Chemical Ejaculation of Stallions After the Administration of Oral Imipramine Followed by Intravenous Xylazine

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The administration of oral imipramine followed by intravenous xylazine may enable practitioners to collect semen from stallions relatively simply, without the aid of a mare or the use of an artificial vagina. Success rates can be very high for some stallions and conversely low for others. By paying careful attention to the method of teasing, drug protocol, and excitement level of the stallion, we can increase our chances for success. Authors’ addresses: Avon Animal Hospital, Box 2406 Windsor, Nova Scotia B0N 2T0, Canada (Johnston) and Annapolis Animal Hospital, 8902 Commercial St., New Minas, Nova Scotia B4N 3C8, Canada (DeLuca). © 1998 AAEP.

1. Introduction

Many equine veterinarians have been contacted at one time or another by stallion or mare owners regarding the natural mating of a mare who will not stand for breeding, even though she appears to be in a strong heat. In general, these breeders are not set up for artificial insemination, or if they are, they may not have a collection mare in heat. Veterinarians and stallion owners have also been faced with the prospect of collecting semen from or hand breeding aggressive stallions for which the proper handling facilities are not available. Less frequently, we also encounter physically disabled stallions from whom semen cannot be collected without great difficulty. It is under these circumstances that we should consider the use of chemical ejaculation of the stallion for semen collection and subsequent artificial insemination. It is our opinion that the suppression of natural breeding afforded by this method of semen collection may also be beneficial toward the training of acceptable manners or behavior of show stallions.

Erection, emission, and ejaculation in the male are thought to be mediated primarily by the sympathetic nervous system through alpha-adrenergic stimulation and smooth muscle contraction. Emission is thought to be primarily an \( \alpha_1 \) event, with ejaculation being primarily mediated through \( \alpha_2 \) stimulation. Previous reports on chemical ejaculation describe the use of several different protocols. McDonnell was able to induce ejaculation in 75% of her trials on eight pony stallions by using prostaglandin \( \text{F}_2 \alpha \) (PGF\(_{2\alpha}\)) at a dose of 0.01–0.15 mg/kg.\(^1\) These results, however, were only attained after each stallion was first treated with prostaglandin to establish an effective dosage for ejaculation. The mechanism...
thought to be responsible for ejaculation after prostaglandin administration is smooth muscle stimulation.

Imipramine alone has been used in research studies for ex copula ejaculation, with success rates ranging 33–37%. Imipramine is a tricyclic antidepressant often used to influence erection, emission, and ejaculation in men. It is thought to act through a variety of pathways such as alpha-adrenergic stimulation and the inhibition of the central uptake of norepinephrine, serotonin, and dopamine. Xylazine alone has been used to induce ex copula ejaculation, with a success rates varying among individual trials. One reported study had an overall success rate of 27%. In this report, ejaculation occurred in 39% of the stallions that received sexual stimulation, compared with 14% who did not receive stimulation. The mechanism through which xylazine acts is not fully understood. Sexual arousal, erection, and ejaculation are thought to involve both \( \alpha_1 \) and \( \alpha_2 \)-adrenergic mechanisms. Although xylazine is primarily thought to be an \( \alpha_2 \) agonist, it is believed to have an effect on both pathways to induce ejaculation. The administration of intravenous imipramine followed by intravenous xylazine has produced variable success rates, depending on the protocol used. Imipramine (1.5–2.5 mg/kg) has been administered with or without sexual stimulation and then followed by xylazine between 10 and 60 min later. Success rates varied (33–53%), depending on the interval between medications, sexual stimulation, and the relative calm of the horse. The highest success rates (53%) were achieved when the horse was not prestimulated, received 2 mg/kg of imipramine, received 0.3 mg/kg of xylazine 1 h following imipramine, and was kept in a calm environment. Card and co-workers in Saskatoon used 200 mg of imipramine followed 1 h later by 150 mg of xylazine to induce ejaculation in a 22-year-old disabled Thoroughbred stallion. This ejaculate was used on five mares, four of which conceived on that particular mating. However, four subsequent attempts using similar and different dosages of imipramine and xylazine failed to induce ejaculation in this horse. When this combination protocol is used, ejaculation may also occur following the administration of imipramine alone.

2. Methods

The method used for ejaculation in this study is similar to that reported by McDonnell and Odian in 1994, except that imipramine was administered orally instead of intravenously. Six breeding stallions owned by five different farms were given this treatment for a total of 14 trials, as outlined in Table 1. The stallions ranged in age from 2 to 16 years. They were all in good health and had no reported infertility problems from previous matings. No two stallions were of the same breed. Semen from these collections were not all evaluated for concentration, as this would have been impractical in the field situations in which the study was conducted. However, a small sample from each ejaculate was checked for sperm content and percent of progressive motility. As is usually the case when intravenous imipramine and xylazine are used, the samples had a very dense concentration of spermatozoa on gross examination and a percent of progressive motility in the 70–90% range.

Fifty-milligram tablets of imipramine were crushed and mixed with feed for oral administration. The dose ranged 0.75–2.0 mg/kg. This was found to be convenient because owners could administer the medication 1–2 h before attempting collection at their premises. Before semen collection, the stallion was exposed to either an estrous mare or urine-soaked bedding material from an estrous mare, or it was not prestimulated in any manner. Follow-

### Table 1. Results of Ejaculation Trials

<table>
<thead>
<tr>
<th>Horse No.</th>
<th>Breed</th>
<th>Weight (kg)</th>
<th>Age (yr)</th>
<th>Collection Attempt</th>
<th>Imipramine Dose (mg)</th>
<th>Arousal Method</th>
<th>Approximate Time to Ejaculation (Postxylazine) (min)</th>
<th>Approximate Semen Volume (cc)</th>
<th>Mare Bred Conception</th>
<th>Individual Success Rate%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Belgian Warmblood</td>
<td>500</td>
<td>5</td>
<td>1</td>
<td>400 Bedding</td>
<td>2</td>
<td>50</td>
<td>Yes</td>
<td>Yes</td>
<td>57%</td>
</tr>
<tr>
<td>2</td>
<td>Quarter Horse</td>
<td>450</td>
<td>16</td>
<td>1</td>
<td>500 Bedding</td>
<td>10</td>
<td>40</td>
<td>No</td>
<td>—</td>
<td>33%</td>
</tr>
<tr>
<td>3</td>
<td>Latvian Warmblood</td>
<td>550</td>
<td>10</td>
<td>1</td>
<td>600 Bedding</td>
<td>—</td>
<td>None</td>
<td>—</td>
<td>—</td>
<td>33%</td>
</tr>
<tr>
<td>4</td>
<td>Hanoverian</td>
<td>575</td>
<td>12</td>
<td>1</td>
<td>800 Bedding</td>
<td>10</td>
<td>40</td>
<td>Yes</td>
<td>Yes</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>Swedish Warmblood</td>
<td>410</td>
<td>2</td>
<td>1</td>
<td>600 Bedding</td>
<td>—</td>
<td>None</td>
<td>—</td>
<td>—</td>
<td>0%</td>
</tr>
<tr>
<td>6</td>
<td>Canadian</td>
<td>465</td>
<td>10</td>
<td>1</td>
<td>800 Bedding</td>
<td>5</td>
<td>50</td>
<td>—</td>
<td>—</td>
<td>100%</td>
</tr>
</tbody>
</table>

*The overall success percentage was 57%.
STALLION

ing a short period of prestimulation when the stallion calmed down and was relaxed in his stall, xylazine 0.3 mg/kg IV\(^b\) was administered. The stallion’s handler or someone familiar with the horse would then very quietly take a seat beside the horse’s front shoulder, out of kicking range. The collection device used was made from a wire coat hanger bent in a circular fashion. A plastic bag was then attached and held in place with clothes pins. If necessary, an extension handle could be attached for further safety. This device resembles a collection basket as seen in many churches. However, care must be taken to avoid startling or touching the horse with the basket apparatus. If ejaculation occurred, it was usually within 3–15 min of xylazine administration, with or without erection. In one horse, on one attempt, the xylazine administered appeared to produce an inadequate level of sedation, and thus another 100 mg of xylazine was administered intravenously. Ejaculation occurred 5 min later.

3. Results

Table 1 shows the results of the procedures. Ejaculation was successfully induced in eight out of 14 attempts for an overall success rate of 57%. As seen, there is individual variation among stallions. Stallion 1 could only have semen collected successfully if bedding from an estrous mare was used for arousal or no prestimulation of any form was used. On two occasions when a estrous mare was present in the barn, ejaculation did not occur. This stallion was stabilized with and surrounded by geldings only and would become excessively aroused and anxious when exposed to an estrous mare. Stallion 2 was older with more breeding experience and was collected successfully on both attempts by using an estrous mare for prestimulation. This method of semen collection was attempted only once on Stallion 3, using bedding for prestimulation. This stallion did not ejaculate. Interestingly, this horse had ejaculated once before, after receiving only xylazine for dental work. Stallion 4 ejaculated approximately 10 min after xylazine was administered. This sample was used to breed a mare located on another farm whose owner was reluctant to transport her horse. This stallion was not trained to use an artificial vagina. The mare conceived with twins on this breeding, one of which was pinched uneventfully. Stallion 5 was less mature than the other stallions (2 years old). On both attempts at semen collection he was stalled next to an estrous mare and seemed a bit anxious prior to xylazine administration. This stallion did not ejaculate on either attempt. Stallion 6 had a substantial amount of urine in his ejaculate. By using a basket with a handle and not a harness, we were able to let the initial jet of urine hit the floor and then collect the actual semen. This required a good eye and a quick hand. Semen from this stallion was also collected on one occasion by adding 5 mg of butorphanol to the xylazine. All stallions for which semen was collected by using this method ejaculated within 12 min after xylazine had been administered.

4. Discussion

The percentages of successful semen collections in this study are slightly higher than those in previous research reports that used a similar protocol with intravenous imipramine and xylazine. This is not very significant given the small sample of stallions used in this study, but it is encouraging nonetheless. Interestingly, personal observations of other researchers have suggested that results are curiously often much higher when a similar protocol is used for stallion semen collection in clinical settings versus those results obtained from planned research work. Some of the failures in this study may have been due to inadequate doses of imipramine and insufficient time for absorption following oral administration. This was concluded because these horses did not appear sedate and showed no inclination toward masturbation, as many horses do after imipramine administration. Perhaps the use of bedding from an estrous mare gives us the advantage of sexually stimulating a stallion while still maintaining a peaceful environment. Many of the failures may have been related to the use of an estrous mare for sexual prestimulation. If only the trials in which no mare was used were considered, a success rate of 66% would have been achieved. Stallion 2 was put in a stall beside the mare to be bred and not teased using direct contact because the mare had a foal by her side and consequently was vicious toward the stallion. One could question whether or not this constituted sexual prestimulation. This horse ejaculated on both attempts under these circumstances.

Stallion 6 was at pasture with the mare used for prestimulation for several months prior to this protocol. She was an older mare and the owner wished to try this method of semen collection and artificial insemination in order to minimize chances for contamination during breeding. Because the mare did not appear ready to breed on ultrasound exam and palpation, insemination was not performed on the first visit. In fact, it is doubtful that the mare was in heat at all on this occasion. The excitement level of this stallion was minimal in response to this particular mare on both occasions, although she was shown to be in heat on the second visit. Regardless of the circumstances surrounding collection, it would appear that the most important factor is the relative calm of the horse before and after xylazine administration. Also, it would appear that for many horses sexual prestimulation using a mare could diminish chances for a successful collection. This has also been observed by other veterinarians and seems to be key in achieving higher numbers of successful ejaculations using xylazine with or without imipramine.\(^c\)

In light of the unpredictability of results obtained by using this procedure, it would not be wise to rely
solely on it to collect semen for a mare with impending ovulation. The main advantage of this procedure is that it is very inexpensive and requires little or no capital outlay for a practice that does not regularly service stud farms. It also offers a reasonable chance of successful breeding in a relatively simple manner, compared with natural mating or traditional semen collection by means of an artificial vagina. In the future, the owner of stallion 1 will use fresh semen obtained by using this protocol for artificially inseminating mares when semen collection attempts are successful, and he will have frozen semen available for postovulation breeding when they are not. We also believe that this protocol offers an interesting alternative to traditional semen collection for the freezing of semen. The use of imipramine often results in an ejaculate that is free of accessory fluids and is the sperm-rich fraction only. Previous research by McDonnell, et al. confirmed that semen collected by chemical ejaculation freezes as well as semen collected by traditional methods. It is our intent to begin freezing semen collected in this manner. A basket apparatus was used in this study since the stallions were not accustomed to a harness attached over their prepuce, which we felt could potentially cause anxiety, resulting in failure. However, McDonnell described the use of a simple, lightweight collecting device that was well tolerated by stallions. The majority of circumstances under which this protocol was used were indeed breeding situations that involved unwilling participants. By using oral imipramine we can achieve results similar to those found with its intravenous use with less expense and more convenience. Further research is needed to formulate a perfect chemical cocktail for ejaculation. In the meantime, it appears that each horse may require a unique set of circumstances for successful chemical ejaculation.

References and Footnotes