DOI: 10.1002/vms3.568

CASE REPORT

WILEY

Laparoscopic-assisted cutaneous ureterostomy in a canine patient with prostatic carcinoma

Giovanni Allevi[1] | Carlotta Spediacci[2] | Elena Marchesi[1] | Marco Trovatelli[2]

[1] Ospedale Veterinario Città di Bergamo, Bergamo, Italy

[2] Department of Veterinary Medicine, Università degli Studi di Milano, Milano, Italy

Correspondence
Giovanni Allevi, Via Vittore Ghislandi, 26/A, 24125, Bergamo, Italy.
E-mail: g.allevi73@gmail.com

Abstract

A 9-year-old neutered male Dachshund dog was assessed for stranguria. An enlarged prostate was identified on physical examination, and a diagnosis of prostatic carcinoma confirmed by cytology. Due to a neoplastic lower urinary tract obstruction, palliative surgical urinary diversion treatment was performed with laparoscopic assisted cutaneous ureterostomy (LACU). The dog recovered well without any major complications. Adjuvant chemotherapy was maintained and continued for post-surgical medical therapy. This report describes a novel minimally invasive assisted technique in canine patients for palliative treatment of prostatic neoplasia.

KEYWORDS
canine, laparoscopy, neoplasia, palliative, prostate, tumour

1 | INTRODUCTION

Prostatic carcinoma is a malignant prostatic tumour with a prevalence of 0.2–0.6% in the canine population (Ravicini et al., 2018) with an increased risk of development in neutered male dogs (Bryan et al., 2007).

Treatment options include partial or complete prostatectomy (Bennett et al., 2018), chemotherapy (Ravicini et al., 2018), radiation therapy, and photodynamic therapy (Walz et al., 2019).

Local invasion is a common finding with prostatic neoplasia due to late diagnosis which results from the non-specific clinical signs. In cases with significant invasion, the patient can present with urethral occlusion (Bennett et al., 2018).

Urinary diversion is a palliative surgical option aimed at treating neoplasia-associated lower urinary tract complications (Bennett et al., 2018), traumatic injuries (Boothe, 2000), or severe lower urinary tract dysfunction (Hu et al., 2016). To our knowledge, there are no previous reports of surgical management via laparoscopic assisted cutaneous ureterostomy (LACU) in veterinary literature.

This case report describes the palliative surgical procedure of LACU in a Dachshund with a diagnosis of prostatic carcinoma and reports the medium term outcome.

2 | CASE HISTORY

A 9-year-old spay male Dachshund weighing 8.6 kg was brought to a primary care clinic for dysuria and haematuria. The patient was referred to the Ospedale Veterinario Città di Bergamo (Bergamo, Italy) for a second opinion 15 days after the initial presentation to the referring veterinarian.

Physical examination revealed with rectal examination a firm, enlarged and irregular prostate with partial compression of the rectal lumen. Complete blood count and biochemical profile were performed resulting in mild thrombocytosis of 426 × 10ş/μL (reference range, 240 to 400 × 10ş/μL), increased alkaline phosphatase activity of 143.89 U/L (reference range, 16–119 U/L) and biochemical urinary profile of creatinine 1.3 mg/dL (reference range, 0.5–1.5 mg/dL) and urea 55 mg/dL (reference range, 20–60 mg/dL).

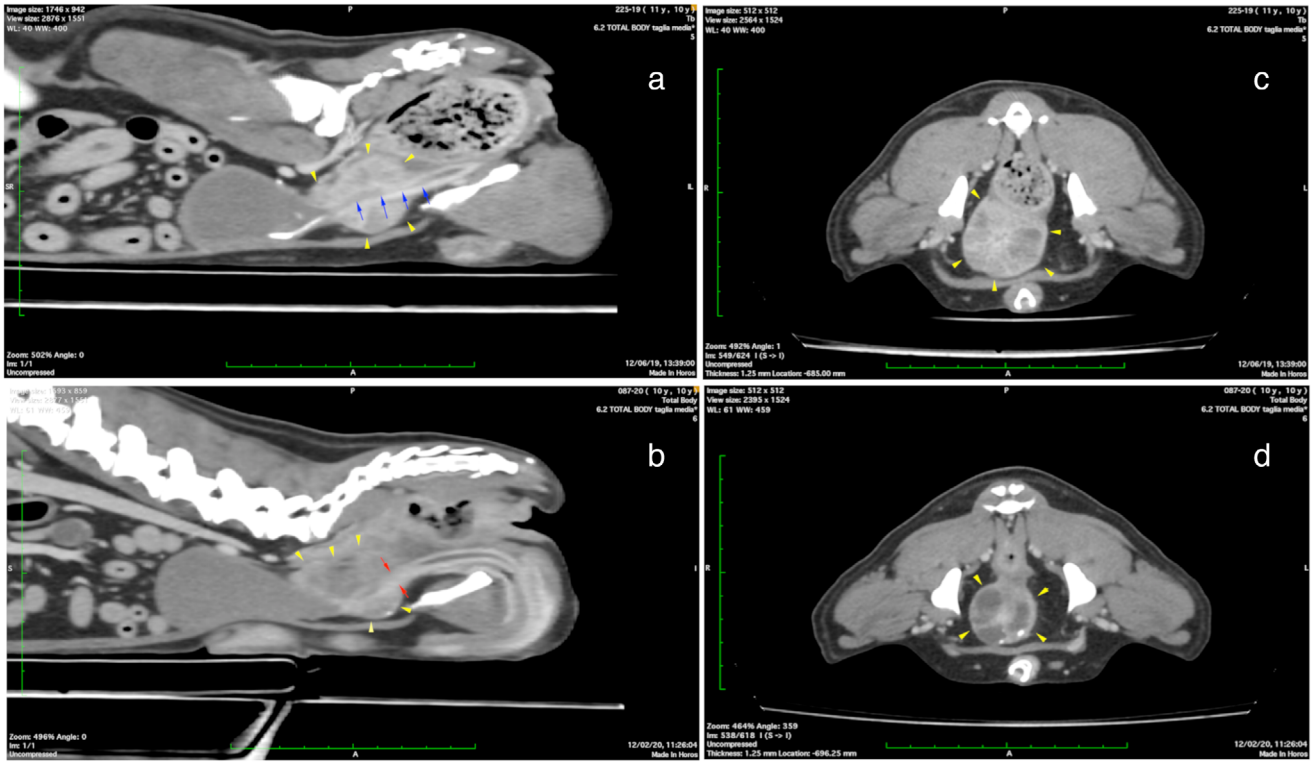

FIGURE 1 Post-contrast computed tomography (CT) scan, multiplanar sagittal reconstruction and transverse section of the first CT scan (a and c), multiplanar sagittal reconstruction and transverse section of the control CT scan (b and d). The prostate gland shows marked increase in volume and heterogeneous enhancement (yellow arrowheads) with multiple dotted calcifications in (d). The prostate contracts close relation with the bladder and the ventral wall of the rectum. In (a), urethral patency (blue arrows) is visible; in (b), a compression of the pelvic urethra caused by the prostatic enlargement is detectable (red arrows)

Abdominal ultrasound examination revealed mild dilatation of the left renal pelvis of 4.2 mm and a prostatic enlargement of 3.4 × 2.6 cm (extending to the region of the trigone and obliterating the left ureterovesical junction). Mild lymph nodes enlargement in association with ventral compression and subsequent dorsal displacement of the rectum caused by prostatic alteration and compression of urethra caused by prostatic changes was also noted. Moderate enlargement of the left medial iliac and sacral lymph node with lively and heterogeneous enhancement was observed. Ultrasound needle aspiration of the prostate and the left medial iliac lymph node were consistent with malignant epithelial neoplasia. Examination of the left medial iliac lymph node showed a finding of malignant epithelial neoplasia.

Computed tomography (CT) examination (Figure 1a–c) aimed at staging the pathology was performed (Toshiba Asteion, 4 CT Scanner, Toshiba). Imaging study confirmed prostate gland enlargement (size 3 cm width × 2.5 cm height × 3 cm length) and dorsal deviation of the rectum. The gland parenchyma was characterised by a heterogeneous density due to the presence of multiple central hypoattenuating, rounded, confluent areas (maximum size 3 cm width × 2.5 cm height × 3 cm length; minimum size 1.2 cm width × 1.6 cm height × 3 cm length) and the presence of some focal areas of mineralisation. The post-contrast exam revealed heterogeneous peripheral enhancement. No signs of pulmonary metastatic disease were noticed on CT.

The owners declined an invasive approach consisting of prostatectomy with lymphadenectomy. Radiation therapy was also declined, opting for metronomic chemotherapy with toceranib (Palladia, Zoetis Italia S.r.l.) 2.5 mg/kg orally every 48 h and piroxicam (Feldene, Pfizer S.r.l.) 0.3 mg/kg orally every 24 h. Follow-up ultrasound at 2 and 4 months showed a partial response of prostate size to 2.4 × 2.7 cm and left medial iliac lymph nodes to 5.7 mm length. Ultrasound evaluation identified the absence of dilatation of the renal pelvis. Clinically, the patient showed no haematuria or dysuria. The patient showed a good response to the treatment with no evident signs of spreading malignancy up to 180 days of the initiation of treatment, then the patient returned with stranguria. Complete blood count and biochemical profile were performed resulting in a slight increase of urea 62.50 mg/dL (reference range, 10–50 mg/dL) and normal renal creatinine values 0.85 mg/dL (reference range 0.5–1.5 mg/dL).

The recheck CT examination (Figure 1b–d) revealed progressive enlargement of the prostate gland (size 4.5 cm length × 3 cm width × 3.5 cm height) with an irregular profile extending to the neck of the urinary bladder and the trigone area. The enlarged gland caused a centripetal compression of the pelvic urethra and marked dorsal displacement of the rectum. Kidneys and ureters were within normal limits. A slight enlargement of the left medial iliac lymph node was observed. Multiple and diffuse pulmonary cavitary lesions characterised by a moderately thick wall and peripheral parenchymal thickening were

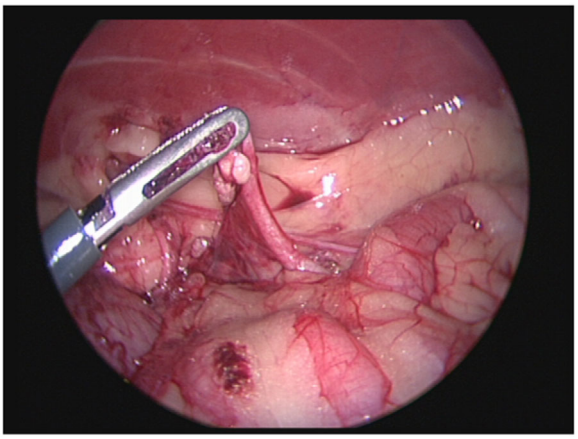

FIGURE 2 The ureter has been resected distally from the bladder insertion and grasped with a Dorsey grasping forceps

detected; multifocal nodules affecting the spleen and liver were also found. These findings were consistent with metastatic lesions.

Consequently, surgical treatment with total prostatectomy was proposed to the owner who refused. Cystotomy tube placement and urethral stenting were proposed but not accepted by the owner; therefore, a bilateral laparoscopic assisted cutaneous ureterostomy was proposed and accepted.

2.1 | Surgical technique

The dog was premedicated with dexmedetomidine (Dexdomitor, Vétoquinol Italia srl) 5 μg/kg intramuscular (IM) and methadone (Semfortan, Eurovet Animal Health B.V.) 0.2 mg/kg IM. General anaesthesia was induced using propofol (Proposure, Merial) 2 mg/kg intravenous (IV) and maintained with isoflurane after endotracheal intubation.

The dog was positioned in dorsal recumbency and the abdomen was aseptically prepared by clipping/shaving the surgical area, followed by sterile scrubbing with chlorhexidine gluconate 4% and alcohol-based solution.

A three-port technique with three 5-mm trocars was used (VersaPort™, COVIDIEN, Medtronic Italia s.p.a, Milano, Italy). A 5-mm port was placed caudal to the umbilicus, and the abdominal cavity was inflated with a pressure of 10 mmHg (Karl Storz Veterinary Endoscopy). A 5-mm, 0° laparoscope camera (Karl Storz Veterinary Endoscopy) was used, and two additional 5-mm working ports were set caudally, in triangulation with the first port, right and left side suprapubic port.

The right ureter was isolated and then transected distally close to the bladder insertion and then mobilised using hook cautery. The dissection was carefully performed, giving particular attention to ureter blood supply preservation. Once the ureter was isolated, it was grasped with a Dorsey forceps (Figure 2) and dissected from the overlying parietal peritoneum with a hook cautery.

To reduce abdominal distention during the uretero-cutaneous stoma phase, the pneumoperitoneum was reduced reaching a pressure of 8 mm Hg.

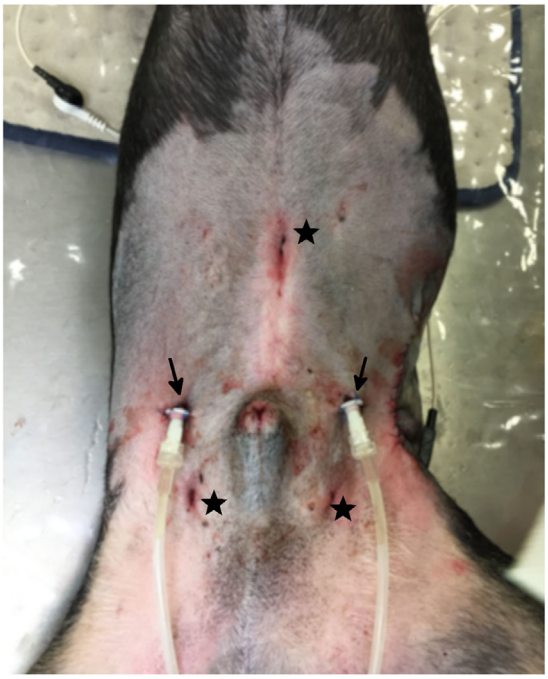

FIGURE 3 Cutaneous incision sites. Laparoscopic three-ports (black stars) are placed in triangulation. Cutaneous ureterostomies (black arrows) are catheterized with two Tom Cat Catheter

Once the location of the stoma was decided, an additional minilaparotomy of 5 mm was created with a parapreputial incision ipsilateral to the ureter. This incision was designed for ureter extrapolation.

A Halsted grasp forceps was inserted into the peritoneum through the parapreputial incision, and the distal part of the ureter was grasped and exteriorised. The ureterostomy was fashioned externally via an open technique. The ureter was spatulated and anastomosed with the ventrolateral abdominal skin to create a ureterocutaneous stoma using a simple interrupted suture of 5/0 poliglecaprone 25 (Monocryl, Ethicon).

The same procedure was performed on the opposite site for the remaining ureter.

The ureters were catheterised during the procedure with two Tom Cat Catheter 4fr, 130 mm in length and maintained for 10 days postoperatively (Figure 3).

The duration of the surgery was 45 min.

2.2 | Postoperative care

During the immediate postoperative period, analgesia was provided with morphine 0.3 mg/kg IM, as needed. Amoxicillin clavulanate (Synulox, Zoetis Italia Srl) 25 mg/kg orally every 12 hr, meloxicam (Metacam, Boehringer Ingelheim) 0.1 mg/kg orally every 24 hr, and tramadol (Altadol, Formevet Srl) 4 mg/kg orally every 12 hr were prescribed. Local wound care consisted of frequent diaper changes (every 6–8 hr) and application of zinc oxide paste. The dog was hospitalised for 5 days.

Adjuvant chemotherapy was continued in the postoperative period with carboplatin (Paraplatin, Bristol-Myers Squibb S.r.l.) 300 mg/m^2 IV

FIGURE 4 Cutaneous ureterostomies 2 months post-operatively. The stoma sites (black asterisk) are visible on the abdominal wall

every 21 days for a total of three sessions. The only adverse effects reported were decreased appetite after the first chemotherapy session, which was resolved with maropitant (Cerenia, Zoetis Italia S.r.l.) 2 mg/kg orally every 24 hr. Throughout the chemotherapeutic procedure the patient maintained an antibiotic prophylaxis enrofloxacin (Baytril, Bayer Spa) 5 mg/kg orally every 24 hr.

The dog returned to normal activity, with a good quality of life. No major complications were reported during the 2 months follow-up period (Figure 4).

Euthanasia was performed 2 months and 10 days postoperatively due to the development of deteriorating respiratory signs likely associated to the metastasising tumour process and confirmed by thorax X-rays.

3 | DISCUSSION

Urinary diversion is a viable salvage surgical procedure in canine patients characterised by low urinary tract occlusion due to invasive prostatic and/or bladder neoplasia. Palliative intent procedures for prostatic neoplasia are composed of partial prostatectomy (L'Eplattenier et al., 2006), transurethral resection (Liptak et al., 2004), urethral stenting (Radhakrishnan, 2017), and urinary diversion.

Several diversion techniques have been described for the management of prostatic cancer. Ureterocolonic anastomosis and intestinal or gastric pouch reservoirs (McCarthy et al., 1992, Stone et al., 1988) for urinary diversion determine severe complications such as absorption of uraemic toxins across the intestinal mucosa (hyperammonaemia, metabolic alkalosis, diarrhoea, vomiting, and, neurologic disease) and frequent pyelonephritis from ascending infections (McLoughlin et al., 1992). More recent case reports describe the ureteral re-implantation to the cranial aspect of the prepuce (Saeki et al., 2015), but the procedure is contraindicated in animals with neoplastic extension into the distal ureters (Saeki et al., 2015). Open surgical techniques have been described for cutaneous urinary diversion in the treatment of bladder cancer in female dog patients (Ricardo Huppes et al., 2017).

Minimally invasive surgeries are widely recognised as an important surgical approach. Laparoscopic techniques are considered less invasive and are associated with lower postoperative pain (Devitt et al., 2005) and a lower wound infection (Mayhew et al., 2012) than conventional open surgery, without compromising the surgical results.

LACU is a minimally invasive approach, presented in human medicine, for urinary diversion with ureteral obstruction caused by advanced pelvic cancer (Asimakidou et al., 2019; New et al., 2018; Puppo et al., 1994).

Urinary diversions are a palliative alternative to curative surgery. The goal of palliative surgery is to alleviate the symptoms related to the neoplasm and its growth, ensuring a good quality of life for the patient.

Alternatives proposed to owners included cystotomy tube placement and urethral stenting. Transabdominal catheterisation is a valid alternative for urinary diversion; the complications reported in literature are patient chewing the tube, breakage of the mushroom tip during tube removal, and fistula formation following tube removal (Beck et al., 2007). Cystotomy tube placement was refused by the owner. Urethral stenting was also proposed but not accepted by the owner on account of the complications of this procedure, including stent migration and re-obstruction due to continued tumour growth (McMillan et al., 2012). Other urethral diversion techniques such as Subcutaneous Ureteral Bypass (SUB; Milligan et al., 2020) have not been proposed to the owner. SUB provide ureteral bypass while preserving the bladder and urethra and respecting normal urinary anatomy. Neoplastic occlusion of the urethra and progression of tumour pathology at the level of the urethra are contraindications for this type of urinary diversion.

In the present case, due to the reluctance of the owners to perform an invasive surgery and to proceed with a urethral stent placement or cystotomy tube placement, the surgical choice moved to a less invasive palliative surgical management. In the case presented, ureteral patency was maintained, and no permanent ureteral stent necessity was presented, giving the patient no contraindications to a palliative LACU approach.

4 | CONCLUSION

In conclusion, LACU can be considered a safe procedure for palliative treatment in patients with obstruction of the lower urinary tract. To the best of our knowledge, the present case is the first description of LACU in a canine patient.

ACKNOWLEDGEMENTS

Allevi G. DVM, PhD performed the surgery, concepted and drafted the work. Spediacci C. DVM, acquired the data and drafted the work. Marchesi E. DVM, acquired and interpreted the data. Trovatelli M. DVM, PhD designed, drafted the work and approved the final version of the manuscript.

AUTHOR CONTRIBUTIONS

Giovanni Allevi was associated with study conceptualization, methodology, and wrote the original draft. Carlotta Spediacci was associated with data curation and wrote the original draft. Elena Marchesi was associated with data curation. Marco Trovatelli was associated with formal analysis, study supervision, wrote the original draft, and reviewed and edited the final manuscript.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

PEER REVIEW

The peer review history for this article is available at https://publons.com/publon/10.1002/vms3.568

ORCID

Marco Trovatelli https://orcid.org/0000-0003-2413-9499

REFERENCES

Asimakidou, M., De Win, G. & Cherian, A. (2019). Laparoscopy-assisted ureterostomy- technique. *Journal of Pediatric Urology*, *15*, 423–424.

Beck, A. L., Grierson, J. M., Ogden, D. M., Hamilton, M. H. & Lipscomb, V. J. (2007). Outcome of and complications associated with tube cystostomy in dogs and cats: 76 cases (1995–2006). *Journal of the American Veterinary Medical Association*, *230*, 1184–1189.

Bennett, T. C., Matz, B. M., Henderson, R. A., Straw, R. C., Liptak, J. M., Selmic, L. E., Collivignarelli, F. & Buracco, P. (2018). Total prostatectomy as a treatment for prostatic carcinoma in 25 dogs. *Veterinary Surgery*, *47*, 367–377.

Boothe, H. W. (2000). Managing traumatic urethral injuries. *Clinical Techniques in Small Animal Practice*, *15*, 35–39.

Bryan, J. N., Keeler, M. R., Henry, C. J., Bryan, M. E., Hahn, A. W. & Caldwell, C. W. (2007). A population study of neutering status as a risk factor for canine prostate cancer. *The Prostate*, *67*, 1174–1181.

Devitt, C. M., Cox, R. E. & Hailey, J. J. (2005). Duration, complications, stress, and pain of open ovariohysterectomy versus a simple method of laparoscopic-assisted ovariohysterectomy in dogs. *Journal of the American Veterinary Medical Association*, *227*, 921–927.

Hu, H. Z., Granger, N. & Jeffery, N. D. (2016). Pathophysiology, clinical importance, and management of neurogenic lower urinary tract dysfunction caused by suprasacral spinal cord injury. *Journal of Veterinary Internal Medicine*, *30*, 1575–1588.

L'eplattenier, H. F., Van Nimwegen, S. A., Van Sluijs, F. J. & Kirpensteijn, J. (2006). Partial prostatectomy using Nd:YAG laser for management of canine prostate carcinoma. *Veterinary Surgery*, *35*, 406–411.

Liptak, J. M., Brutscher, S. P., Monnet, E., Dernell, W. S., Twedt, D. C., Kazmierski, K. J., Walter, C. U., Mullins, M. N., Larue, S. M. & Withrow, S. J. (2004). Transurethral resection in the management of urethral and prostatic neoplasia in 6 dogs. *Veterinary Surgery*, *33*, 505–516.

Mayhew, P. D., Freeman, L., Kwan, T. & Brown, D. C. (2012). Comparison of surgical site infection rates in clean and clean-contaminated wounds in dogs and cats after minimally invasive versus open surgery: 179 cases (2007–2008). *Journal of the American Veterinary Medical Association*, *240*, 193–198.

Mccarthy, R. J., Lipowitz, A. J. & O'brien, T. D. (1992). Continent jejunal reservoir (Kock pouch) for urinary diversion in dogs. *Veterinary Surgery*, *21*, 208–216.

Mcloughlin, M. A., Walshaw, R., Thomas, M. W. & Hauptman, J. G. (1992). Gastric conduit urinary diversion in normal dogs. Part II, Hypochloremic metabolic alkalosis. *Veterinary Surgery*, *21*, 33–39.

Mcmillan, S. K., Knapp, D. W., Ramos-Vara, J. A., Bonney, P. L. & Adams, L. G. (2012). Outcome of urethral stent placement for management of urethral obstruction secondary to transitional cell carcinoma in dogs: 19 cases (2007–2010). *Journal of the American Veterinary Medical Association*, *241*, 1627–1632.

Milligan, M. L., Berent, A. C., Weisse, C. W., Lamb, K. & Toizer, E. (2020). Outcome of SUB placement for the treatment of benign ureteral obstruction in dogs: Nine dogs and 12 renal units (2013 to 2017). *Journal of Small Animal Practice*, *61*, 428–435.

New, F., Deverill, S. & Somani, B. K. (2018). Role of percutaneous nephrostomy in end of life prostate cancer patients: a systematic review of the literature. *Central European Journal of Urology*, *71*, 404–409.

Puppo, P., Perachino, M., Ricciotti, G. & Bozzo, W. (1994). Laparoscopic bilateral cutaneous ureterostomy for palliation of ureteral obstruction caused by advanced pelvic cancer. *Journal of Endourology*, *8*, 425–428.

Radhakrishnan, A. (2017). Urethral stenting for obstructive uropathy utilizing digital radiography for guidance: Feasibility and clinical outcome in 26 dogs. *Journal of Veterinary Internal Medicine*, *31*, 427–433.

Ravicini, S., Baines, S. J., Taylor, A., Amores-Fuster, I., Mason, S. L. & Treggiari, E. (2018). Outcome and prognostic factors in medically treated canine prostatic carcinomas: A multi-institutional study. *Veterinary and Comparative Oncology*, *16*, 450–458.

Ricardo Huppes, R., Crivellenti, L. Z., Barboza De Nardi, A., Roque Lima, B., Alves Cintra, C., Luiz Costa Castro, J. & Adin, C. A. (2017). Radical cystectomy and cutaneous ureterostomy in 4 dogs with trigonal transitional cell carcinoma: Description of technique and case series. *Veterinary Surgery*, *46*, 111–119.

Saeki, K., Fujita, A., Fujita, N., Nakagawa, T. & Nishimura, R. (2015). Total cystectomy and subsequent urinary diversion to the prepuce or vagina in dogs with transitional cell carcinoma of the trigone area: A report of 10 cases (2005–2011). *Canadian Veterinary Journal*, *56*, 73–80.

Stone, E. A., Withrow, S. J., Page, R. L., Schwarz, P. D., Wheeler, S. L. & Seim, H. B. (1988). Ureterocolonic anastomosis in ten dogs with transitional cell carcinoma. *Veterinary Surgery*, *17*, 147–153.

Walz, J. Z., Desai, N., Van Asselt, N., Poirier, V. J., Hansen, K. & Selmic, L. (2019). Definitive-intent intensity-modulated radiation therapy for treatment of canine prostatic carcinoma: A multi-institutional retrospective study. *Veterinary and Comparative Oncology*, *18*, 381–388.

How to cite this article: Allevi, G., Spediacci, C., Marchesi, E., & Trovatelli, M. (2021). Laparoscopic-assisted cutaneous ureterostomy in a canine patient with prostatic carcinoma. *Veterinary Medicine and Science*, *7*, 1483–1487. https://doi.org/10.1002/vms3.568