

Use of pharmacologically induced ejaculation to obtain semen from a stallion with a fractured radius

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α -Adrenergic agents can successfully induce ex copula ejaculation in stallions with injuries that would preclude normal sexual arousal, mounting, or thrusting.

Y Genetic material from valuable stallions with life-threatening or debilitating injuries can be preserved by freezing semen obtained by pharmacologically induced ejaculation.

A 13-year-old Quarter Horse stallion was admitted for surgical repair of a spiral fracture of the radius. The fracture was repaired, using internal fixation, and recovery from anesthesia was uncomplicated. Two days after repair of the fracture, the stallion had signs of abdominal pain. Palpation per rectum revealed a cecal impaction. The impaction was corrected surgically, and recovery from anesthesia again was uncomplicated. After surgical correction of the cecal impaction, the stallion had intermittent pyrexia and was gradually becoming increasingly lame on the fractured limb. Eleven days after internal fixation of the radius, radiography revealed disruption of the fracture repair. Because of failure of the fixation, euthanasia was recommended. The owners inquired about the possibility of semen collection and freezing prior to euthanasia of the horse.

Because of the horse's fracture, it was unlikely that semen could be collected by standard techniques that involved pelvic thrusting while standing or mounted. Pharmacologically induced ejaculation with the stallion standing quietly in a stall was recommended. If semen could be obtained without undue stress to the stallion, and if results of a semen freezing test were satisfactory, the owners were willing to prolong the life of the stallion for 24 to 48 hours to allow for collection and freezing of additional ejaculates. The testes were palpated prior to collection and were found to be soft.

It was decided to initially administer clomipramine hydrochloride in an attempt to induce ejaculation with minimal sedative effects.¹ If ejaculation was not induced within the first hour, xylazine hydrochloride would be administered to provide ad-

ditional α -adrenergic stimulation.¹⁻³ A collection device consisting of an embroidery hoop (15 mm in diameter) and attached plastic bag^a was positioned over the stallion's prepuce and held in place with a girth strap fashioned out of elastic bandage wrap.^b Six minutes later, 900 mg of clomipramine (2.2 mg/kg of body weight) was administered IV through a previously placed indwelling jugular catheter. Penile erection was detected 7 minutes after administration of the clomipramine. Penile erection and masturbation were noticed intermittently, accompanied by dripping of presperm fluids, but the stallion did not ejaculate. Fifty-five minutes after clomipramine administration, 200 mg of xylazine (0.5 mg/kg) was administered IV through the jugular catheter. Approximately 2 minutes after xylazine administration, the horse ejaculated semen in a series of 6 ejaculatory jets. After clomipramine treatment, the horse was quietly alert to barn activity. Within 30 seconds of xylazine administration, the horse reached a plane of light sedation, but remained standing.

While ejaculation was being induced, preparations were made for immediate evaluation, processing, and freezing of the semen. Within 5 minutes of collection, the ejaculate was evaluated, using guidelines established by Kenney et al.⁴ Although the sperm concentration and total number of spermatozoa in the ejaculate would have been adequate to allow immediate addition of extender and to attempt freezing, poor motility rendered the ejaculate unsuitable for freezing. Morphologic assessment of the sperm was not performed in light of the poor motility (Table 1).

Table 1—Results of evaluation of semen samples obtained from a 13-year-old Quarter Horse stallion with a spiral fracture of the radius

Variable	Source of sample	
	Pharmacologically induced ejaculate	Epididymal... aspiration/flush
Volume (ml)	4	<0.5
Sperm concentration (per ml)	1,188 x 10 ⁶	1,100 x 10 ⁶
Total No. of sperm (x10 ⁹)	4.75	ND
Total motile sperm (%)	<5	<5
Progressively motile sperm (%)	0	1

^aCollected after administration of clomipramine hydrochloride and xylazine hydrochloride. ...Collected after stallion was euthanized.
ND = not determined.

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The stallion was euthanatized, using an overdose of barbiturate.^c Within 10 minutes of euthanasia, the testes were removed. The epididymides were separated from the testicular parenchyma and were minced. Spermatozoa were aspirated and flushed from the tail of the epididymides and evaluated for motility. Although motility of the epididymal sperm was slightly better than that of the ejaculated sperm, it was still inadequate for freezing (Table 1). Longevity of motility was extremely poor, with none of the sperm having progressive motility after 3 minutes in a skim milk/glucose extender at ambient room temperature (approx 22 C).

Although pharmacologically induced ejaculation has been attempted in clinically normal horses, as well as horses with ejaculatory dysfunction and aorto-iliac thrombosis,^{3,5} it has not been reported in a clinical situation involving a horse with a debilitating musculoskeletal injury. In experiments that used pony stallions, a combination of imipramine and xylazine induced ejaculation without prior sexual stimulation in 10 of 24 (42%) trials.¹ In the disabled stallion reported here, ejaculation was smoothly and efficiently induced, and an ejaculate representative of the stored epididymal sperm was obtained. The ejaculate had a sufficient concentration of sperm, such that it could have been immediately extended and frozen.

Many owners of stallions with disabling conditions desire an evaluation of a stallion's potential fertility so that informed decisions can be made on the cost effectiveness of veterinary care. In addition, owners of valuable stallions with life-threatening disabilities often inquire as to the possibility of preserving a stallion's genetic qualities through the use of semen freezing prior to further deterioration of the horse's condition. Physical disabilities may preclude the use of standard semen collection techniques. In some of these cases, semen collection that uses an artificial vagina or manual stimulation can be attempted with the stallion standing on the ground, thus eliminating the need for the stallion to mount a mare or dummy.^{6,7} However, because the horse must become sexually aroused and thrust vigorously, use of these techniques still are limited by the physical condition of the stallion and, in most cases, the need for immediate availability of a mare.⁹ Furthermore, some stallions require a period of training before they learn to thrust and ejaculate without mounting.^{7,8} Other modifications of standard collection techniques, such as the use of an artificial vagina with the horse leaning into a support device, have been attempted with various degrees of success.⁸ Electroejaculation has been performed in equidae and could be considered as an alternative semen collection technique for disabled stallions, but semen obtained typically is unsatisfactory for freezing, and general anesthesia is required.⁹ Mammalian sperm aspirated from the tail of the epididymis are capable of fertilizing ova.^{10,11} To our knowledge, however, use of this technique

and freezing of epididymal sperm have not been performed successfully in clinical situations.

The ejaculatory reflex currently is understood to be primarily an α -adrenergically mediated event.¹²

-Adrenergic agents such as imipramine and clomipramine are used widely in human beings as anti-depressants and are known to influence erection and ejaculation.^{13,15} Disturbances of or facilitation of sexual response, including orgasm and ejaculation, are potential effects of treatment with these compounds.¹⁶ In addition to their α -adrenergic effects, these tricyclic compounds have several effects in the CNS involving norepinephrine, dopamine, and serotonin systems, each of which plays a role in male sexual arousal, erection, and ejaculation.¹⁷

α -Adrenergic agents have been used to induce ejaculation in stallions. In horses, imipramine induces penile erection and masturbation, and increases ejaculation during masturbation.⁵ This technique does not require a mare for sexual stimulus, nor does it require any physical activity on the part of the stallion. The only prerequisite is that the stallion stand quietly during the procedure.^{3,5} Xylazine is an α -adrenergic agonist used routinely in veterinary medicine as a sedative and analgesic for dogs, cats, and horses.¹⁸ It has been reported anecdotally that an ancillary effect of xylazine use in stallions is ejaculation within a few minutes of IV injection. These horses ejaculate without developing penile erection and without masturbating.

Imipramine¹ and xylazine^{1,3} have been evaluated in experiments that were conducted on clinically normal stallions for the specific purpose of developing protocols for pharmacologically induced ejaculation. Despite research, the ideal protocol for pharmacologic induction of ejaculation in debilitated stallions has not been established. In the horse described here, we attempted to tailor the protocol to the stallion's unstable musculoskeletal condition. In our experience, doses of imipramine or clomipramine that induce ejaculation result in minimal musculoskeletal instability and little sedation compared with doses of xylazine that induce ejaculation. Therefore, we proceeded initially with clomipramine treatment. Although penile erection and masturbation were observed, the stallion had not ejaculated by 55 minutes after clomipramine administration. In healthy pony stallions that did not ejaculate within 60 minutes of imipramine treatment, the administration of xylazine resulted in ejaculation in 2 of 10 instances.² Therefore, we proceeded with xylazine administration.

Semen obtained after induction of ejaculation with xylazine or imipramine/xylazine combinations is of comparable quality to that obtained via in copula methods.¹⁻³ Ejaculates pharmacologically induced by the use of imipramine/xylazine combinations are of low volume and extremely high sperm concentration, making them ideal for freezing with currently available techniques. Comparison of post-thaw motility of sperm rich in copula

ejaculates and post-thaw motility of ex copula induced ejaculates were not significantly different.² Spermatozoa obtained immediately after euthanasia from the tail of the epididymides of the stallion in our report were of similar poor quality to sperm in the ejaculated sample. Poor semen quality may have been a result of intermittent fever, medications administered during hospitalization, or other unrelated factors.

Pregnancy rates obtained with use of frozen semen vary widely among stallions, and, thus, it is strongly recommended that a stallion successfully complete a rigorous screening process before being used in a semen freezing program.¹⁹ Without prior fertility evaluation, use of frozen semen can produce disappointing results. Nonetheless, pharmacologic induction of ejaculation to obtain semen for freezing does provide for the possibility of preserving genetic material from valuable stallions in extreme circumstances.

^aTail Mitt, Nasco, Fort Atkinson, Wis.

^bVetrap, 3M, St Paul, Minn.

^cBeuthanasia solution, Schering-Plough Animal Health, Kenilworth, NJ.

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