

## Persistent Hymen and Pyocolpos in a Female Shih-Tzu Dog

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**Abstract :** A 9-year-old intact female Shih-Tzu was presented with abdominal pain and abdominal distension. Since the animal's birth, the owner had never observed proestrous bleeding in the patient. Ultrasonography revealed segmental enlargement of the genital system. An ovariohysterovaginectomy was performed to remove the genital mass. The vagina was grossly dilated as a result of being filled with a solid black-green substance. A vaginogram was performed. Based on the surgical findings and vaginogram results, an imperforate hymen was diagnosed. One month from the first surgery, a stump pyocolpos developed between the sutured site and the obstructed portion. The persistent hymen was removed by endoscopy. However, peritonitis and sepsis developed after the procedure, and the dog died. Therefore, During operation of persistent hymen, a cruciate incision over the hymen strongly recommended to avoid additional post operative complications.

**Key words :** Persistent hymen, ovariohysterovaginectomy (OVHV), pyocolpos, dog.

### Introduction

The hymen is an embryological remnant of mesodermal tissue that normally perforates during the later stages of embryonic development. The lack of perforations in the membrane is called an persistent hymen (2,7). Congenital vaginal obstruction is a uncommon malformation of the genital system that results in a structural anomaly of the vagina. It can be problematic when it precludes the outflow of vaginal secretions (3). Most cases usually present because of cyclic abdominal pain in the absence of menstruation at the time of puberty and are diagnosed as cases involving an persistent hymen. In some patients, this abnormality can lead to accumulation of blood, mucus, (9,10) or pus (6). We report a case involving a Shih-Tzu dog with an persistent hymen. The aim of this report is to describe the chronic conditions of an persistent hymen that was undiagnosed until the dog was 9 years old and to increase awareness about the possibility of pyocolpos as a potential complication developing after ovariohysterovaginectomy (OVHV) without a cruciate incision over the hymen.

### Case

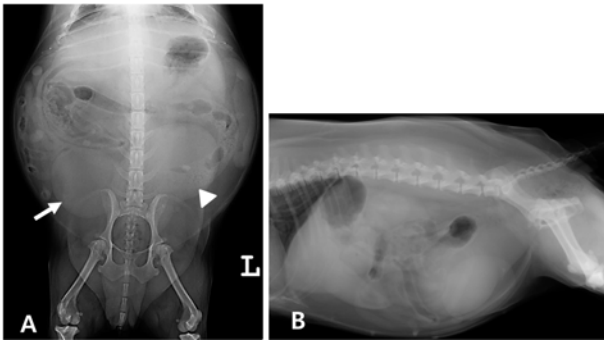
A 9-year-old intact female Shih Tzu weighing 12 kg presented to the Animal Medical Center at Gyeongsang National University with abdominal pain and abdominal distension. The dog's medical history revealed that she had shivering,

fever, and anorexia for 2 months, which had been treated with tramadol, meloxicam, and antibiotics by the referring veterinarian. The dog was suspected as having pyometra in local animal hospital.

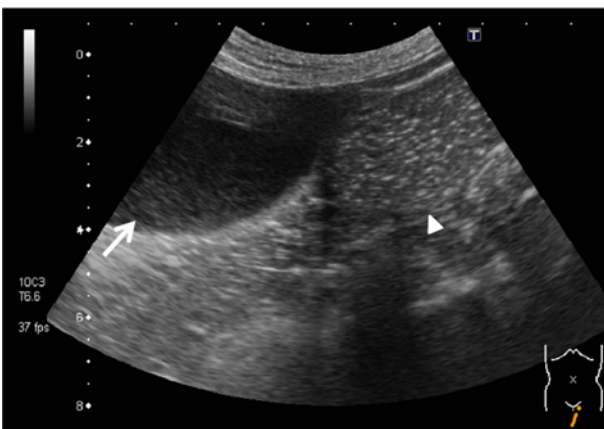
Physical examination revealed severe abdominal distention caused by a caudal abdominal mass. The dog had a normal body temperature and a normal heart rate at the time of referral but was panting and had respiratory stridor. Her body condition score was 5/5. A complete blood cell count (CBC) and serum biochemistry analysis were performed on the patient prior to surgery. The CBC revealed moderate leukocytosis ( $29.2 \times 10^3$  cells/ $\mu$ L, reference ranges: 6.0-17.0 cells/ $\mu$ L) and mild polycythemia (18.5 g/dL, reference ranges: 12.0-18.0 g/dL) Serum biochemical analysis revealed hyperglycemia (131 mg/dL, reference ranges: 60-110 mg/dL) and an increased enzyme activity level of alkaline phosphatase (334 U/L, reference ranges : 20-150 U/L).

Abdominal radiographs confirmed the presence of an extended abdominal mass with circular and soft opacity (8 × 13 cm) beside the bladder (Fig 1). Ultrasonograms revealed unilateral severe renal pelvic dilation, ureteral calculi, hydroureter in the left kidney, and pyelectasia in the right kidney. Two mass were identified in the spleen. One is a heterogeneous, circular mass at the hilum region and the another was ill-defined mass of heterogeneous echogenicity at the head region. Segmental enlargement of the genital system with cellular debris was observed (Fig 1, Fig 2, arrowhead). The urinary bladder was displaced and full as a result of urine accumulation, with thickened bladder wall at sonography (Fig 2, arrow). Based on the diagnostic image results, exploratory laparotomy was strongly recommended. Additionally, a splenectomy was planned because the masses within the spleen

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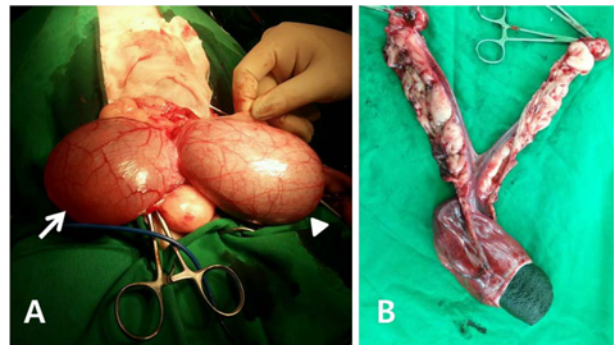
**Fig 1.** Ventrodorsal (A) and left lateral (B) radiographs of the abdomen. Radiographic images revealed segmental enlargement of the genital system (arrow head) and urinary bladder (arrow).



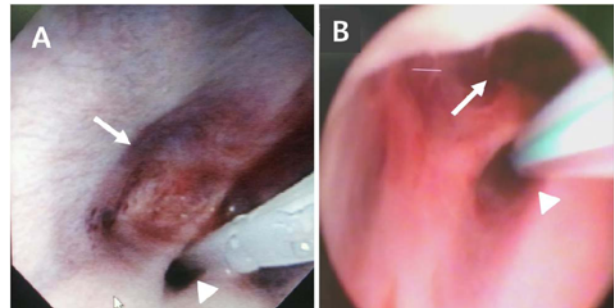
**Fig 2.** Transverse sonogram of the urinary bladder (arrow) and the abdominal mass (arrow head). The mass was filled with cellular debris.

were suspicious for tumor.

Atropine (0.04 mg/kg, administered subcutaneously [SC]), butorphanol (0.2 mg/kg, SC), and diazepam (0.2 mg/kg, administered intravenously [IV]) were used as preanesthetic drugs for surgical treatment, and cefazolin (25 mg/kg, IV) was used as a prophylactic antibiotic. After induction with propofol (6 mg/kg, IV), anesthesia was maintained with inhaled isoflurane, and normal vital signs were maintained during anesthesia. During the operation, the cystic mass was confirmed as the extended vagina, and OVHV was performed. Splenectomy was also performed. A severe stenosis existed between the bladder, rectum, and vagina, and their sharing of multiple blood vessels necessitated particular care on the part of the surgeon (Fig 3A). The vagina was transected just in front of the pelvic rim. The caudal portion of the vagina was flushed with warm antibiotics contained saline (enrofloxacin 0.25 mg/ml) many times and then was sutured firmly with absorbable suture materials. At that time, canalization of hymen was not checked, however, the canal between vagina and uterus was existed. The vagina was filled with a solid black-green substance and was grossly dilated. The cervix and uterus appeared normal macroscopically (Fig 3B). A per-



**Fig 3.** (A) Laparotomy revealed the urinary bladder (arrow) and the extended vagina (arrow head). (B) Ovaries, uterus, and vagina after extirpation. The vagina was distended with a solid black-green substance.



**Fig 4.** (A) Vaginal obstruction by the intact hymen (arrow) was diagnosed by endoscopic examination. A persistent hymen existed over the external urethral orifice (arrow head). (B) After the endoscopic procedure, the vagina was canalized (arrow).

sistent hymen was diagnosed via endoscopic exam after surgery (Fig 4A). A urinary catheter was inserted, and the persistent hymen was exposed over the external urethral orifice (Fig 4A). The substance that had been diluted with saline was smeared onto a glass slide and dyed with Diff-Quik stain. On cytologic examination, there were no visible bacteria, and the substance consisted of primarily debris of unknown origin and intermediate and superficial cells. On histopathological examination, the cervix and vagina had a normal structure, with mild congestion and subepidermal hemorrhage; no abnormalities were noted in the ovary. The splenic mass was diagnosed as malignant lymphoma.

Butorphanol (0.2 mg/kg, SC, for one day) for immediate pain management and cefadroxil (25 mg/kg, administered orally [PO], twice daily [bid]), carprofen (2.2 mg/kg, PO, bid), ranitidine (2 mg/kg, PO, bid), and misoprostol (5 µg/kg, PO, bid) were administered postoperatively for 10 days. After surgical treatment, the hydronephrosis improved. Urinary incontinence developed after surgery, and diazepam (0.2 mg/kg, PO, three times a day [tid]) was used as a muscle relaxant but was ineffective. Stump pyocolpos developed one month from the first surgery. The persistent hymen was dissected by using endoscopic biopsy forceps (Fig 4B) to perform lavage. The

dog developed peritonitis and sepsis and died on 3 day after lavage. Necropsy of the dog was not performed, in compliance with the owner's request.

### Discussion

The usual clinical presentation of a persistent hymen in people is an expanding abdominal mass and cyclic lower abdominal or back pain at the time of puberty (3). The diagnosis is made only when adolescent female patients present with acute abdominal pain and/or urinary retention (8). In this case, the owner reported that she observed vaginal swelling during the dog's estrous cycles but had never observed proestrous bleeding since its birth. Because the dog did not exhibit any severe signs related to the persistent hymen, the owner was not concerned with the weak estrus. The referring veterinarian had treated the dog for abdominal pain of an unknown cause for 2 months, but a sonographic examination was not performed. When the dog was referred, we diagnosed mucometra or pyometra from the results of radiography and ultrasonography. The age of the dog contributed to the misdiagnosis. Using ultrasonography, the origin of the genital mass was indistinguishable between the uterus or vagina in this case. Therefore, an accurate diagnosis was made after OVHV using an endoscope. Most cases of hydrocolpos, pyocolpos, and hematocolpos are found by exploratory surgery (6,9,10). Endoscopy and retrograde vagino-urethrocytography assist in making an accurate diagnosis (5,8,10).

After OVHV, the dog developed urinary incontinence. This complication has also been reported in other studies (8,9). In this case, the muscular relaxation of the urethra did not promote spontaneous urination. Because the accumulated material in the vagina displaced the urinary bladder for several years, the mechanical effects on the urethra and bladder may have led to functional changes in the urinary system. The incontinence may have also been related to the deviation of the urinary bladder and lowered abdominal pressure after surgery.

In this report, the pyocolpos with subsequent peritonitis developed 1 month after the initial operation. For the treatment of pyocolpos, drainage through hymenotomy (4) and removal using endoscopy (1) have been reported to be effective. In addition, after excision of the hymen, drainage of a few days' duration is needed to facilitate outflow of the vaginal discharge and to prevent recurrence (3).

### Conclusion

In this report, we did not perform a hymenotomy during the first operation, which may have contributed to the development of pyocolpos. Although the persistent hymen was dissected to perform endoscopic-assisted lavage, the dog was not able to overcome the peritonitis and sepsis. And died 3 days after dissection of hymen. In persistent hymen, OVHV without canalization of hymen can cause life-threatening post operative complications. Therefore, to avoid complications such as stump accumulation, hymenotomy is strongly recommended.

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## 시츄 개에서 발생한 처녀막 잔존증과 질축농증

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**요 약** : 9살의 중성화하지 않은 암컷 시츄가 복통과 복부 팽만을 주증으로 내원했다. 보호자는 개가 태어난 이후로 발정과 관련한 출혈을 단 한번도 관찰하지 못 했다. 초음파 검사 상에서 분절된 생식기계의 확장이 관찰되었다. 생식기계의 종괴를 확인하고, 난소·자궁·질 적출술을 실시하였다. 육안적으로 관찰했을 때, 질은 확장되어 있었고 고형의 질은 초록색의 물질로 차있었다. 수술 결과와 질조영술을 바탕으로하여 처녀막 잔존증으로 진단하였다. 수술 한 달 후, 봉합한 부위와 질의 막혀있는 부분 사이에 잔존성 질축농증이 발생하였다. 잔존된 처녀막은 내시경으로 제거하고, 세척하였으나, 복막염과 패혈증이 발생으로 폐사하였다.

**주요어** : 처녀막 잔존증, 난소자궁질적출술, 질축농증, 개