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Received: 3 March 2026 | Revised: 24 September 2026 | Accepted: 6 October 2026

DOI: 10.1111/vsu.70169

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CASE REPORT

Laparoscopic-assisted treatment of giant urachal cyst in a female Dachshund

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Abstract

Objective: To describe the clinical features and successful surgical management of a giant, symptomatic urachal cyst (UC) in a dog using a laparoscopic-assisted approach without partial cystectomy.

Study design: Case report.

Animal: A 10-year-old, 4.6 kg, spayed female Dachshund.

Methods: The dog presented with urinary incontinence, pollakiuria, and abdominal distension. Computed tomography (CT) and cystography identified a 13-cm cystic lesion at the bladder apex without luminal communication. A laparoscopic exploration was initially attempted either for cyst resection, or for decortication combined with omentalization. Following percutaneous aspiration of the cyst, the lesion was dissected from the surrounding omental adhesion. Due to the inability to identify the course of both ureters and the indistinct anatomical margins between the cyst and the bladder, the procedure was converted to a mini-laparotomy. The cystic wall was readily separated from the bladder apex by blunt dissection and completely excised after circumferential incision at the external junction between the cyst and the bladder using a vessel sealing device. Following omentalization of the cyst resection site, the bladder was returned to its anatomical position within the peritoneal cavity.

Results: Postoperative recovery was uneventful. Transient apical bulging and discomfort during bladder distension were observed on postoperative cystography, attributed to a localized compliance mismatch between the denuded bladder wall and the stiffer, thermally coagulated region. Bladder capacity normalized by day 21 with a normal bladder silhouette. Histopathology confirmed a subserosal UC with no evidence of malignancy. The patient remained clinically well, and no recurrence was noted during a 20-month follow-up.

Jiyoung Park and Won-Jong Lee contributed equally to this study.

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Conclusion: Laparoscopic-assisted resection was an effective, minimally invasive treatment for the giant UC in this dog. Consistent with current human medical guidelines, simple marginal excision without partial cystectomy proved feasible and sufficient for a UC lacking luminal communication, regardless of lesion size.

1 | INTRODUCTION

The urachus is a fetal embryonic canal that connects the urinary bladder to the placenta, allowing urine to drain during development.[1–4] Normally, it involutes at birth and becomes a fibrous cord (median vesical ligament) linking the bladder apex to the umbilicus. When this regression is incomplete, the remnant results in various urachal anomalies (UAs).[1,5]

UAs are classified into four types based on their anatomical relationship with the urinary bladder and the umbilicus, as well as the presence and extent of luminal patency: urachal diverticulum (vesicourachal diverticulum, UD), urachal cyst (UC), patent urachus, and urachal sinus.[1,4,6] UDs occur when a portion of the urachus at the bladder apex fails to close, resulting in a blind-ended outpouching that extends either intra- or extra-luminally.[1] In contrast, a UC develops when a focal segment of the urachus remains patent while both the cranial and caudal ends close, leaving no communication with either the umbilicus or the bladder lumen.[1,5] Continuous secretion from the epithelium of this isolated segment leads to cyst formation, which may become secondarily infected later in life, potentially mimicking an abscess.[5]

Although UAs are considered an uncommon congenital condition, UDs are the most frequently reported type in both dogs (89.5%[1] and 97%[6]) and cats (96.7%).[1] However, because many dogs with UAs remain asymptomatic, the majority of cases are diagnosed incidentally,[1] meaning the true prevalence may be underestimated. In a study by Groesslinger et al. involving 50 dogs euthanized for unrelated reasons,[2] UAs were identified in 36%, all of which were UDs except for a single UC. In human medicine, the incidence of UAs is reported to be approximately 1 in 5000–8000 live births.[7]

UAs can increase the risk of recurrent urinary tract infections by promoting urine retention and incomplete emptying during voiding. This may be related to alterations in bladder positioning; specifically, the attachment at the cranial apex can displace the bladder ventrally and cranially, thereby potentially impairing efficient urinary drainage.[6] In addition, 31% of dogs with UAs were reported to present with urolithiasis sediment.[1] Consequently, the most common clinical signs include stranguria, hematuria, and urethral obstruction, while non-specific signs include umbilical discharge, pyrexia, abdominal pain, and acute or recurrent localized infections.[8]

In humans, UAs are most frequently confirmed via ultrasonography (90.6% of studies), followed by CT (40.6%) and voiding cystourethrogram (34.4%).[8] Conversely, a previous study evaluating 33 dogs with UAs reported diagnostic detection rates of 18% for ultrasonography, 55% for positive-contrast cystography, and 89% for cystoscopy, establishing the latter as the most reliable technique.[6] However, this distribution likely reflects the specific study population, in which 32 of the 33 cases were UDs of varying sizes—including lesions that were too small to grossly visualize during laparotomy—and only one case was a cyst. Furthermore, five UCs described by Perondi et al. were ultrasonographically characterized as small (0.2–0.5 cm in diameter), well-defined, round, anechoic structures with smooth, regular, and hyperechoic thin walls, located cranial to the bladder apex.[1]

Regarding the management of UAs in human medicine, surgical options range from traditional open surgery to minimally invasive laparoscopic or robotic procedures, with or without bladder cuff resection.[7,8] However, controversy persists over whether prophylactic surgery should be performed in all patients, including those with incidental findings.[7] Nogueras et al. reported the usefulness of a conservative approach in 13 children (10 cysts and 3 fistulas; 4 incidental findings, and 9 symptomatic UAs, including 7 infected cases).[7] Spontaneous regression was observed in eight patients (61.5%); however, two of the six patients with infected UCs managed with antibiotics ultimately ended up requiring surgical intervention due to reinfection. In another review on pediatric UAs, 20 patients (including 14 with UCs) were converted from conservative to surgical management owing to recurrent symptoms, with infection being the most common reason; conversion rates ranged from 13% to 44% across the reviewed studies.[8] Authors who advocate for the systematic excision of urachal lesions do so to prevent infection, reinfection, or potential malignant transformation in adulthood.[7]

To date, in dogs and cats, open surgical resection appears to be the most commonly reported treatment for UAs.[3,4,6,9–13] Partial cystectomy—traditionally performed for UAs as a wide resection encompassing the bladder

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cuff or dome— was concurrently executed in most patients regardless of the presence of infection or malignancy; notably, the majority of these cases were UDs,[6,9,10,13] with the remainder consisting of one UC,[6] two cases of patent urachus,[11,12] and one urachal adenocarcinoma arising from an intraluminal bladder mass in an 8-year-old Labrador Retriever.[14]

This case report describes a giant, symptomatic UC in a dog that was successfully treated using a laparoscopic-assisted approach without bladder cuff resection. Herein, the clinical course—including the diagnostic workup, surgical management, and long-term outcome—is detailed.

2 | MATERIALS AND METHODS

A 10-year-old, 4.6 kg spayed female Dachshund was referred for urinary incontinence, pollakiuria, and dribbling. The dog also exhibited anorexia, abdominal distension, and reluctance to move. According to the owner, a duplicated bladder had been suspected during total mastectomy and ovariohysterectomy performed 3 years prior for a mammary gland tumor. The exact duration of clinical signs was not precisely determined as the owner suspected these symptoms to be secondary to canine cognitive dysfunction syndrome. The referring veterinarian reported erythema and edema of the urethral orifice and vulva, secondary to multiple difficult attempts at urinary catheterization.

No remarkable abnormalities were identified on blood examination from the referring hospital including complete blood count, serum chemistry, and electrolytes. Three-view plain abdominal radiographs revealed a large soft tissue opacity occupying most of the caudal abdomen (Figure 1A). Ultrasonography identified a thin-walled cystic structure containing echogenic fluid located cranial to and separate from the urinary bladder (Figure 1B). Retrograde cystography, performed using both conventional radiography and contrast-enhanced computed tomography, demonstrated that the lesion was continuous with the bladder apex; however, no direct communication with the bladder lumen was identified (Figure 1C,D). Due to its significant size (13 cm in diameter), the bladder was severely compressed with the steeply stretched and tapering bladder lumen at the lateral junction between the cyst and the bladder in a circumferential manner (Figure 1D).

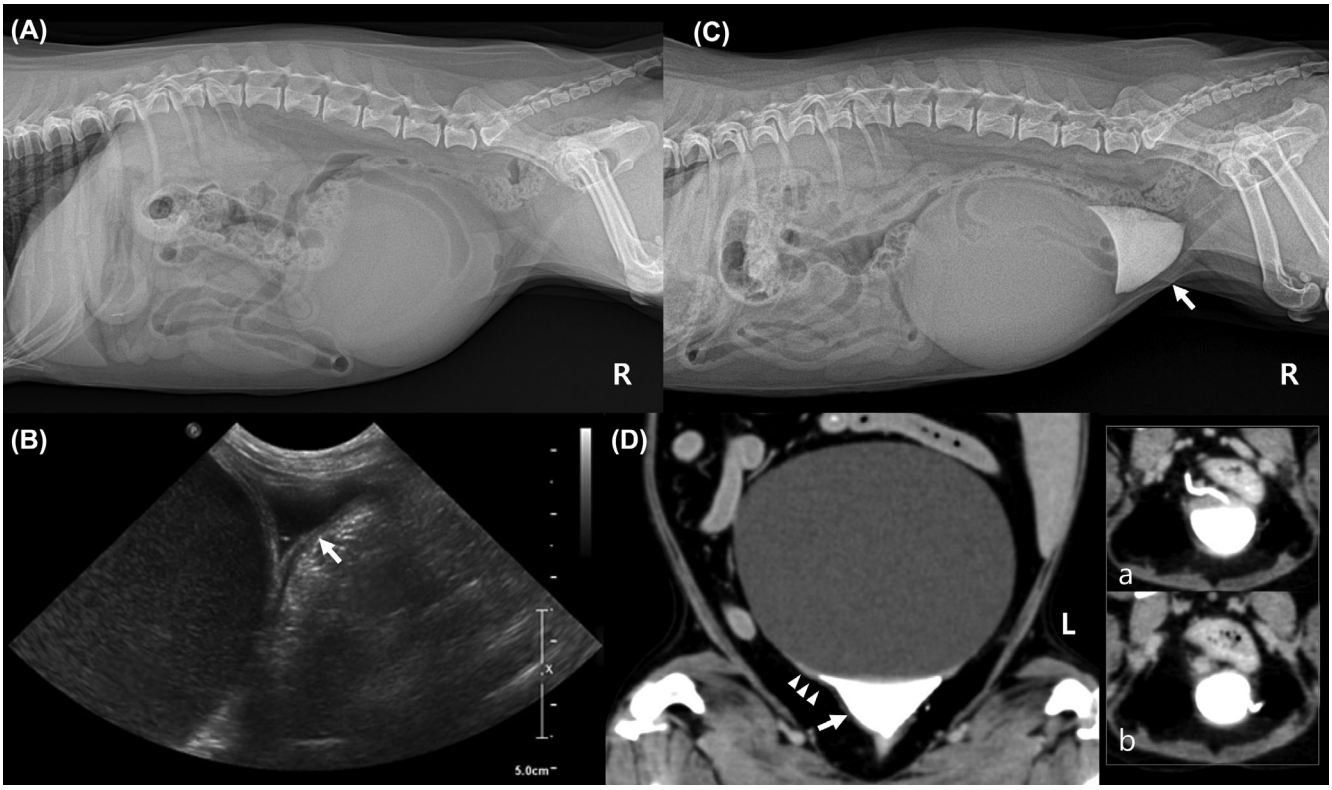


FIGURE 1 Preoperative diagnostic images of a urachal cyst in a dog. (A) A giant soft tissue opacity mass on plain abdominal radiography. (B) A cystic lesion identified on ultrasonography. (C) Identification of a mass showing no communication with the urinary bladder on positive contrast cystography. (D) A cystic mass causing severe compression of the urinary bladder on computed tomography (inset: rotational displacement of the ureteral insertion sites; a, right ureter; b, left ureter). Arrows, urinary bladder; arrowheads, steeply stretched and tapering bladder lumen at the lateral junction between the cyst and the bladder (indicating the right side only).

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However, the actual junction between the compressed urinary bladder and the cyst was difficult to delineate, which may have led to its underestimation even with contrast-enhanced retrograde cystography. With the ureters coursing dorsally to the lesion, the abnormal position of their insertions into the bladder led to the suspicion of a right-sided rotation; no renal pelvic dilation was observed. No further remarkable findings of malignancy within the lesion or invasion into the bladder and remaining abdominal organs were identified.

Based on these imaging findings, a tentative diagnosis of UC was made. Laparoscopic exploration was attempted under general anesthesia, with surgical options moving forward including either (1) cyst resection or (2) decortication and omentalization, contingent upon whether the UC was separable from the bladder to preserve the bladder wall.

The laparoscopic tower was positioned at the end of the patient's hind limbs. Using a three-portal approach (Figure 2), the first 10-mm camera port was placed on the ventral midline, at one-sixth of the distance between the xiphoid process and the pubis. The second and third 5-mm instrument ports were established bilaterally in the paramedian regions, at the cranial third of the distance between the first port and the pubis.

Upon exploration of the abdominal cavity (Figure 3), the giant cyst was found to be fixed and minimally mobile within the abdominal cavity, adhering to the surrounding omentum and ventral abdominal wall. At an intra-abdominal insufflation pressure of 10 mmHg, working space was insufficient. Percutaneous aspiration of the cyst was performed to improve visualization using a 22-gauge spinal needle under laparoscopic visualization. After aspiration of 100 mL of white, turbid fluid, the cyst was meticulously dissected from the surrounding adhesions to the omentum and ventral abdominal wall using a J-hook and an electrothermal bipolar vessel sealing device (LigaSure, Medtronic, USA), while maintaining its spherical configuration. No obvious umbilical connection was identified. Following a stab incision with a laparoscopic scissor, the cyst was completely evacuated (>200 mL). Subsequently, 15 mL of urine was aspirated via the pre-placed urinary catheter, and the bladder was easily distended with up to 100 mL of sterile saline. After complete evacuation of the infused saline, the demarcation between the cyst wall and the bladder wall remained indistinct on the external surface macroscopically. Ureteral tracing was also unclear, prompting conversion to a 2-cm mini-laparotomy cranial to the pubis, followed by bladder exteriorization (Figure 4). The bilateral ureteral insertions were then identified, confirming that the cystic lesion was not associated with the ureters.

The cranio-lateral side of the cyst wall was incised longitudinally down to the lateral junction between the

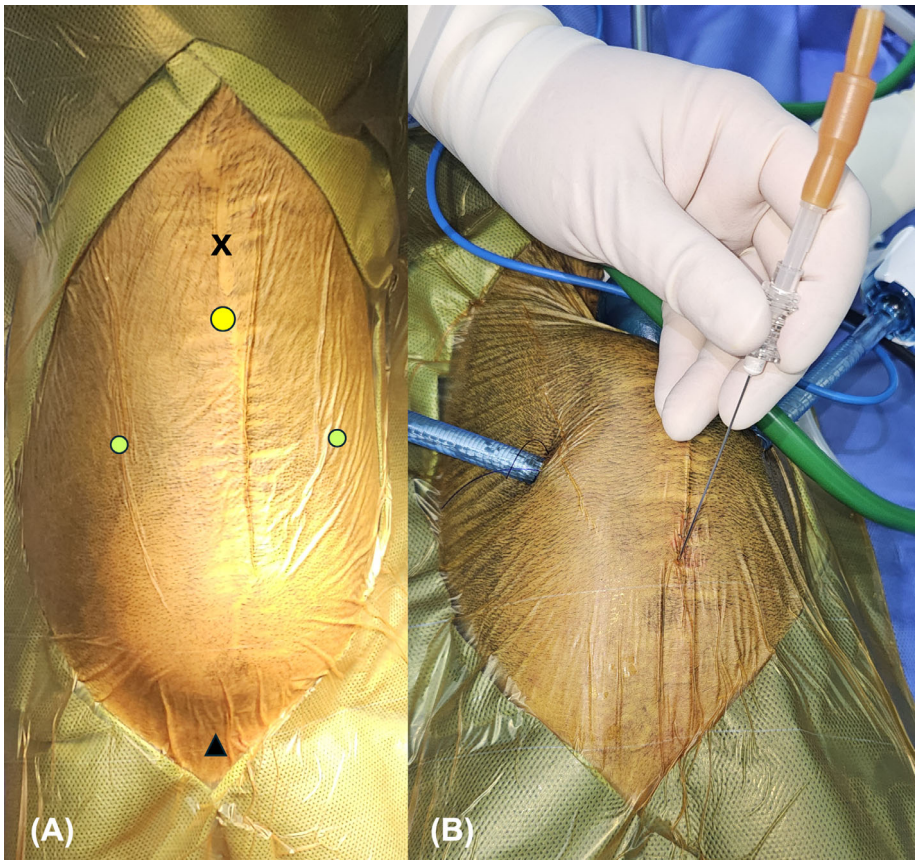


FIGURE 2 Overhead views showing portal placement for laparoscopic exploration of a giant urachal cyst in a dog. (A) Locations of one 10-mm camera port (yellow circle) and two 5-mm instrument ports (small yellow-green circles); note the silhouette of the enlarged cystic lesion in the caudal abdomen before insufflation. (B) Portal placement and aspiration of the cyst following insufflation. X, xiphoid process; triangle, pubis.

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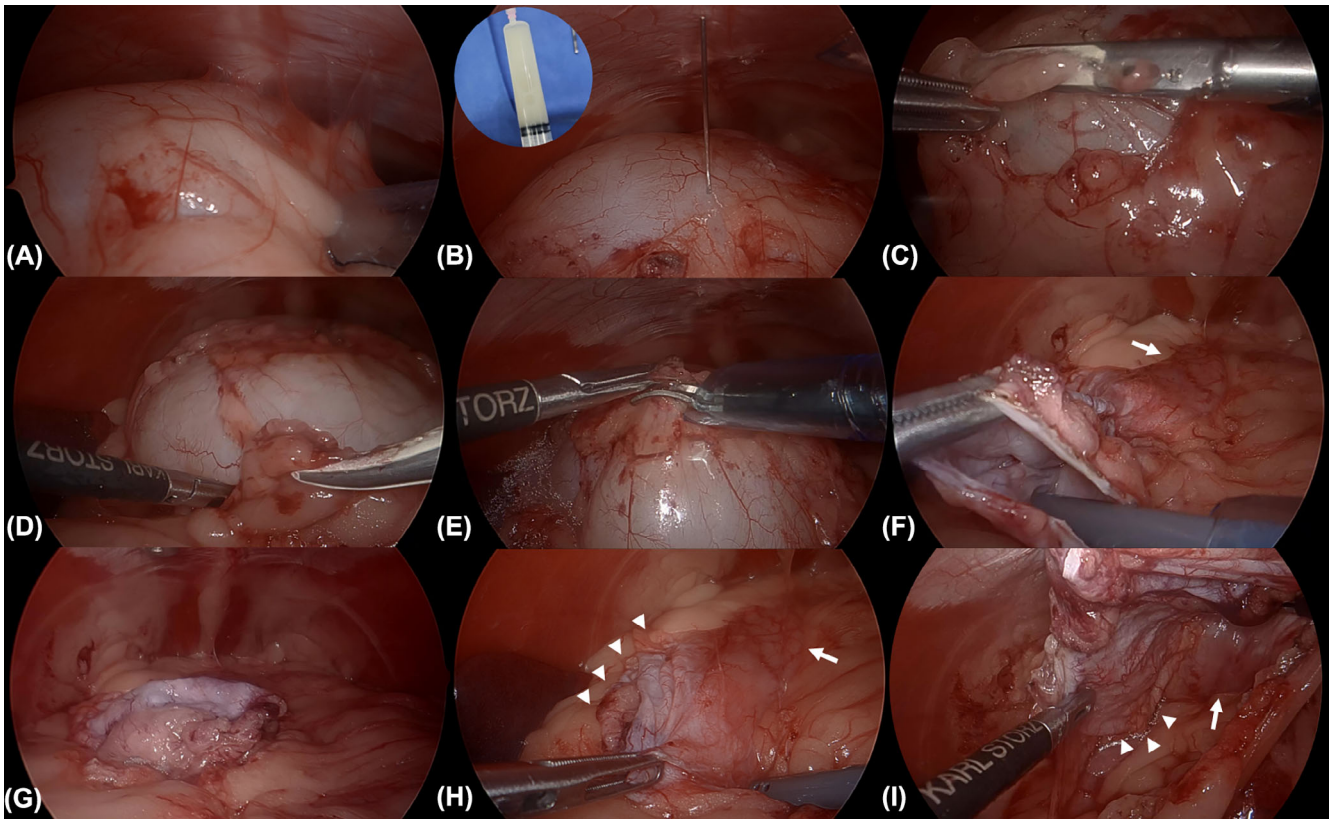


FIGURE 3 Laparoscopic images of surgical treatment of urachal cyst in a dog. (A) A giant cyst adhered to the ventral abdominal wall and surrounding omentum, (B) Decompressed cyst following percutaneous aspiration (inset: non-infected creamy turbid aspirate). (C, D) The cyst being dissected from the omentum using vessel-sealing device (E, F) stab incision followed by complete aspiration, (G, H, I) cranial, ventral, and dorsolateral views of the collapsed cyst and the bladder, showing an ambiguous junctional boundary of the external wall. Arrows, urinary bladder; arrowheads, cyst wall.

cyst and the bladder. Then, the thin, semi-transparent, and distensible layer of its caudal wall was identified and readily separated from the bladder apex along a distinct plane. Following the completion of simple blunt dissection of the caudal cyst wall adherent to the bladder, the remaining lateral wall of the lesion was completely excised via circumferential resection using the LigaSure device at the vesicocystic junction. After omentalization at the exposed bladder apex, the bladder was returned to the abdominal cavity. Following peritoneal lavage, an active, closed-suction drain (Barovac, Sewoon Medical, Korea) was placed preemptively to evacuate residual lavage fluid, which was difficult to completely aspirate, and to monitor for potential urine leakage, although such leakage was considered highly unlikely. Incision sites were routinely closed and infiltrated with bupivacaine. Urinary catheterization was also maintained postoperatively to promote healing of the bladder apex by preventing bladder distension, and to provide urinary diversion, thereby alleviating the dysuria, discomfort, and irritation caused by the pre-existing urethral edema and inflammation.

3 | RESULTS

The patient recovered uneventfully, with improved activity and appetite. No contrast leakage was identified during postoperative cystography. However, following the instillation of approximately 20 mL of contrast medium, the bladder silhouette was not uniformly rounded. Instead, as the infusion volume increased, a focal cranial protrusion beyond the expected contour was observed at the site previously in contact with the cyst, resulting in an apical bulging appearance (Figure 5A). During the infusion, the patient initially tolerated the early stage well, but displayed signs of aversion toward the end of the procedure.

While the patient was hospitalized for 5 days due to postoperative gastroenteritis secondary to suspected foreign bodies, normal urination was observed after the urinary catheter was removed on postoperative day (POD) 2. Bacterial culture of the cystic fluid was negative. A definitive diagnosis of UC was established based on histopathological findings of a urothelial lining with thin smooth muscle and fibrovascular/collagenous connective

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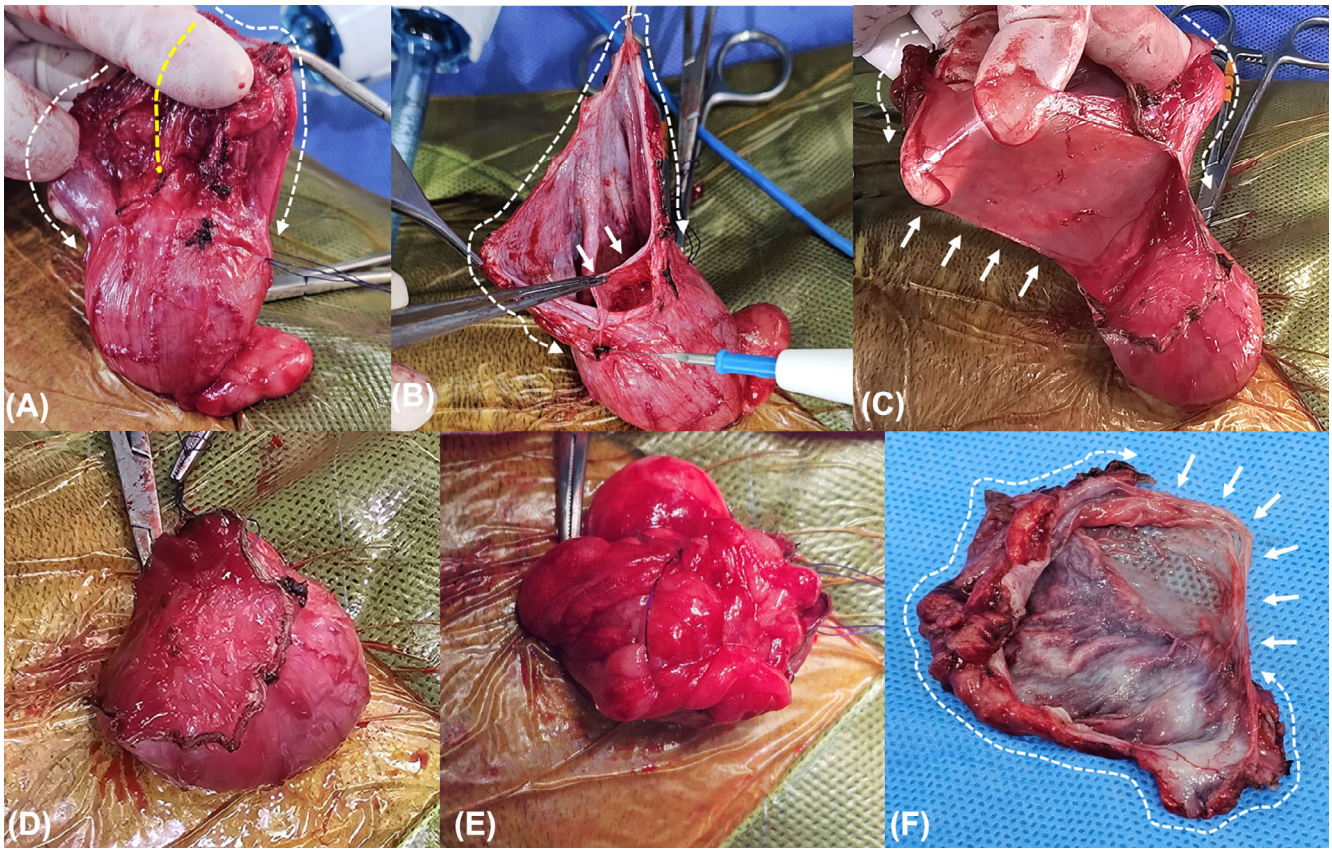


FIGURE 4 Intraoperative images following conversion to mini-laparotomy for urachal cyst resection in a dog. (A) A collapsed cyst continuous with the bladder prior to a longitudinal incision (yellow dashed line) into the craniolateral wall of the cyst. (B) A distinct dissection plane between the cyst and the bladder, allowing for effortless peeling of the cyst wall. (C) A semi-transparent, thin layer of the caudal part of the cyst wall dissected from the bladder apex. (D) The urinary bladder following complete en bloc resection of the cyst, displaying a circumferential band of thermal coagulation induced by an electrothermal bipolar vessel-sealing device at the site where the serosa of the cyst wall merges with the lateral aspect of the bladder wall. (E) The bladder apex after omentalization and (F) the resected cyst. White dashed arrows, the cranial and lateral walls of the urachal cyst that were not associated with the urinary bladder apex; white arrows, the caudal wall of the urachal cyst adhered to and dissected from the bladder apex.

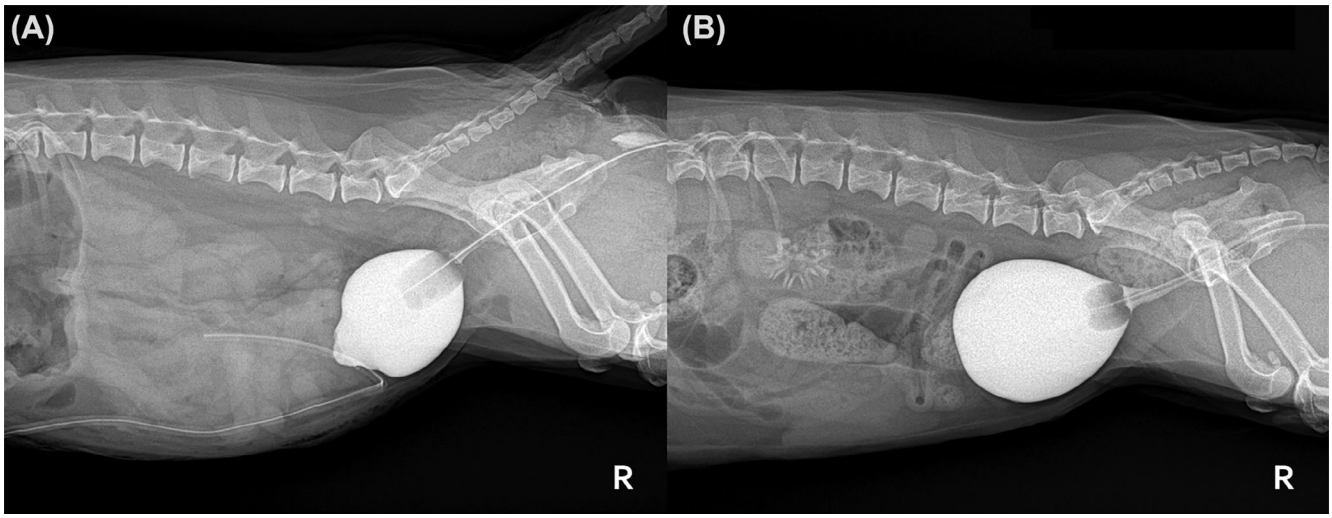


FIGURE 5 Positive contrast cystography images after laparoscopic-assisted marginal resection of a subserosal urachal cyst in a dog. (A) Immediately after surgery, showing a focal cranial protrusion and apical bulging at the surgical site after the instillation of 20 mL. (B) At 21 days postoperatively, showing a normalized bladder capacity and a rounded silhouette after the instillation of 50 mL.

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tissue, with no evidence of malignancy. The caudal region of the cyst wall dissected from the bladder apex exhibited a urothelial lining only. In contrast, the cranial and lateral aspects of the cyst wall not associated with the dissection were variably surrounded by adipose tissue or a serosal layer featuring reactive fibrovascular granulation tissue with scattered hemosiderophages, hemorrhage, fibrin, and mild perivascular infiltrates of lymphocytes and plasma cells. The lining mesothelial cells were often attenuated or inconspicuous, with small regions of mildly reactive or hypertrophic mesothelial cells. Based on these findings, the lesion was consequently considered to be a UC originating from the subserosal area of the bladder apex wall.

The patient regained a good appetite and returned to normal activity levels. Bladder capacity and contour gradually normalized (Figure 5B), reaching 50 mL by POD 21 without signs of pain or discomfort during distension. The owner reported an increased voiding volume and the resolution of urinary signs, including pollakiuria. The patient remained clinically well for at least 20 months following surgery.

4 | DISCUSSION

While UCs are recognized as the most prevalent type of UA in human medicine,[8,15] they are infrequently reported in dogs and cats. In the present case, a large soft tissue opacity lesion at the urinary bladder apex was presumptively diagnosed as a giant UC without luminal communication with the bladder using preoperative ultrasonography and contrast cystography, which was subsequently confirmed with postoperative histopathology. Differential diagnoses such as a urinary bladder duplication cyst or subserosal inclusion cyst were successfully ruled out based on the location of the lesion, surgical findings, and the presence of a urothelial lining on histopathology. Because the urachus and the urinary bladder are fundamentally continuous structures during embryonic development, it remains uncertain whether a urachal anomaly and the bladder would consistently maintain anatomically distinct serosal layers if a remnant persists. However, the granulation tissue with chronic reactive changes in the serosal layer of the UC observed in this case may be due to chronic friction, irritation, and increased intraluminal pressure driven by the gradual expansion of the cyst to its current massive size.

UCs are clinically important because of their potential complications. The most frequently reported complication associated with UCs in humans is infection; however, others such as progressive enlargement, calculus formation, intracystic hemorrhage, enteric fistula, bowel obstruction, urinary tract infection, Reiter's disease, and malignant transformation have been reported as well.[7,16] The urachal infection typically results from bacterial migration from the umbilicus, most commonly involving *Staphylococcus aureus*.[7,16] Peritonitis and sepsis can be induced by intraperitoneal perforation and rupture of infected UCs.[17–19] In the present case, the non-infected UC presented with urinary signs associated with decreased bladder capacity and non-specific signs of abdominal discomfort, which were likely attributable to the mass effect of a space-occupying lesion. The patient recovered without further clinical signs following surgical correction.

Traditionally, symptomatic urachal remnants have been managed by open, wide local excision of the entire urachal tract, extending from the umbilicus to the bladder apex, including a cuff of bladder tissue.[20] This strategy has been advocated in light of reported rates of recurrent infection exceeding 30% and the potential for malignant transformation in residual tissue.[20] However, there is no clear consensus regarding the necessity of routine bladder cuff resection. Mesrobian et al. reported favorable outcomes following open surgery for UAs without bladder communication (including 9 UCs and 9 urachal sinuses) performed without cuff resection.[21] Subsequently, it has been suggested that routine resection of a bladder cuff during excision of UAs may be unnecessary. en bloc.

Instead, bladder cuff or partial cystectomy is generally reserved for cases involving an adherent UA attached to the bladder dome with demonstrable communication between the cyst and the bladder, particularly when confirmed by imaging, or when urachal carcinoma is suspected.

[15,22] In line with this evolving approach on surgical dose, laparoscopic techniques have been increasingly utilized safely and effectively, offering reduced invasiveness and lower morbidity,[15,20,22,23] even in cases of adenocarcinoma accompanied by partial cystectomy.[23,24]

In laparoscopic colorectal or gynecologic surgeries in human medicine, several techniques have been used to identify the ureters and prevent iatrogenic damage, including cystourethroscopic light guidance, preoperative ureteral cannulation, and real-time visualization via fluorescent ureterography under near-infrared fluorescence with intra-ureteral indocyanine green administration.[25,26] Furthermore, pudexacianinium, an indocyanine green derivative that is excreted into the urine, can be administered via intravenous injection.[27] In the present case, without the aid of these techniques, the elusive visualization of the ureteral course proved unexpectedly challenging during the procedure. Furthermore, determining the precise resection margin to preserve the bladder wall while removing the extensive lesion was also difficult. Intraoperative cystoscopy under laparoscopic visualization could have provided light guidance for demarcating the external junction between the cystic wall and the

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bladder on the lateral aspect of the UC-bladder complex. However, it still would have limited utility in confirming the complete removal of the urachal remnant or evaluating intraluminal involvement, given the lack of communication with the bladder lumen by definition. Consequently, the procedure was converted to an open surgery to facilitate manual palpation, allowing for the complete excision of the remnant tissue without incising the bladder cuff.

A partial cystectomy remained a possible intraoperative conversion option depending on laparoscopic findings and ability to safely marginally resect the UC, but it was not prioritized owing to the massive size of the lesion. Nonetheless, even if the associated bladder wall had been extensively resected, the long-term impact on bladder capacity and function would likely have been negligible theoretically; as clearly demonstrated in Figure 3, the resection would have been restricted to within 40% of the total volume—a range from which canine models generally recover baseline storage capacity within 10 months.[28] However, such an aggressive resection would inevitably increase intraoperative hemorrhage and invasiveness if performed via an open approach without a stapling device. In this patient, although a partial cystectomy was not ultimately performed, the bladder still required an adaptive recovery period to restore its normal wall distensibility and overall capacity. This was presumably due to the chronic compression exerted by the massive lesion, coupled with mechanical manipulation during cyst wall dissection, which temporarily compromised bladder function.

Conversely, an alternative initial plan of decortication combined with omentalization—techniques previously utilized for renal[29] or paraprostatic[25] cysts—might have simplified the procedure for this non-infected cyst and yielded a similar favorable outcome. However, this approach would have fundamentally violated the surgical principle of complete excision of all urachal remnants. Whether any urachal remnant remains in this case following resection with bladder wall preservation could theoretically be confirmed through a histopathologic examination of the remaining bladder wall, which was not performed owing to the marginal nature of the excision. Nevertheless, complete removal and subsequent cure was suspected due to the en bloc nature of the resection of the UC without tearing or fragmentation, absence of any infiltration or subsidiary microcysts on histopathology, and the lack of recurrence in the follow-up period.

Upon retrospective evaluation of the surgical execution, cyst dissection could have been entirely feasible as a purely intracorporeal laparoscopic procedure as dissection was ultimately easier than anticipated. Additionally, there was a safe and adequate distance between the ureteral insertion and lesion. However, given the novel nature of the laparoscopic approach in this case and to minimize iatrogenic injury and maximize patient safety, conversion to a mini-laparotomy was elected. After conversion, direct visualization and manual palpation of the lateral junction of the UC-bladder complex margin offered less additional clinical benefit than expected. Instead, the most critical intraoperative finding occurred upon making a simple longitudinal incision into the emptied cyst wall, which allowed us to visually confirm that the bladder apex and the cyst wall were merely loosely apposed. In the present case, this longitudinal incision unexpectedly yet significantly facilitated the identification of a clear dissection plane between the lesion and the bladder. Hence, if this incision had been attempted intracorporeally prior to conversion—combined with fluid distension, which was previously used only to verify bladder volume and extensibility—we believe that the entire procedure could have been successfully completed laparoscopically without the need for open surgery. This approach likely would have enabled intracorporeal cyst dissection without bladder rupture. Indeed, preoperative bladder catheterization is a simple yet crucial maneuver in human medicine that facilitates dissection by allowing intraoperative control of bladder distension as required under direct laparoscopic visualization.[15]

Moreover, assuming the bladder tissue maintained its elasticity without fibrotic changes, the abnormal bladder configuration, including the stretched and tapering corner, was likely resolved once the UC was opened and the pressure on the bladder was relieved. Furthermore, even if the bladder had been inadvertently opened during dissection, it could have been readily managed with primary closure using intracorporeal suturing or stapling according to the degree of the opening. Conversely, from the perspective of lesion dissection alone, rather than completely opening and draining the UC as in our case, maintaining a reduced size via aspiration while preserving some degree of the lesion's shape might facilitate dissection during marginal resection. However, this would only be possible if the distinct boundary between the two structures to be separated was clearly identified, which was not the case in the present patient with a massive UC.

Nonetheless, this finding on the anatomical relationship between the UC and the bladder could be limited to the present case featuring a subserosal lesion, warranting further case accumulation regarding the degree and nature of adherence between the walls of these two structures, specifically whether they are loosely apposed or tightly adhered.

The focal cranial protrusion and apical bulging observed during postoperative cystography could potentially be attributed to non-homogeneous biomechanical alterations of the bladder wall at the surgical site. The

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intensive dissection of the massive UC likely led to partial-thickness denudation of the bladder wall including the serosal lining, which may have resulted in a localized area of diminished structural integrity, although this was not evaluated histopathologically. In contrast, the concurrent use of an electrothermal bipolar vessel sealing device induced thermal coagulation and collagen cross-linking, which likely transformed the previously pliable bladder wall into a stiffer, less compliant region.[30,31] These combined factors presumably created a compliance mismatch between the potentially weakened, denuded site and the stiffer, thermally coagulated region. Consequently, as the bladder was distended with contrast medium, this disparity in wall elasticity likely prevented uniform expansion, manifesting as an abnormal silhouette and eliciting signs of discomfort due to the concentration of mechanical tension on the more compliant apical region. As demonstrated in the present case, these biomechanical alterations likely resolve over time as the tissue undergoes remodeling. The surgical site was reinforced with omentalization to facilitate the healing process and provide a physiological scaffold for the affected area, leveraging the omentum's well-documented capacity for promoting angiogenesis and tissue remodeling.[32] This approach fundamentally differs from the objective of omentalization in conventional decortication, which primarily aims to provide continuous physiological drainage of cystic lesions.

A previous report described a non-infected UC masquerading as pyometra in a Pit Bull.[4] However, unlike the present case, the cyst in that report existed as an entirely separate entity from the bladder. Notably, it completely lacked both the direct physical contact and the adhesion between the cystic body and the bladder wall that were characteristically observed in our case, while also lacking luminal communication. Instead, this tubular, blind-pouch cyst was only loosely attached to the bladder apex via fibrous connective tissue—presumably representing a closed caudal urachal end. When considered alongside the findings in our case, this could indicate that the anatomical relationship with the bladder, including its relative location and degree of adherence, varies depending on the specific anatomical level along the bladder-to-umbilicus axis where the UC developed. Consequently, a partial cystectomy was also not required in that case; the lesion was easily removed via simple ligation and transection of the stalk-like connecting tissue at the bladder apex. Similarly, further information regarding whether the urachal remnant between the cyst and bladder was entirely removed was also unavailable in that case.

This report illustrates successful laparoscopically assisted resection of a giant subserosal UC that was loosely adherent to the bladder apex, providing effective resolution and significant improvement in urinary function and quality of life through a minimally invasive approach with a meticulous and complete dissection. While the primary limitation of this report is its focus on a single case, it successfully demonstrates that simple marginal excision without bladder cuff resection may be a feasible and sufficient treatment for UCs lacking luminal communication, consistent with findings in human medicine. Total laparoscopic surgical removal and resolution of clinical urachal abnormalities should similarly be explored in the future to possibly offer a more tailored and less invasive surgical approach. Nevertheless, to minimize surgical invasiveness and ensure optimal recovery, we emphasize the importance of early intervention before the progression of lesions and exacerbation of clinical symptoms occur.

AUTHOR CONTRIBUTIONS

Park J, DVM, PhD: Lead surgeon, writing – original draft, review and editing, figure image preparation. Lee W, DVM, PhD: Data collection, case management, writing – review and editing. Jeong J, DVM, PhD: Writing – review and editing. Lee H, DVM, PhD: Writing –review and editing. Jeong SM, DVM, PhD: writing – review and editing. Kim D, DVM, PhD: Writing – review and editing.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest related to this study.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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How to cite this article: Park J, Lee W-J, Jeong J, Lee H, Jeong SM, Kim D-H. Laparoscopic-assisted treatment of giant urachal cyst in a female Dachshund. *Veterinary Surgery*. 2026;1-10. doi:10.1111/vsu.70169

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