



## Clinical Report

### Hypospadias and Testicular Agenesis in Two German Shepherd Puppies

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#### Abstract

**Case Description-** Hypospadias and testicular agenesis were described in this clinical report in two German shepherd puppies presented with a history of lethargy, anorexia, dysuria, urinary incontinence, severe urine scald dermatitis and pyoderma in the abdominal area.

**Clinical Findings-** Clinical examinations revealed incomplete development of the external genitalia including penile and preputial hypoplasia with lack of preputial sheath at the penis tip. Moreover, both testes were not found on clinical examination and ultrasonography of one case while another dog had unilateral testicular agenesis.

**Treatment and Outcome-** One of the puppies died before any other diagnostic and therapeutic interventions. Resection of penile and preputial remnants combined with prescrotal urethrostomy was done on the other puppy.

**Clinical Relevance-** One of the considerable issues in dog breeding is abnormalities of the external genitalia. Hypospadias and testicular agenesis are rare reproductive disorders which have probably congenital origin. The importance of elimination of affected dogs from reproductive programs should be emphasized by veterinary practitioners.

**Keywords-** Hypospadias, Unilateral and Bilateral testicular agenesis, Dog.

#### Case Description

Congenital anomalies of the reproductive system are rarely reported in small animal practice.<sup>1</sup> Agenesis and dysgenesis describe developmental failures and defects in the genital tracts respectively.<sup>2</sup> Hypospadias is a congenital developmental anomaly of the external reproductive tract. It occurs due to the failure of urogenital fold closure causing incomplete formation of the penile urethra.<sup>3,4</sup> This anomaly may occur in both female and male dogs.<sup>5</sup> Based on location of urethral orifice, hypospadias is classified as glandular, penile, perineal, anal and scrotal. Perineal hypospadias is reported as the most common form.<sup>6,7</sup> This malformation may be seen independently or in association with other abnormalities such as

cryptorchidism and testicular hypoplasia.<sup>8,9</sup> The condition is observed in several animal species, including dogs.<sup>7</sup> Various canine breeds can be affected, but Boston terriers show the highest prevalence.<sup>3,8</sup> The exact etiology of these abnormalities remains unknown although some heritable mechanisms and environmental predisposing factors have been suggested.<sup>7,10</sup> Herein, hypospadias and testicular agenesis were reported in two 3-week-old German shepherd puppies referred to the Veterinary Hospital of Shahid Bahonar University of Kerman, with history of lethargy, anorexia, dysuria, urinary incontinence, severe urine scald dermatitis and pyoderma in the abdominal area.

#### Clinical Findings

Case1. In physical examinations, penis was hypoplastic, and the preputial sheath was not developed completely. The hypospadiac urethral orifice was ventrally located along the midline at the 2 cm from the tip of the penis in both puppies. Hypospadias was classified as penile based on location of the urethral orifice in the affected

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puppies. A large volume of fluid was palpated in subcutaneous space defined as urine after aspiration, in one of the puppies. Accumulation of urine within the prepuce resulted in subcutaneous irritation, severe urine scald dermatitis and adhesion of skin margins to the penis. Self-mutilation worsened this condition (Fig.1). Moreover, analysis of urine sample collected with cystocentesis, showed an ascending urinary tract infection. The puppy died before any other diagnostic and therapeutic interventions. In necropsy, severe skin slough in the abdominal area due to subcutaneous urine extravasation was found. Lower urinary tract was not detectable because of adhesion formation with a severe fibrinopurulent exudate. Even so, presence of the urine pool showed that proximal, intrapelvic and distal parts of urethra were affected. Bilateral testicular agenesis was confirmed at necropsy (Fig.2).



**Figure 1.** Hypoplastic penis is showed and the preputial sheath is not developed completely (up arrow). Scrotal sac is not detected too (down arrow).



**Figure 2.** A) The photograph shows subcutaneous urine accumulation (arrow). B) Lower urinary tract is not detectable due to severe fibrinopurulent exudate (arrow).

Case 2. Penile hypoplasia (infantile penis), hypospadias, unilateral testicular agenesis and lack of scrotal pocket were noted (Fig.3). Complete blood count (CBC), serum biochemistry and urinalysis findings were normal for this puppy.

### Treatment and Outcome

Conservative treatment for case 2, including topical silver sulfadiazine ointment and systemic antibiotic therapy with Co-Amoxiclav suspension (25 mg/kg PO q12h; Farabi Pharmaceutical Co, Iran) for 10 consecutive days were considered. Urine dermatitis was completely controlled after two weeks.

In day of surgery, the animal was premedicated with 0.05 mg/kg acepromazine (KELA Laboratoria, Belgium) intramuscularly. Anesthesia was induced intravenously with 10 mg/kg thiopental sodium (Thiopental, Caspian, Iran) and maintained with halothane 2% (Halothane BP, Nicholas, India). Surgical preparation was carried out in a standard method. In this study, the dog underwent permanent prescrotal urethrostomy operation. To perform the urethrostomy, the penile and preputial remnants were resected and, the mucosal layer of urethra was found and sutured to the surrounded skin with nylon 4-0 in simple interrupted method. The size of urethral orifice was designed 3 mm, approximately (Fig.4). The postoperative recovery was uneventful.



**Figure 3.** Penile hypospadias, penile hypoplasia (up arrow) as well as testicular and scrotal sac agenesis is considerable (down arrow).



**Figure 4.** Prescrotal urethrostomy.

## Clinical Relevance

One of the considerable issues in dog breeding is abnormalities of the external genitalia<sup>7</sup> which declines qualities and characteristics of breeds, and finally results in economic losses. Despite significant importance, little attention has been done regarding these problems. Hypospadias is a rare congenital anomaly of the external genital tract reported in dogs<sup>11,12</sup>, goats<sup>13</sup>, cattle<sup>14</sup> and humans<sup>15</sup>. Affected animals may show other anomalies in the genital system such as cryptorchidism, underdeveloped prepuce, penile hypoplasia, hermaphroditism or pseudohermaphroditism.<sup>11</sup> In this paper, we report penile hypospadias associated with testicular agenesis in two German shepherd puppies. According to the location of urethral orifice, penile form was considered for hypospadias in these cases. Similar to our findings, there are some reports of hypospadias in dogs.<sup>4,7,16</sup> In animals, perineal hypospadias is the most common form while the glandular form frequently is seen in humans.<sup>4</sup> Accordance with our findings, penile hypospadias in dogs was described previously.<sup>4,6,7,10</sup> Perineal hypospadias was the highest prevalence<sup>4,7,10,11,12</sup>; while, other forms of this abnormality such as anal; scrotal and glandular were infrequently detected.<sup>3,4</sup> In this report, we observed bilateral testicular agenesis in one puppy while the other had unilateral defect with absence of scrotal sac. Compared to our findings, unilateral agenesis of the right testicle was described by Ndikuwera<sup>6</sup> whilst hypospadias and bilateral cryptorchidism have been also reported.<sup>4,7,16</sup> Guimarães et al. (2013) reported periurethral hypospadias with bilateral cryptorchidism and absence of scrotal sac in a mongrel dog. Hypospadias and testicular agenesis are heterogeneous etiologically and pathogenetically.<sup>7</sup> The precise etiology of both conditions is unclear.<sup>16,17</sup> Sexual differentiation is determined according to establishment of chromosomal, gonadal, or phenotypic sex. Therefore,

abnormalities in one of them could result in sex anomalies.<sup>2</sup> Classification of sex disorders depends on cytogenetic assessment, and pathologic evaluations of different parts of the reproductive system. Hypospadias and testicular agenesis have been described in human sex disorders<sup>2</sup> but they were not defined in animals precisely. Chromosomal anomalies, especially in sex chromosome are well documented in human cases with hypospadias.<sup>2</sup> It is believed that hypospadias is a form of pseudohermaphroditism in animals and humans. Jurka et al. (2009) reported hypospadias in a hermaphroditism dog based on karyotyping and hormonal profile. Different congenital and environmental factors are also postulated such as inadequate production of androgens, estrogen exposure and organochlorines.<sup>4,6,9,10</sup> In this study, hypospadias and testicular agenesis had a probably congenital origin according to the age of animals. Furthermore, two out of six puppies were affected which one male and three female dogs were normal. Therefore, it could indicate that these abnormalities are likely to be inheritable genital birth defects. Unfortunately, we did not perform further investigations to classify sex disorders and evaluate hermaphroditism in the affected puppies.

Hypospadias occurrence is rare in dogs compared to other animal species and humans.<sup>7,9</sup> It seems that incidence rate of reproductive abnormalities, especially hypospadias is underestimated due to little attention and careless examination of newborns. Asymptomatic patients could be discharged without any treatment. However, it is essential to prevent recurrent urinary tract infections or reproductive complications. Therefore, surgery is recommended to reconstruct of severe malformations.<sup>1,4</sup> The importance of elimination of affected dogs from natural or assisted reproductive programs should be emphasized by veterinary practitioners.

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## چکیده

### هایپوسپادیاس و اجنزیس بیضه در دو توله ژرمن شپرد

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**توصیف بیمار-** در این گزارش درمانگاهی، هایپوسپادیاس و اجنزیس بیضه در دو توله ژرمن شپرد ارجاعی به بیمارستان دامپزشکی با تاریخچه سستی، بی‌اشتهایی، دیس‌اوری، بی‌اختیاری در دفع ادرار، درماتیت شدید ناشی از ادرار سوختگی و پیودرم در ناحیه شکمی توصیف شده است.

**علائم بالینی-** معاینه بالینی شکل‌گیری ناکامل ناحیه خارجی تناسلی، مشتمل بر هیپوپلازی پنیس و پریپوس همراه با فقدان غلاف پریپوس در نوک پنیس را مشخص نمود. به علاوه، هر دو بیضه در بررسی بالینی و اولتراسونوگرافی یکی از موارد مشاهده نشد، در حالی که توله دیگر اجنزیس یک طرفه بیضه را نشان داد.

**درمان و نتیجه:** یکی از توله‌ها قبل از انجام هرگونه روش تشخیصی یا درمانی تلف شد. برداشت بقایای پنیس و پریپوس همراه با پراسکروتال اورتروستومی در رابطه با توله دیگر که در آن هایپوسپادیاس و اجنزیس یک طرفه بیضه تشخیص داده شد، انجام گرفت. کاربرد بالینی - یکی از مسائل قابل توجه در پرورش سگ، ناهنجاری‌های دستگاه تناسلی خارجی است. در این مطالعه، هایپوسپادیاس و اجنزیس بیضه به عنوان دو اختلال نادر تناسلی احتمالاً با منشاء مادرزادی بودند. اهمیت حذف سگ‌های درگیر از برنامه‌های تولید مثلی باید توسط دامپزشکان تأکید گردد.

**کلید واژگان-** هایپوسپادیاس، اجنزیس یک طرفه و دوطرفه بیضه، سگ.