XYLAZINE-INDUCED EX COPULA EJACULATION IN STALLIONS

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ABSTRACT

This study is a part of ongoing work toward developing pharmacological methods of enhancing and inducing ejaculation in stallions with ejaculatory dysfunction. We evaluated ex copula ejaculatory response to treatment with the alpha-adrenergic agonist xylazine hydrochloride, with and without preliminary sexual stimulation. Twenty-eight mature stallions each received, in random order, one xylazine trial (0.3 mg/lb, i.v.) without preliminary sexual stimulation, one xylazine trial with 5 to 10 min of sexual prestimulation, and one control trial (equivalent volume sterile water injection). Trials were conducted in the animal stalls. Ejaculation occurred in 15 of 56 (27%) xylazine trials. No ejaculations occurred in the sterile water control trials. In trials with sexual prestimulation, ejaculation occurred in 39% compared with 14% in trials without prestimulation. This difference was significant ($P < 0.05$). Xylazine-induced ejaculates were collected into a plastic bag attached to a girth and were similar to those obtained by artificial vagina. Nine of the 15 ejaculations occurred within 2 min of injection.

Key words: stallion, ejaculation, alpha-adrenergic agonist, xylazine

INTRODUCTION

Xylazine, an alpha-adrenergic agonist, is used routinely in veterinary medicine as a sedative and as an analgesic for dogs, cats and horses (1). Stallions have been observed occasionally to ejaculate within a few minutes of intravenous injection of xylazine. In two recent cases involving stallions with long-term ejaculatory dysfunction, we used xylazine (0.3 mg/lb i.v.) to induce ejaculation ex copula (2) as an alternate method of collecting semen for breeding. These stallions failed to ejaculate in copula and xylazine appeared to induce ejaculation with much greater frequency than we had casually observed in stallions tranquilized with similar dosages for other purposes. One possible explanation for this difference in ejaculatory response is that xylazine treatment was preceded by prolonged daily sexual interaction without ejaculation. It is possible that this teasing may have led to a state of heightened readiness to ejaculate. Also, the routine situations in which animals are tranquilized with xylazine may involve manipulation or disturbance of the animal that interferes with ejaculation. To better understand pharmacologically-induced ex copula ejaculation, the primary objective of our study was to quantify the frequency of ejaculation following xylazine treatment in normal stallions, both at rest and following sexual stimulation without copulation. Secondary objectives were to evaluate the ejaculates obtained in this manner and to establish the typical latency period between treatment and ejaculation.

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MATERIALS AND METHODS

General Design

Each of twenty-eight stallions underwent three treatment trials in random order, at 3- to 5-d intervals. The three treatment conditions consisted of xylazine without sexual prestimulation, xylazine with sexual prestimulation, and sterile water (control) treatment. The difference in the proportion of trials in which ejaculation occurred between conditions was tested using the z-test (3).

Subjects

Twelve horse and 16 pony stallions, housed in individual box stalls or kept at pasture at the Hofmann Center, University of Pennsylvania, were used as subjects. These stallions ranged in age from 2 to 22 yr and were all sexually experienced. The stallions had been used as subjects of semen research at the same facility.

Trials

Xylazine treatment consisted of intravenous injection of 0.3 mg/lb xylazine hydrochloride.[a] This is typically the highest dosage at which an animal remains stable in a standing position and it is the dosage that was used to induce ejaculation in the above-referenced clinical cases. Control treatment consisted of injection of an equivalent volume of sterile water. Following injection, the stallion was allowed to stand undisturbed in the stall for 30 min. Trials were video recorded. Pretreatment sexual stimulation consisted of 5 to 10 min of continuous teasing to one or more estrous mares, ending at least 15 min before commencement of a treatment.

Ejaculates were collected using a plastic bag positioned over the prepuce by a girth strap. Ejaculates were evaluated according to Kenney et al. (4) for comparison with values for ejaculates obtained from these stallions by artificial vagina methods in earlier trials.

RESULTS

No ejaculations occurred during the 28 sterile water control trials. Fifteen ejaculations occurred during the 56 xylazine trials (27%), each from a different stallion. Eleven (39%) of these occurred in the pretreatment sexual stimulation condition, and the remaining four (14%) occurred without sexual prestimulation. The proportions (4 of 28 and 11 of 28) are statistically different ($z = 2.11$, $P < 0.01$). Ejaculations occurred at 0.5, 0.6, 0.75, 1.3, 1.5, 1.25, 1.5, 1.5, 1.8, 2.5, 3.0, 3.1, 4, 4.5, and 10 min following treatment. Ejaculations occurred with the typical sequence and number of jets. Ejaculation was typically preceded by jerky lifting of the tail and twitching of the perineal muscles and prepuce. Erection never occurred, and in most instances the penis remained in the sheath or dropped only three to four inches before ejaculation occurred.

For 12 of the 14 semen samples evaluated, volume, pH and concentration of spermatozoa were similar to ejaculates obtained from the stallions by artificial vagina during previous trials. One of the atypical ejaculates was low in volume, with a concentration of spermatozoa approximately four times that routinely obtained

a Haver Laboratories, Shawnee, KS.

from this stallion by artificial vagina. The other atypical ejaculate contained a disproportionately large volume of gel (greater than 50 cc gel, 30 cc gel-free semen). Interestingly, this was from a stallion that had not produced gel in any of the 15 ejaculates collected by artificial vagina during a previous 3-mo study. Sperm concentration and volume of the gel-free portion of the ejaculate were similar to those of ejaculates collected by artificial vagina from the stallion.

DISCUSSION

Xylazine treatment resulted in ejaculation ex copula in 15 of 56 trials (27%) in the animals with normal ejaculatory function in copula. Sexual prestimulation led to a significantly higher ejaculation frequency.

Frequency of ejaculation following xylazine treatment, both with and without sexual prestimulation, was considerably lower than that observed in the two clinical case stallions similarly treated with xylazine (3 of 3 and 7 of 8). The 5-10-min sexual prestimulation period used in this study was considerably shorter than the hours of teasing that preceded xylazine treatment of the clinical case stallions. In addition to teasing, one of the clinical case stallions typically repeatedly mounted, inserted and thrust without ejaculation. This copulatory activity may have resulted in a more complete priming for ejaculation. For example, the accessory glands typically enlarge with precopulatory interaction (5). With prolonged copulatory interaction without ejaculation, engorged accessory glands may more readily emit their contents, triggering the ejaculatory reflex. Perhaps longer teasing as well as allowing mounting and thrusting without ejaculation would further increase the frequency of xylazrne-induced ejaculation in normal stallions. In addition, stallions experiencing ejaculatory dysfunction may also be hypersensitive to exogenous adrenergic stimulation, perhaps as a result of altered receptor populations secondary to reduced endogenous adrenergic stimulation.

The mechanism by which xylazine induces ejaculation in stallions is not readily apparent. Alpha$_1$ receptor events appear to be the the principal adrenergic mediation of erection and ejaculation, while alpha$_2$-events have been implicated in the CNS arousal component of sexual behavior (6-8). Xylazine has both alpha$_1$- and alpha$_2$-adrenergic effects, both centrally and peripherally (1), but it has been viewed as promoting predominantly alpha$_2$-events.

We have successfully employed this method for obtaining semen from a stallion unable to ejaculate during copulation due to reduced hind limb strength associated with aortic-iliac thrombosis (2). The method has also been used to obtain semen from a stallion with extremely low libido (authors' unpublished observations). We are presently evaluating alpha-adrenergic agents for the enhancement of ejaculation in copula.

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