

Retrograde ejaculation in a stallion

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- ▶ Retrograde ejaculation may be more prevalent than assumed.
- ▶ Large numbers of spermatozoa may be obtained from the urinary bladder of affected horses even when normal ejaculation appears to occur.
- ▶ Evaluation of a urine sample obtained via bladder catheterization after ejaculation is a simple diagnostic procedure that should be used to investigate the possibility of retrograde ejaculation in stallions that apparently fail to ejaculate or when the ejaculate is lower in volume and contains fewer spermatozoa than expected.

A 5-year-old Arabian stallion achieved an 80% seasonal pregnancy rate when bred to a limited number of mares (< 10) by natural cover. During subsequent breeding seasons, pregnancy rates declined. The stallion seemed to vocalize more than usual in the breeding shed and developed aggressive behavior toward mares and the stallion handler. This became most noticeable during the stallion's third year at stud, when hemorrhage from the penis was noticed when the stallion dismounted. Hematuria was observed for 3 days after the incident, and the stallion vocalized during urination. The owner declined endoscopic examination of the urethra. Hemospermia and hematuria resolved spontaneously with sexual rest. During the following 2 breeding seasons, attempts to collect semen by use of an artificial vagina resulted in continued aggressive behavior, low semen volumes, and poor pregnancy rates, but no further hemospermia. At 10 years of age, the stallion was referred to a university reproduction laboratory for evaluation and to have semen frozen to avoid further handling problems in the breeding shed.

At referral, the stallion was in good physical condition. Abnormalities of the external genitalia and testes were not detected. The stallion was taken to the breeding shed and, after being sexually aroused with a mare in estrus, was encouraged to mount a breeding phantom and ejaculate into an artificial vagina. Behavior of the stallion was considered to be somewhat unruly but not overly aggressive. Seven milliliters of gel-free semen was obtained and contained 625×10^6 spermatozoa/ml (4.4×10^9 total spermatozoa) of which 55% were motile. Subsequent attempts to collect semen from the horse during the next several days were unsuccessful. During these attempts, the stallion had good libido, readily mounted the phantom, and thrust vigorously after entering the artificial vagina.

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However, despite typical ejaculatory behaviors, including tail flagging, urethral pulsations, postejaculatory quiescence, and erectile refractoriness, the collection receptacle remained devoid of semen.

Medical treatment with imipramine hydrochloride (1.76 mg/kg [0.8 mg/lb] of body weight, PO, q 12 h) was instituted. Four days after initiation of treatment, an ejaculate was collected, consisting of 20 ml of gel-free semen that contained 4.2×10^9 spermatozoa. The stallion was sexually rested for 5 days at which time another semen collection was attempted. Two hours before this collection attempt, the stallion was sedated with a combination of xylazine (0.66 mg/kg [0.3 mg/lb], IV) and butorphanol (0.01 mg/kg [0.005 mg/lb], IV) to facilitate urinary bladder catheterization, which yielded 113 ml of urine that was free of spermatozoa. Subsequently, an ejaculate was obtained, which consisted of 8.8×10^9 spermatozoa in 24 ml of gel-free semen. Immediately after semen collection, the stallion was placed in stocks, sedated again as described, and the bladder was catheterized. Twenty-five milliliters of urine that contained 625×10^6 spermatozoa was aspirated from the bladder. Spermatozoa were enumerated by use of a hemacytometer. Administration of imipramine was continued, and the stallion was sexually rested for 1 week. Subsequently, another semen collection attempt obtained 7 ml of gel-free semen that contained 880×10^6 spermatozoa. The following day, another collection attempt was made, but although the stallion had behavioral signs of ejaculation, no semen was obtained. Again, the stallion was immediately placed in stocks, sedated as described, and the bladder was catheterized, yielding 220 ml of urine that contained 1.21×10^9 spermatozoa. Endoscopic examination of the urethra, seminal colliculus, and bladder did not reveal abnormalities.

On the basis of the history and clinical findings, a diagnosis of idiopathic retrograde ejaculation was made. Whether the retrograde ejaculation in this stallion was associated with the previous painful ejaculation and hemospermia could not be confirmed. Because the owner felt that the stallion did not have substantial commercial value at stud and was deemed difficult to handle in the breeding environment, further diagnostic tests and treatment were declined. The stallion was eventually castrated and was subsequently used solely as a pleasure horse for riding.

There are 2 distinct physiologic events, emission and ejaculation, that conclude the act of copulation. Emission (the release of spermatozoa and accessory gland fluids into the urethra) results from contraction of smooth muscles surrounding the caudae epididymides, deferent ducts, ampullae, vesicular glands, and prostate gland. Simultaneous bladder neck contraction keeps the urethral orifice of the bladder closed. Emission and closure of the urethral sphincter

are mediated by sympathetic stimulation of α -adrenergic receptors. The arrival of semen in the caudal portion of the urethra appears to trigger ejaculation, which is the forceful expulsion of semen from the urethra. The ejaculatory reflex is mediated via the pudendal nerve and parasympathetic sacral outflow. The propulsive force of ejaculation results from the rhythmic contractions of the striated bulbospongiosus, ischiocavernosus, and urethralis muscles as well as the associated movement of the pelvic floor musculature.^{1,2}

The retrograde flow of spermatozoa into the bladder of humans during the ejaculatory process was first described by De Albuquerque^a in 1939, where it was termed retrospermia. Since 1950, the term retrograde ejaculation has been used.² Retrograde ejaculation is well-documented in humans and has been reported in various domestic animals, including rams,^{3,4} bulls,⁵ dogs,⁶⁻⁹ and cats.^{10,11} Retrograde ejaculation in stallions has been suspected but previously had not been substantiated by the recovery of substantial numbers of spermatozoa from the bladder.¹

Processes that interfere with competency of the urethral sphincter may result in retrograde ejaculation. These processes may be neurogenic, myogenic, or neuromuscular. Neurogenic causes often result from traumatic or surgical injury to sympathetic innervation, whereas myogenic and neuromuscular causes typically result from surgery to the pelvic urethra or neck of the bladder. In humans, prostatectomy and radical bilateral retroperitoneal lymphadenectomy are the most common urologic surgical procedures resulting in retrograde ejaculation. Extensive pelvic surgery involving the colon and rectum, medical conditions such as multiple sclerosis and diabetic neuropathy, congenital defects, and drugs that interfere with sympathetic tone have also been associated with retrograde ejaculation in humans.²

Most reports of retrograde ejaculation in domestic animals are associated with semen collection via electroejaculation.^{3-5,10,11} In dogs, retrograde ejaculation has been associated with hypothyroidism⁹ and sedation with xylazine.^{7,12} It also appears that some degree of retrograde ejaculation may be physiologic in dogs⁷ and cats.¹¹

Retrograde ejaculation is suspected in humans who report a small volume of ejaculate or absent ejaculate after orgasm. The diagnosis is confirmed when 10 to 15 spermatozoa/high-power field are observed in a urine specimen obtained after ejaculation.¹³ However, caution should be exercised when interpreting voided urine samples, because the spermatozoa obtained may originate from the urethra rather than the bladder.¹⁴ Catheterization of the bladder of clinically normal horses immediately after ejaculation will yield spermatozoa but in low numbers.

Several approaches have been used to circumvent infertility caused by retrograde ejaculation in humans, including medical and surgical treatments as well as artificial insemination and assisted reproductive technologies that use spermatozoa obtained from the bladder. Spermatozoa obtained from the bladder are extremely fragile, and successful use requires gentle handling as well as proper adjustment of urine pH and osmolarity prior to ejaculation.²

Medical treatment of retrograde ejaculation is based on increasing sympathetic tone at the neck of the bladder or decreasing parasympathetic activity. α -Adrenergic agents used to restore antegrade ejaculation in humans include phenylpropanolamine hydrochloride, synephrine, midodrin, ephedrine sulphate, and pseudoephedrine hydrochloride.^{2,13} The anticholinergic drug brompheniramine has also been used to successfully treat retrograde ejaculation in diabetic patients. These drugs as well as the tricyclic antidepressant imipramine hydrochloride are more effective when administered for 4 days rather than when 1 or 2 doses are administered.¹³ After several unsuccessful semen collection attempts, the stallion described in this report was treated with imipramine for 4 days after which semen was successfully collected.

At doses used to treat depression in humans, tricyclic antidepressants may have adverse effects on ejaculation.¹⁵ However, when low doses of tricyclic antidepressants are used, anejaculation is alleviated.¹⁶ Similar efficacy has been reported with the use of imipramine in stallions with long-term ejaculatory dysfunction in which imipramine appeared to enhance ejaculation.¹ Imipramine also appears to enhance contractility of the bladder neck during emission and, as such, has been useful in treating urospermia.¹ The mechanism of action is not completely understood, but apparently tricyclic antidepressants and their metabolites promote α -adrenergic activity by inhibiting the reuptake of norepinephrine.¹

The stallion reported here had all of the clinical signs indicative of retrograde ejaculation in humans, including low volume of ejaculates, lack of semen despite other signs of ejaculation, and large numbers of spermatozoa in the bladder after semen collection attempts. It is interesting that large numbers of spermatozoa ($25 \times 10^6/\text{ml}$) were recovered from the bladder of this stallion, even when semen was collected. This may indicate that retrograde ejaculation in stallions may be more prevalent than presently assumed. Low seminal volume may be related to failure of bladder neck closure, because emission and bladder neck closure are primarily mediated via α -adrenergic mechanisms.¹ In stallions that are suspected of having this condition, obtaining a urine sample via bladder catheterization after ejaculation is a simple procedure that should be used as an aid in diagnosis.

^aDe Albuquerque J. A clinical and therapeutic study of retrospermism (abstr). *Arch Basil di Andrologia* 1939;1:113.

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