A case of palliative urethral stenting for canine prostatic carcinoma

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Abstract

A 9-year-old, castrated male Shih Tzu was brought to our hospital with labored urination and narrow feces. Prostatic cancer was diagnosed by catheter aspiration biopsy. World Health Organization (WHO) clinical staging of the prostatic tumor was T3N1M0 and urethral stenting was performed. After intervention, labored urination was resolved immediately, and natural urination was possible. Occasional mild incontinence appeared postoperatively, but a dramatic improvement in quality of life (QOL) was achieved. Until the dog died on day 99 of the illness (postoperative day 90), no dysuria was noted and good QOL was maintained. Urethral stenting is minimally invasive and enables natural urination. This technique is useful in palliative treatment of malignant tumors associated with urethral obstruction.

Key word: Canine prostatic cancer, Self-expanding nitinol stent, Urethral stenting

Prostatic tumors are rare in dogs, but occur more often in humans and dogs than in other animals [9]. Adenocarcinoma is the most common prostate tumor in male dogs, but transitional cell carcinoma, undifferentiated carcinoma, hemangiosarcoma and leiomyosarcoma have also been reported [3]. Tumor behavior differs by type, but prostatic cancer is generally highly locally invasive and metastatic, with rapid metastasis to the spine, sublumbar lymph nodes and lungs [4]. Clinical signs of prostatic cancer in dogs are variable and can be attributed to local or distant disease progression. With prostatic enlargement, compression of the urethra may prevent complete voiding of urine, predisposing the dog to the development of stranguria and dysuria. Complete obstruction of urinary outflow may result in hydroureter, hydronephrosis, and subsequent renal failure. In addition to physical obstruction, local invasion of prostatic carcinoma into the lumbar vertebrae or nerve roots may result in constipation or gait abnormalities secondary to osteolytic or neuropathic pain or neurological compromise [4].

Total prostatectomy and radiotherapy are used as localized treatment for prostatic cancer [1, 4]. In humans, permanent seed implants are attracting attention as an excellent method of treatment [10]. However, these implants are not licensed for animals in Japan and total prostatectomy is not often performed due to the high morbidity and the lack of efficacy in prolonging survival [4, 7, 9]. Radiotherapy is also used to alleviate symptoms, but survival is not prolonged because of the high rate of metastasis [9]. No large-scale research reports have clarified the efficacy of chemotherapy, and euthanasia is sometimes considered at the time of diagnosis because of the difficulty in achieving control of defecation and urination disorders and the pain associated with bone metastasis.

Prostatic cancer shows a high rate of metastasis and stenting is performed not for localized suppression of the tumor, but to ensure patency of the urethra. Various investigations have examined types and shapes of stents, use of stents coated with paclitaxel and the effects of short- and long-term stenting on the urethral epithelium [2, 6, 13]. In recent years, stenting has been used for palliative clinical treatment in the veterinary field, and palliative urethral stenting for bladder
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In the present study, prostatic cancer was diagnosed in a dog with stranguria and dysuria, and urethral dilatation was performed using a urethral stent. Dysuria improved immediately after urethral stenting, enabling natural urination and maintenance of good quality of life (QOL) until the dog died after 3 months.

The dog was a 9-year-old castrated male Shih Tzu weighing 8.1 kg. At the time of presentation, the dog had a 3-month history of pollakiuria and a 2-month history of dysuria. No hematuria was observed, but only small amounts of urine were voided with pain on urination. One month before presentation, feces became compressed and had a flat appearance, and the dog was brought to the clinic for examination.

An initial general and rectal examination showed enlargement of the prostate with irregular, hard swelling on the prostate surface. The sublumbar lymph nodes were immobile and enlarged. Abdominal radiography showed calcification in the prostate, enlargement of sublumbar lymph nodes by 1 cm and rectal stenosis due to the enlarged sublumbar lymph nodes and prostate.

Retrograde double-contrast urography showed leakage of contrast medium into the parenchyma of the prostatic urethra and a mass-like shadow from the same site to the bladder trigone (Fig. 1). Ultrasonography revealed a multifocal region and calcification with a high echo level in the prostate. A mass protruded about 1 cm from the prostatic urethra into the urinary bladder. Blood chemistry examinations revealed a slight increase in alkaline phosphatase to 492 U/L (reference range, 23–212 U/L), but no other abnormalities.

Urinalysis showed no abnormalities other than an occult blood reaction. A sample was taken from the prostate tumor via catheter aspiration biopsy, and cytodiagnosis and histopathological examination were performed. Cytology revealed cells collected in clusters and showed atypical findings such as anisokaryosis, a high nucleus-to-cytoplasm ratio, cells with two nuclei, and an increase in the number of nucleoli as well as a coarse chromatin pattern. These findings suggested an epithelial malignant neoplasm. Histopathology showed intermediate to highly malignant prostatic carcinoma. From these findings, prostatic carcinoma (intermediate to high malignancy) with a clinical stage of T3N1M0 was diagnosed and urethral stenting was performed.

In one study, balloon-expandable and self-expanding metallic stents were used to evaluate the management of malignant urethral obstructions in 12 dogs. The stent length was chosen with the objective of re-establishing urethral patency and maintaining urinary continence. Thus the length was approximately 10 mm, which included the length from the cranial to the caudal ends of the obstruction; this length would minimize stenting of adjacent healthy urethra [16]. In another study, 12 clinically normal mixed-breed dogs received stainless urethral self-expanding metallic stents. A histological examina-

![Fig. 1. Retrograde double-contrast urography](image)

Swelling of the prostate and raising of the rectum to the dorsal side were observed. Contrast medium leaked at the tumor in the bladder trigone and in the prostatic urethra.
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The length of the prostatic urethra from the bladder trigone and the urethral diameter were measured on retrograde double-contrast urographic images. The distance from the tumor in the bladder trigone to the prostatic urethra was 43 mm. To maintain urinary continence and avoid occluding the urethral stent because of tumor growth, the stent region was extended about 10 mm in both cranial and caudal directions, which included the region of tumor growth.

The transverse urethral diameter was measured by ultrasonography: it was initially 4 mm and became 5.4 mm on dilatation. The desired dilated diameter was set at 1.1 times the normal dilated urethral diameter, and stent type and size were based on findings from ultrasonographic and retrograde double-contrast urographic imaging (Fig. 2). The stent used was a SMART Control Nitinol Stent System (6 mm × 60 mm; Cordis, Johnson & Johnson, Tokyo, Japan) and the sheath was a brite tip SHEATH (6 Fr, sheath length=45 cm, usable guidewire=0.035 inch; Cordis). Stenting was performed in a right lateral recumbent position under a C-arm X-ray guidance system. First, the range of the tumor was confirmed by urography (Fig. 3). Next, the sheath was inserted from the penis to the bladder, but since urethral obstruction was marked in the prostatic urethra from the bladder trigone, a finger was inserted into the rectum when the sheath was inserted, and the sheath was then inserted into the bladder under manual guidance. Once the stent was inserted into the bladder with the sheath as a guide, the sheath was removed. After removal of the sheath, the stent was expanded at the preoperatively planned site (Fig. 4). The time required for this procedure was 30 min. Postoperative computed tomography (CT) and

Fig. 2-1. Bladder trigone-prostate transition area. Tumor in the bladder trigone (1) and urethral diameters (4,5) were measured on ultrasonography.

Fig. 2-2. Prostate urethral length (2) was measured on ultrasonographic imaging.

Fig. 2-3. Retrograde double-contrast urography. Lengths of the prostatic urethra from the bladder trigone (3) and urethral diameter (5) were measured on X-ray images.

Fig. 2-4. Urethral longitudinal section. Urethral diameter (4) was confirmed on ultrasonographic imaging. Distance (3) from the tumor in the bladder trigone (1) to the prostatic urethra (2) was 43 mm. This distance was extended by each cranial and caudal about 10 mm using a 60-mm stent. Transverse diameter was initially 4 mm (4) and became 5.4 mm on dilatation (5), representing a 10% increase. A stent thickness of 6 mm was selected.
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Plain radiography (Fig. 5) confirmed stent expansion at the appropriate site. Natural urination was possible immediately after stenting, with occasional mild incontinence after urination. On postoperative day 3, the dog was discharged and treatment with piroxicam (Baxo, Toyama Chemical Company, Tokyo, Japan) was continued at 0.3 mg/kg, q2day. On day 42 of the illness (postoperative day 23), ultrasonography was performed because of dysuria, revealing that the tumor in the bladder had expanded to the vicinity of the stent. Since urethral reobstruction due to growth of the tumor was suspected, chemotherapy was started with mitoxantrone (Novantron; Wyeth, Tokyo, Japan) at 5.5 mg/m²/3 weeks. Mitoxantrone was administered a total of three times at a total dose of 6.66 mg. No dysuria was observed and good QOL could be maintained until the animal died on day 99 of the illness (day 90 postoperatively). Neither tumor growth in the bladder nor distal metastasis to the lungs or bones was found. The cause of death was considered to be cancerous cachexia based on a markedly reduced body weight and anorexia.

Various methods have been attempted for palliative treatment of malignant tumors associated with urinary obstruction, such as bladder and prostate tumors, including daily catheterization by balloon catheterization or urinary catheterization by the owner, transperitoneal cystostomy, cystoperitoneal shunt using a peg tube, nephro-peritoneal shunt, and cystectomy with implantation of the Angiomed IUC urethral stent set [8, 12, 14, 15]. However, many problems have arisen, including complications such as urinary tract infection, long-term tube implantation, tube damage, discoloration of urine, reduced...
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QOL and greater burden on the owner because of the need for an Elizabethan collar, etc. Since radical treatment was difficult in the present case—dysuria had occurred, and sudden death was a strong possibility because of renal failure or bladder rupture due to acute urethral obstruction—palliative urethral stenting was performed. Postoperative recovery was rapid, and good QOL was achieved with minimally invasive urethral dilatation using a urethral stent.

In research on palliative urethral stenting for malignant tumors associated with urinary tract obstruction, serious incontinence has been reported as a complication in about 25% of animals [16]. The remaining 75% showed either mild incontinence or control of urination. In the present case, occasional mild incontinence occurred, but QOL was unaffected. Stent displacement can be avoided by selecting stents of an appropriate size [3, 5, 16]. The possibility of stent reclosure is <5% within 3 months after stenting. Growth of the tumor into the stent or at the ends of the stent can cause reclosing, and this can be improved by restenting [5]. Problems reported to date have mainly been seen in medium-sized to large dogs. In Japan, where small-sized dogs are popular, cardiovascular stents for human use are employed to obtain the appropriate size of stent, but this can be very expensive. Urethral stents for animals are marketed overseas, but many time-related problems are involved with the use of these in Japan, as they must be obtained as individual imports and cannot be applied immediately.

Since urethral reobstruction due to growth of the prostatic cancer and infiltration into the urethral stent was suggested, chemotherapy using mitoxantrone was added. No findings, such as urethral obstruction or distal metastasis due to the tumor, or cancerous peritonitis, were found up to the time of death, but the dog died on day 99 of the illness due to progression of cancerous cachexia, including marked weight loss and anorexia. However, natural urination was possible and good QOL was maintained thanks to urethral dilatation using a urethral stent at an early stage, confirming that urethral stents are minimally invasive in the body and allow long-term urination control. This approach appears to be useful as a palliative therapy for malignant tumors associated with urethral obstruction.

References

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前立腺癌に対して緩和的尿道ステント術を行った犬の1例

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和文要約

シーズー、去勢雄、9才が、排尿困難を主訴として来院した。カテーテル吸引による病理組織検査では前立腺癌で進行度はT3N1M0であった。緩和治療として、尿道ステント設置術を実施し、排尿後に失禁を認めることはあったが自力排尿が可能となった。術後90日目に死亡するまで排尿障害は認められなかった。尿道ステントは最小限の侵襲であり、尿路閉塞を伴う悪性腫瘍に対する緩和的治療として有用であると考えられた。

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