Proceedings of the 36th World Small Animal Veterinary Congress WSAVA

Oct. 14 - 17, 2011
Jeju, Korea

Next Congress:

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Recessed or juvenile vulva is frequently observed in female dogs of all ages. This may be a normal finding unaccompanied by clinical problems. However, some dogs with recessed vulva develop persistent, repeated infections of the vagina or bladder, and owners may confuse associated symptoms with urinary incontinence. It is often impossible to achieve long-term relief with antibiotic therapy alone, and surgical correction of the recessed conformation of the vulva facilitates treatment of lower urinary tract infection.

Introduction
Urinary tract infection (UTI) occurs commonly in dogs, and it has been suggested that as many as 15% of all dogs develop UTI during their lifetime [1]. The presence of renal failure or metabolic disorders such as hyperadrenocorticism or diabetes mellitus predisposes animals to urinary tract infection [1]. Accurate determination of the specific bacteria present and the pattern of antimicrobial sensitivity are critical to successful treatment of UTI. Recurrent or persistent UTI may be the result of: 1. use of an inappropriate antibiotic; 2. use of an appropriate antibiotic but for an insufficient length of time; 3. failure to perform urine culture after antibiotic therapy has been discontinued for at least 7 days to confirm control of the infection; 4. presence of calculi; 5. undetected pyelonephritis; 6. prostate disease; or 7. anatomic abnormalities which interfere with treatment of UTI.

Contribution of Recessed Vulva to Persistent UTI
Primary vaginitis in the absence of structural or hormonal abnormalities is uncommon in dogs. Systemic antibiotic therapy, with or without local flushing of the vagina and vulva, is usually unsuccessful in providing long-term control of vaginitis. Chronic vaginitis is also often associated with urinary tract infection, and it is assumed that this is the result of ascending migration of bacteria. In dogs with chronic vaginitis and/or chronic urinary tract infection, consideration should be given to correcting structural abnormalities, particularly a recessed location of the vulva, as part of the treatment. Chronic urinary tract infection can contribute to apparent
urinary incontinence by causing continued irritation and instability of the bladder leading the animal to initiate urination to alleviate discomfort. It has also been hypothesized that urine may be retained within the vagina as a result of structural abnormalities and that this volume of urine may be discharged periodically resulting in evidence of incontinence.

It must be emphasized that not all dogs with a recessed (sometimes referred to as “juvenile”) vulva will suffer perivulvar dermatitis, chronic vaginitis, or ascending UTI. However, the presence of one or more of these disorders concurrent to recessed conformation of the vulva raises the index of suspicion that the anatomy of the vulva may contribute to the onset or persistence of one or more of these conditions. In one study, correction of recessed vulva resulted in resolution of perivulvar dermatitis in 14 of 15 female dogs and resolutions of symptoms of UTI in all 16 female dogs treated [2]. In another study, surgical correction of recessed vulva was associated with resolution of UTI in 16 of 19 female dogs and pervivular dermatitis in 16 of 20 female dogs [3]. Both these studies indicated that improvement in UTI and perivulvar dermatitis was durable after surgery, although perivulvar dermatitis recurred in 1 dog after substantial weight gain.

Bacteria were cultured from 11 of 15 dogs evaluated for vestibulovaginal stenosis, and it was concluded that surgical correction of vaginal stenosis facilitated treatment of chronic or recurrent UTI in these dogs [4]. It was assumed that vaginal stenosis resulted in urine retention, and vaginectomy or resection and anastomosis of the stenotic area were the most effective forms of surgical treatment. However, an extremely high percentage of female dogs have vaginal stenosis in the absence of clinical symptoms, and no correlation was found between vaginal diameter and lower urinary tract disease in one study [5]. Similarly, the presence of a vaginal septum usually remains undetected unless difficulties are encountered during breeding, and there is no evidence that vaginal septa contribute to chronic vaginitis or ascending UTI. Historically, many veterinarians have attributed vulvar hypoplasia to performance of ovariohysterectomy at an early age, but carefully controlled studies have failed to confirm this [6].

Treatment

Obesity may contribute to development of redundant skin folds that overly the vulva and aggravate this problem; however, recessed vulva can also be observed in relatively thin dogs. In the author’s experience, resection of the redundant skin folds around the vulva (vulvoplasty) has been very effective in controlling perivulvar dermatitis and chronic urinary tract infection and/or urinary incontinence in dogs with a recessed conformation of the vulva. Vulvoplasty is performed by removing an inverted “U”-shaped piece of skin dorsal and lateral to the vulva. In most dogs, there is a large amount of redundant skin available for closure. The amount of skin to be removed can usually be estimated by pinching the perivulvar skin between the thumb and fingers. It is often helpful to use a sterile marking pen to draw the proposed line of incision. This can be reassessed and redrawn to achieve the desired effect. The benefit of having the line of incision clearly marked is that it is easy to lose orientation relative to the vulva because the surrounding tissue is very mobile. It is uncommon that too much skin is removed, and a far more common error is to remove an insufficient amount, leaving the vulva in a recessed position. However, the amount of skin to be removed should be carefully assessed in each dog, because complications with wound healing due to excessive skin tension can occur. The wound is typically closed in 2 layers. Subcutaneous tissues are closed with 3-0 or 4-0 monofilament absorbable suture in an interrupted pattern, and the skin is closed with 3-0 suture in an interrupted pattern. Careful spacing
of sutures will allow primary closure despite the fact that the length of the peripheral incision is greater than that of the incision adjacent to the vulva.

References