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Medical and surgical treatment of USMI

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The medical treatment of USMI is the method of choice and should always precede a surgical therapy. The action of the used substances implies an increase of the urethral closure pressure. In the first line alpha-adrenergic agonists are used. The effect of these sympathomimetic drugs is explained by the fact, that 50% of the urethral closure pressure is generated by the sympathetic nervous system. Alpha-adrenergic agonists improve the urethral closure pressure by stimulation of the alpha-receptors of the smooth urethral musculature (1-6). The treatment with alpha-adrenergic agonists results in continence in 75% of incontinent bitches.

An alternative is the treatment with estrogens, which is successful in 65% (7-9). But with estrogens unwanted side effects can occur such as swelling of the vulva and attractiveness for male dogs (8). Nowadays only short-acting estrogens are used (10). The depot preparations used in the past are obsolete, in part because they can potentially cause a bone marrow depression (11). Estrogens indirectly increase the urethral closure pressure; they sensitise the alpha-receptors for endogenous and exogenous catecholamines (12). If therapy with alpha-adrenergic agonists is unsatisfactory, a combination with estrogens may potentiate the effect.

The alpha-receptors are divided in alpha1- and alpha2-subtypes. These receptor subtypes are distributed differently in each single effector. Alpha-1 receptors are found in many target organs of the sympathetic nervous system. With a few exceptions, alpha-2 receptors are not present in target organs of the sympathetic nervous system, but in neuronal synapses. It is now known, that the alpha-receptors at the bladder neck and proximal urethra of the bitch, which are responsible for continence, belong to the subtype 1 (13).

The side effects of alpha-adrenergic agonists is explained by the fact that alpha-1 receptors are not just found at the bladder neck, but also in other organs, especially in the wall of blood vessels. Phenylpropanolamine (PPA) acts selectively on alpha-1 receptors.

The older substance Ephedrine is less selective than PPA. It also stimulates beta-receptors and therefore has the tendency to have more side effects (1,2). In contrast to PPA a habituation to Ephedrine occurs. Because of these reasons PPA is the therapy of first choice.

In humans treatment with PPA sometimes causes side effects, such as an increase in blood pressure and headache. It may occasionally trigger a stroke or a heart attack and is therefore no longer used. With PPA used in dogs, at the recommended dose of 1.5 mg/Kg BW bid or tid, an increase in blood pressure was not observed (4, 14). The side effects

observed in dogs were never life threatening and usually were self-limiting; diarrhoea, vomiting, anorexia, apathy, nervousness and aggressiveness (6,7,15).

For refractory cases different surgical therapies are available, of which colposuspension (16), urethropexy (17) and the endoscopic injection of collagen (18) are mainly used, with a success rate of 50 – 75%. With all three techniques a deterioration in the response rate was seen over time. At our clinic, we prefer the endoscopic injection of collagen as this method is least invasive, with a minimal rate of complications and the results are as good as the more invasive techniques.

Colposuspension (16): The bitch is placed in dorsal recumbency with the hind limbs flexed. A Foley catheter is used to empty the bladder. The catheter cuff is inflated with air and drawn into the neck of the bladder. A caudal, midline, abdominal skin incision is made. The prepubic tendon is exposed on both sides of the mid-line. The external pudendal vessels are identified and avoided. Traction on the bladder allows the bladder neck to be identified due to the presence of the inflated Foley catheter cuff. An index finger is inserted through the vulva and used to displace the vagina cranially. The fat and fascia around the ventral bladder neck and proximal urethra are separated until the vaginal wall is exposed dorso-lateral to the urethra. The vaginal wall is grasped with Allis tissue forceps on each side of and approximately one centimetre away from the proximal urethra. The surgeon withdraws the finger from the vagina and changes his gloves. The vagina on each side of the proximal urethra is anchored to the prepubic tendon using two 0 or 1 monofilament nylon sutures. Sutures are taken through the full thickness of the vaginal wall and are pre-placed. Before tying, tension is placed on the sutures to determine that strangulation of the urethra between the vagina and pubis would not occur. Once the sutures are tied, a final examination is performed to confirm that the urethra is freely moveable between the vagina and pubis and is not compressed in any way. The beneficial effect of the operation may be the resultant re-location of the bladder, bladder neck and proximal urethra into an intra-abdominal position.

Urethropexy (17): A caudal midline celiotomy is performed. Blunt dissection in the midline is used to visualise the ventral aspect of the urethra at the level of the cranial pubic brim. A suture of 2/0 or 0 polypropylene is placed caudal to one prepubic tendon so that it enters the caudal

abdomen. While traction is applied to the bladder neck and urethra via the bladder neck stay suture, the polypropylene suture is passed transversely through the muscular layers of the adjacent urethra. Once placed through the urethra, the suture is passed caudal to the opposite prepubic tendon and out of the abdominal cavity. The suture ends are held together with a pair of haemostatic forceps. The procedure is repeated, with a second polypropylene suture being placed through the urethral wall approximately 3 to 5 mm cranial to the first. Both the polypropylene sutures are now tied. This results in the closure of the most caudal aspect of the celiotomy incision and fixation of the urethra to the ventral abdominal wall at the end of the cranial pubic brim. The mechanism of action remains uncertain, although re-location of the bladder neck into an intra-abdominal position and the production of a localised increase in urethral resistance are likely consequences of the procedure.

Urethral submucosal injection of collagen (18): The goal of treatment is to enhance the closure of the proximal urethra. Under general anaesthesia, the patient is placed in dorsal recumbency with the hindlimbs extended cranially. Then under cystoscopic control three collagen deposits (Zyplast®, Collagen International Inc. Lausanne, Switzerland) are injected in a circular manner approximately 1.5 cm caudal to the bladder neck (18). In 19 of 32 (=59%) bitches urinary incontinence resolved with a single collagen injection, but 5 bitches still needed phenylpropranolamine for complete continence. A second injection was performed in 9 dogs, of which 5 became continent, including two bitches with additional medication. The final success rate was 75%. An aim of a recent study was to evaluate the long-term success of the endoscopic injection of collagen. After a mean observation period of 33 months the final success rate was 68% (19).

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