

## Scientific Report

# Hypospadias in goats

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(Received 20 Apr 2008; revised version 23 Feb 2009; accepted 17 Mar 2009)

## Summary

Hypospadias is an uncommon congenital defect of urinary tract in farm animals. This defect has been recorded rarely in calves, lambs and foals in the world. The aetiology of hypospadias is not well understood, it seems to be multifactorial and may be related to genetic, endocrinological, and environmental factors. During April to October 2007, twenty-four goat kids with signs of hypospadias were referred to the Veterinary Hospital of Kerman University, Iran. The age of patients ranged from one week to three months old. Penile and testicular hypoplasia were observed in all of them. In one case, ectopic penis (between anus and scrotum) was found. In one goat, opening of the urethra was located in the scrotal region and in the others it was in the penile position. Urine had leaked into the subcutaneous tissue of the ventral abdominal wall and prepuce but the skin of the swollen area was normal and no signs of urine scalding were visible. For the treatment of patients, penile urethrostomy at the proximal region of the defect was performed by suturing the urethral epithelium to the skin with 3-0 nylon sutures in a simple interrupted pattern. There was no complaint about postoperative complications from goat's owners.

**Key words:** Hypospadias, Goat, Iran

## Introduction

Congenital defects of the urinary tract are not common in farm animal (Dennis and Leipold, 1979). Hypospadias is a rare congenital malformation of the urethra in domestic mammals. To the author's knowledge, there has been only one report of hypospadias in goat kids (Al-Ani *et al.*, 1998). The most frequently reported defects of the urinary tract in goats are intersexes, testicular hypoplasia and unilateral cryptorchidism (Al-Ani *et al.*, 1998).

Hypospadias is imperfect closure of the external male urethra (Radostits *et al.*, 2007). Affected animals may have other congenital or developmental anomalies such as cryptorchidism, which is reported to be the most congenital anomaly associated with hypospadias. Hypospadias is classified based on the location of the urethral opening as glandular, penile, scrotal, perineal and anal. In some cases the penis may be

underdeveloped and abnormal (Alam *et al.*, 2005).

The aetiology of hypospadias is not well understood, it seems to be multifactorial and may be related to genetic, endocrinological, and environmental factors (Silver, 2000). In the majority of cases the etiology remains elusive, but generally it is considered as a congenital deformity that may be caused by extra- or intra-uterine factors resulting defects in androgen metabolism and/or androgen receptors (Uda *et al.*, 2004). The purpose of this report is to present 24 cases of hypospadias in goats and their surgical management.

## Case presentation

Over a 6-month period, from April to October 2007, twenty-four goat kids from eight flocks with signs of hypospadias were referred to the Teaching and Research Hospital of the Faculty of Veterinary

Medicine, Shahid Bahonar University of Kerman, Iran. The herd size was between 15 to 50 goats. The goats were kept indoors during the night and were grazed during daytime. In addition to grass feeding and grazing in pistachio orchards, grain and other feedstuffs including alfalfa and hay were supplied according to the availability and need. The age of patients ranged from one week to 3 months old. Penile and testicular hypoplasia were observed in all of them. In one case, ectopic penis (between anus and scrotum) was seen (Fig. 1). In one goat opening of the urethra was located in the scrotal region and in the others it was in the penile position. Physical examination of the kids revealed that all of them were male, not hermaphrodites or pseudo-hermaphrodites. Urine leaked into the subcutaneous tissue of the ventral abdominal wall and prepuce but the skin of the swollen area was normal and no signs of urine scalding were visible.



**Fig. 1: Ectopic penis, between anus and scrotum**

### **Surgical technique**

Surgical treatment has been carried out on all cases (24 goat kids). The goats were sedated by administering xylazine hydrochloride (Rompun<sup>®</sup>, Bayer) at 0.05 mg/kg IV, then they were placed in dorsal recumbency and the caudal abdominal and perineal regions were surgically prepared with 7.5% povidone-iodine surgical scrub. Local anesthesia was used by circumferential injection of 1% lidocaine hydrochloride solution around the skin of the swollen area. Penile urethroscopy at the proximal region of the defect was performed by suturing the urethral epithelium to the



**Fig. 2: Penile urethroscopy at proximal region of the defect**

skin with 3-0 nylon sutures in a simple interrupted pattern (Fig. 2).

Postoperative treatments included intramuscular injection of penicillin-streptomycin (20000 IU/kg – 20 mg/kg) for 5 days, daily lavage of wound with normal saline and topical nitrofurazone ointment. After 2 weeks, there were no complications such as significant wound infection, dehiscence of wounds, obstruction in the artificial opening and dysuria in the operated kids. Until now, there is no complaint about postoperative complications from goat's owners.

### **Discussion**

The development of the external male genitalia is a complex process, involving genetic programming, cell differentiation, hormonal signaling, enzyme activity, and tissue remodeling. A disturbance in these processes might lead to disruption of the fusion of the urogenital folds at different sites along the urogenital tract. Environmental toxicants and xenoestrogens, acting during fetal life, have been partly implicated in an increasing incidence of hypospadias, as well as other reproductive tract abnormalities (Baskin *et al.*, 2001). Recently, association between environmental oestrogen-like compounds and hypospadias has been suggested (Sharpe and Skakkebaek, 1993). Several lines of evidences have suggested that oestrogens can modulate serum androgen levels. An additional concept explaining these disorders is of androgen-oestrogen imbalances created by endocrine disruptors, affecting androgen production and action (Tazuke *et al.*, 1992; Bay *et al.*, 2006).

Familial clustering of hypospadias among first-degree relatives, as well as twin studies and segregation analysis have supported a strong heritable component in this disorder in human (Fredell *et al.*, 2002). Hypospadias is also thought to be inherited in sheep and dogs but this has not been confirmed because there have not been sufficient cases to study (Dennis, 1974; Hayes and Wilson, 1986); however, this deformity is one of the most common congenital anomalies in human (Baskin, 2000).

In a postmortem study of 4417 lambs, only ten (0.2%) had hypospadias (Dennis, 1974). In dogs, the incidence of hypospadias has been reported to be 0.003% (Hayes and Wilson, 1986). Individual cases of hypospadias have been reported in cattle, horses and cats (Kumi-Diaka and Osori, 1979; King and Johnson, 2000; Bleul *et al.*, 2007).

One possible explanation for increase in the incidence of hypospadias may be environmental contaminations. Farm animals are constantly exposed to oestrogenic compounds which are known for their ability to disrupt reproduction, the so-called oestrogenic endocrine disruptors (Kim *et al.*, 2004). Recent studies have shown that prenatal exposure to synthetic oestrogens induces hypospadias in the mouse genital tubercle. This animal model supports the hypothesis that oestrogenic endocrine disruptors may be responsible for the increased incidence of hypospadias in farm animals. Vilela *et al.* (2007) believe that maternal consumption of phytoestrogen (plant oestrogen) present in soy products, can cause hypospadias in mouse model, too.

Recent changes in agriculture, particularly the increasing organic farming together with more expensive fertilizers, have led to wider cultivation of red clover. It is well known that red clover contains phytoestrogens. Phytoestrogens are available in many foodstuffs. Even low concentrations, but prolonged exposure may cause phytoestrogens in the body to reach biologically significant levels (North and Golding, 2000). It seems that grazing in pistachio orchards may play an important role in this abnormality, too. North and Golding (2000) discussed the more indirect role of phytoestrogens; rather than having a

direct oestrogenic effect, they may interact with other factors in the diet and lead to an interference with normal oestrogen biosynthesis.

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