical testing. Two stay sutures were placed within the wall of this structure using 2 metric polydioxanone (PDS II, Ethicon) to allow for manipulation during dissection. Dissection was begun by following the structure cranially with Mixter forceps to identify the blind ending region and dissect it away from the bladder. Dissection was then continued caudally until the fluid-filled pouch merged medially with the prostate gland and dissection could not continue without injury to this organ. The lateral wall of the structure was incised to reveal a communication with the urethra, as suspected from the retrograde urethrocystogram. A 6 Fr rigid urinary catheter was inserted through this communication and was seen exiting antegrade through the penis (Figure 3). The wall of the pouch was partially incised

LEARNING POINTS/TAKE-HOME MESSAGES

- Multiple ipsilateral genitourinary deformities should be suspected and potentially investigated in animals presenting with a urogenital developmental abnormality (e.g., or cryptorchidism).
- Ectopic ureters are less commonly associated with urinary incontinence in male dogs; therefore, other causes (such as urethral sphincter mechanism incompetence) should also be considered.
- Multiple imaging modalities, such as intravenous urography and positive-contrast retrograde urethrocystography, were essential in characterising the ectopic ureterocoele remnant in this case report.

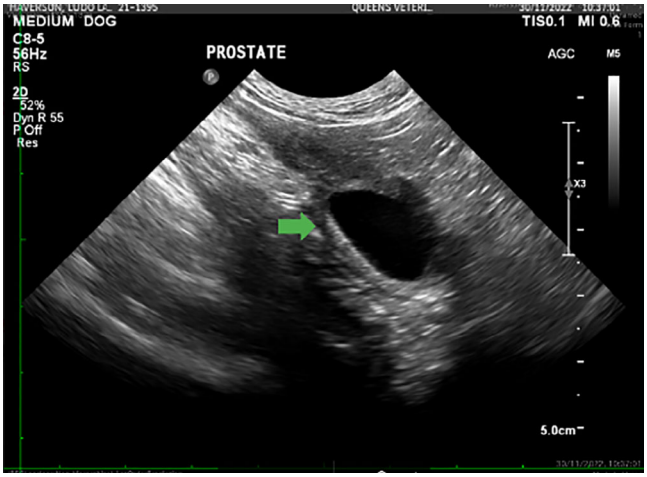

FIGURE 1 Abdominal ultrasound examination of a sagittal image revealing the ectopic ureterocoele remnant (green arrow), which appeared as a cavitary lesion on the left side of the prostate that was filled with anechoic fluid and measuring: height 18 mm, length 26 mm and width 17 mm.

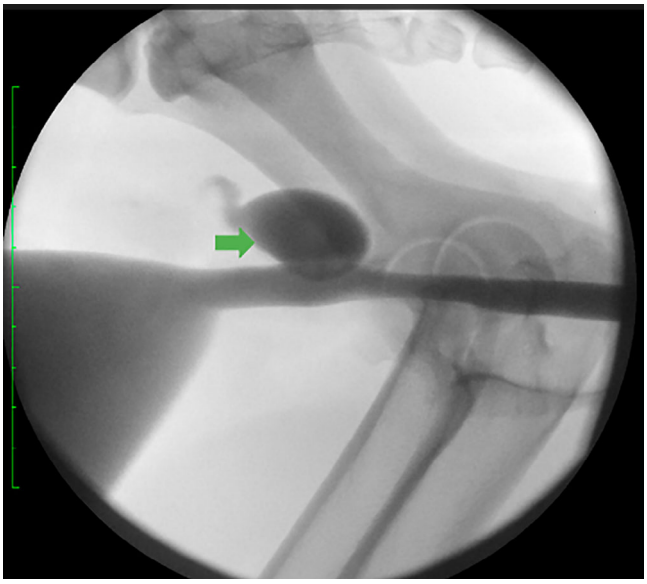

FIGURE 2 A retrograde urethrocystogram performed under fluoroscopy demonstrating the ectopic ureterocele remnant (green arrow) as a blind-ending ovoid structure communicating with the fairly uniform prostatic urethra and filling with contrast agent under pressure.

circumferentially around the catheter with a number 11 scalpel blade, and a simple continuous suture pattern with 1.5 metric PDS was placed to close the communication. This was reinforced with a single horizontal mattress suture, also with 1.5 metric PDS. The free walls of the now opened cyst-like structure were resected as far as possible, leaving the medial aspect in situ (which was continuous with the prostate gland). Retrograde passage and flushing of the urethra were performed to confirm that no further communication existed. The urinary catheter was removed, and the omentum was tacked to the dorsal, ventral and caudal aspect of the remaining cyst wall using 1.5 metric PDS. The excised structure was sent for histopathology.

Immediately following the surgical procedure, the dog was given meloxicam (Metacam, Boehringer Ingelheim; 0.2 mg/kg subcutaneously) and methadone (0.2 mg/kg IV). The dog was hospitalised overnight on methadone (0.2 mg/kg IV every 4 hours) and was administered IV fluid therapy (Aquapharm 11, Animalcare; 4 mL/kg/h). No urination or urinary incontinence was reported overnight, with normal voiding reported the next morning. No dysuria or dyschezia was observed within the postoperative period, and the patient was discharged 19 hours following surgery with a 5-day course of meloxicam (Metacam, Boehringer Ingelheim; 1.5 mg/mL oral suspension, 0.1 mg/kg every 24 hours).

Histopathology identified that the 'cyst-like' structure was lined by well-differentiated urothelium (transitional epithelium), which was segmentally present (Figure 4). Masson's trichrome staining showed that much of the cyst wall was formed by collagenous tissue and only one section was admixed with bundles of smooth muscle. There was no evidence of glandular structures nor medium- or large-sized blood vessels consistent with a persistent Müllerian duct or a cyst of prostatic origin. Therefore, due to its histopathological urinary origin, and its anatomical location as determined on imaging and exploratory laparotomy, a diagnosis of an ectopic ureterocoele remnant (EUR) was reported. This was differentiated from an ectopic ureteral remnant due to the structure being dilated and fluid filled.

OUTCOME AND FOLLOW-UP

The 2-week postoperative examination found that the patient had recovered well following surgery. A 48-hour period of urinary incontinence was reported immediately postoperatively; however, this self-resolved without intervention. No other urinary tract signs were reported by the owner. Physical examination was unremarkable with the patient being comfortable on palpation of its caudal abdomen and its prepuce being clean and dry. Urinalysis was unremarkable and urine culture was negative.

At the 8-week postoperative examination, the owner reported that the dog's mild intermittent urinary incontinence had recurred to what was reported pre-operatively. A repeat ultrasound examination and positive-contrast retrograde urethrogram were performed. On a urinary tract focused ultrasound imaging, a small area of heterogeneous tissue was present adjacent to the margin of the prostate consistent with previous omentalisation, and a narrow hypoechoic-anechoic cylindrical structure was visible measuring 3.9 mm in length. On the retrograde urethrogram study, which was performed as previously, the structure seen on ultrasound was filled with a small amount of contrast agent (Figure 5).

Although a small amount of contrast filling was observed in the same region as previously, it was deemed likely to be clinically insignificant and unlikely to be the cause of the dog's continued urinary incontinence. Therefore, the most likely cause of the dog's incontinence at this stage was USMI, as a diagnosis of exclusion. Treatment with phenylpropanolamine (Propalin 40 mg/mL; Vetoquinol UK; 1.2 mg/kg twice a day) was trialled and this improved the dog's urinary incontinence. The phenylpropanolamine was then stopped for 2 weeks to confirm the improvement was due to the medication. The owner reported the urinary incontinence worsened during this time; therefore, treatment with phenylpropanolamine was resumed and is ongoing.

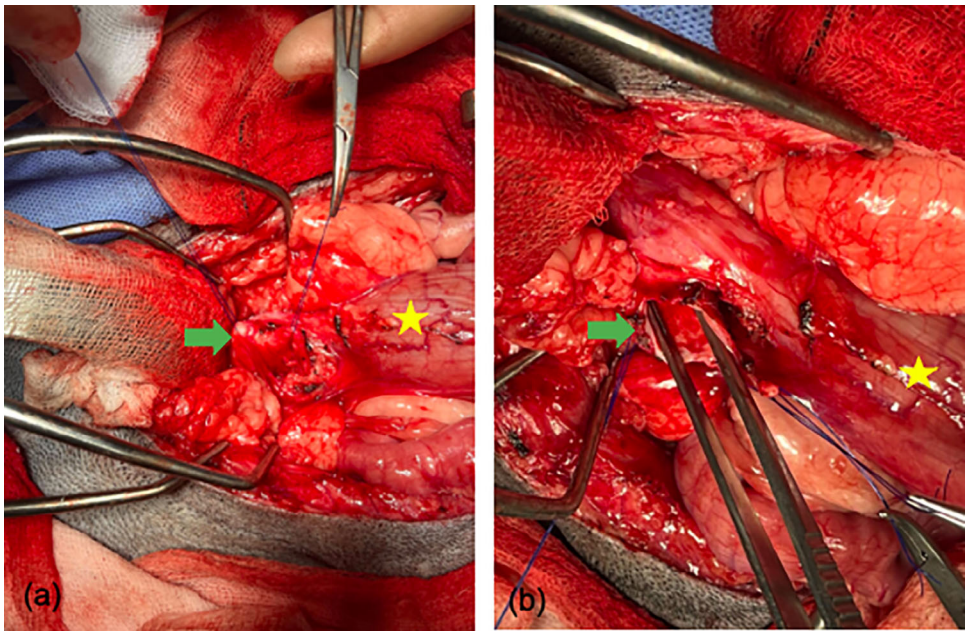

FIGURE 3 Surgical resection of the ectopic ureterocele remnant (green arrow). (a) Two stay sutures placed cranially and caudally to allow careful manipulation during surgery. (b) Lumen of the ectopic ureterocele remnant incised to demonstrate its communication with the prostatic urethra. Urinary bladder shown (star) with the cranial aspect of the patient to the right of the images.

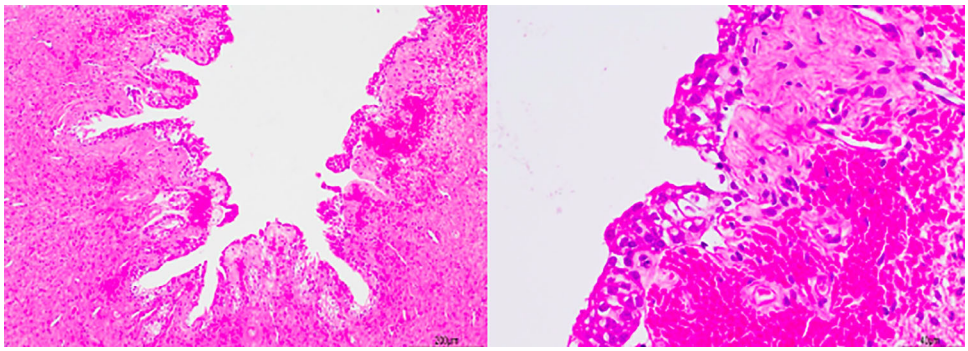

FIGURE 4 Microscopy of the ectopic ureteral remnant with a well-defined lining urothelium (transitional epithelium) and a lumen (a) (hematoxylin and eosin [HE], bar 200 μm) and detail of the urothelium. (b) (HE, bar 40 μm). Both images show a wall formed by collagenous tissue. Images above need to be labelled a) and b)

DISCUSSION

This is the first known case report describing ipsilateral EUR, RA and cryptorchidism in a male dog with urinary incontinence. An ectopic ureterocoele can be described as a cystic dilation of an abnormally positioned ureter, caused by the abnormal development of the metanephric ducts.[8,9] Numerous studies report ectopic ureters or ureterocoeles; however, only two case reports describe an ectopic ureter occurring with ipsilateral RA,[4,5] with only one of these case reports describing it in a male dog with urinary incontinence.[5] The first case report describes an 8-month-old Pekingese bitch that presented with urinary incontinence and multiple urinary tract abnormalities, including left RA, bilateral ectopic ureters with a cranial blind-ending left ureter, and urinary bladder hypoplasia.[4] No treatment was elected for the urinary incontinence and a restricted protein diet was recommended for the presumed renal insufficiency. The second case report describes a 1-year-old, male, neutered, mixed breed dog that presented with urinary incontinence and had bilateral intramural ectopic ureters with right renal agenesis.[5]

Unilateral RA is usually an incidental finding (such as in our case report) and asymptomatic, unless the contralateral kidney is diseased.[4,5,8] Multiple ipsilateral congenital genitourinary abnormalities, as described in our case report, have been previously reported in dogs, cats and humans,[4,5,10–12] and can be explained by the development of the kidney, ureter and genital tract from embryonic structures that are in close relationship to each other (the mesonephric duct, ureteric bud and metanephric duct).[8,9]

Ectopic ureters and ureterocoeles are commonly associated with urinary incontinence in female dogs,[13,14] but are less commonly associated with urinary incontinence in male dogs.[15] The main other differential in juvenile male dogs is USMI. In this patient, the role of the anatomical abnormality could not easily be defined without treatment, as USMI is a diagnosis of exclusion. In male dogs, USMI has been associated with bladder neck position (intrapelvic vs. intra-abdominal) and neutering status.[16] It has been suggested that

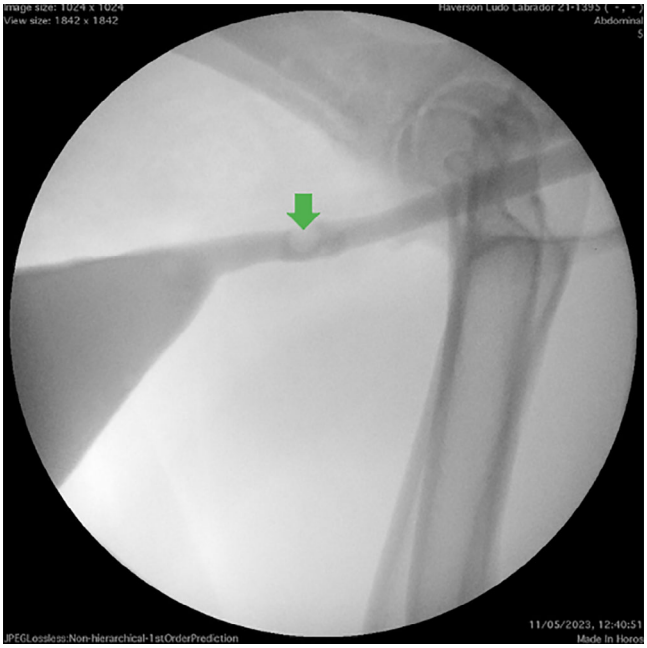

FIGURE 5 A retrograde sagittal urethrocystogram performed under fluoroscopy 8 weeks postoperatively demonstrating a cylindrical structure, measuring 3.9 mm in length, filled with a small amount of contrast agent.

the urinary bladder neck position is related to prostate size, with dogs with smaller prostates (i.e., neutered dogs) being more likely to have bladders in an intrapelvic location, which are more susceptible to increased intra-abdominal pressures, especially during recumbency. Furthermore, larger prostates are thought to compress the prostatic urethra, thereby increasing resistance to urine outflow.[16] This may explain why in our case report, urinary incontinence occurred 6 months following neutering. This may suggest that the EUR may have been an incidental finding (or at least not entirely contributing to the dog's clinical signs). Interestingly, the EUR was not detected in the patient during the first abdominal ultrasound. This may have occurred due to the lesion being not yet fluid filled.

Multiple imaging modalities, such as IV urography and positive-contrast retrograde urethrocystography, were essential in characterising the EUR in this case report. As mentioned previously, the EUR was initially thought to be contributing to the patient's clinical signs; however, the retrograde filling of contrast agent is unlikely to reflect normal urinary voiding; therefore, structures highlighted with retrograde urethrocystography require careful interpretation to determine their clinical significance.

In our case report, urinary incontinence did not improve with surgical removal of the EUR, and was thus assumed to be due to USMI (diagnosis of exclusion). Given the mild and intermittent nature of the incontinence in this patient, and the positive response to phenylpropanolamine, long-term medical management was considered appropriate. Other medical treatment options in male dogs include the use of testosterone cypionate; however, only 38% (3/8) of male dogs had a good to excellent response in one study.[17] Response of male dogs to medical management is poorer than their female counterparts, with the use of phenylpropanolamine in males resulting in a 44% good to excellent outcome[2] compared with 85%–89% good to excellent outcome in females.[18,19]

Surgical treatment options, such as an artificial urethral sphincter, will be considered should the incontinence worsen. In a similar case report describing a male neutered dog with urinary incontinence with a left ectopic ureter and a right ectopic ureteral remnant, the dog's urinary incontinence resolved with surgical correction, performing a left neo-ureterostomy and resecting the right ectopic ureter.[5] Another case report describes a male dog with urinary incontinence and a prostatic utricle, with an improvement of their clinical signs achieved with both removal of the prostatic lesion and a prostatopexy performed.[20] It may have been beneficial in our case to have performed a procedure such as a prostatopexy alongside the surgical resection of the EUR to address the underlying USMI.[21]

In summary, this is the first known case report describing ipsilateral EUR, RA and cryptorchidism in a male dog with urinary incontinence. Multiple ipsilateral genitourinary deformities should be suspected and potentially investigated in animals presenting with a urogenital developmental abnormality (or cryptorchidism). Ectopic ureters are less commonly associated with urinary incontinence in male dogs; therefore, other causes (such as USMI) should also be considered.

AUTHOR CONTRIBUTIONS

Ombeline McGregor provided diagnostic imaging evaluation. Fernando Constantino-Casas provided histopathological examination and diagnosis. Case management and surgery were performed by Laura Owen. Lavinia Economu wrote the manuscript. All authors were involved in writing and reviewing the final case report.

CONFLICT OF INTEREST STATEMENT

The authors declare they have no conflicts of interest.

FUNDING INFORMATION

The authors received no specific funding for this case report.

ETHICS STATEMENT

No ethical approval was required as this is a descriptive case report with no original research data. The authors confirm that the ethical policies of the journal, as noted on the journal's author guidelines page, have been adhered to.

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