

## Ejaculatory failure associated with aortic-iliac thrombosis in two stallions

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**A**ortic-iliac thrombosis is an acquired disease of unknown pathogenesis primarily affecting the terminal portion of the aorta, and the internal and external iliac arteries. The most common clinical sign is exercise intolerance manifested as hind limb lameness. Other clinical signs include increased saphenous vein refill time and coldness of hind limbs.<sup>1</sup> Diagnosis can be made tentatively by palpation per rectum and definitively by ultrasonography.<sup>2</sup> In this report, we describe 2 horses with aortic-iliac thrombosis that were examined because of ejaculatory failure.

A 17-year-old Standardbred stallion (stallion 1) was referred for evaluation of ejaculatory failure. After several years of successful breeding, the stallion had developed transient ejaculatory difficulty in spite of excellent libido and willingness to mount and serve the artificial vagina. No pattern had been noticed in the ejaculatory dysfunction, except that it had occurred more frequently toward the end of each of the previous 2 breeding seasons. During the first month of the current breeding season, the stallion regularly ejaculated on the first mount. Then the stallion experienced a fall from the dummy mare, after which he failed to ejaculate in spite of apparently normal mounting and vigorous thrusting. Efforts to solve the ejaculatory problem had involved changing height and angle of the dummy mount, using an estrous mount mare, and using indoor and outdoor breeding areas.

Our initial examination was performed at the farm. The stallion had not ejaculated for 2 weeks. He had excellent libido, readily mounted the dummy, maintained erection, and thrust vigorously (6 to 10 or more strong pelvic thrusts), but failed to ejaculate. For some mounts, after several vigorous thrusts, the stallion would lie on the dummy mount with both hind limbs dangling freely and quivering. The stallion remained on the dummy mount for an unusually long time (1 to 2

minutes). When encouraged to dismount, the stallion did not support his weight on his hind limbs and dismount normally. During some mounts, the stallion's hind limbs advanced farther under the dummy mount than usual, and he appeared unable to reposition his hind limbs appropriately. During some dismounts, he stumbled or fell over on his side. To evaluate alternative semen collection techniques, efforts were made to stimulate thrusting while the stallion was standing on the ground. With manual stimulation<sup>3,4</sup> or use of a Missouri model artificial vagina,<sup>a</sup> some pelvic thrusting was elicited. However, the stallion lunged forward clumsily and was too unstable in the hind limbs to proceed safely. Palpation per rectum revealed no abnormalities of the internal genitalia and no evidence of pelvic fracture.

The horse was subsequently admitted to the referral center for further evaluation of hind limb weakness and ejaculatory failure. Musculoskeletal and neurologic examinations performed with the horse at rest revealed no abnormalities that would account for the hind limb weakness. Ultrasonographic examination per rectum revealed no abnormalities of the internal genitalia. However, ultrasonographic examination of the terminal portion of the aorta revealed aortic thrombosis involving the dorsal surface of the aorta and occluding 60 to 70% of the terminal portion of the aorta (Fig 1). The thrombus extended from the caudal aspect of the external iliac arteries to the cranial portion of the origin of the internal iliac arteries, protruding up to 4 cm into the lumen.

Therapy to assist the stallion to ejaculate was aimed at reducing pain on exertion and developing a breeding procedure that would best accommodate the compromised hind limb function. Phenylbutazone (2.0 g, 7 am and 4 pm, <sub>PO</sub>) was administered and, in an attempt to maximize sexual arousal and possibly lower the ejaculatory threshold, 50 µg of gonadotropin releasing hormone<sup>b</sup> was administered *sc* at 2 hours and again 1 hour before breeding.<sup>5</sup> Several variations of ground collection with artificial vagina<sup>6</sup> or manual stimulation<sup>3</sup> were

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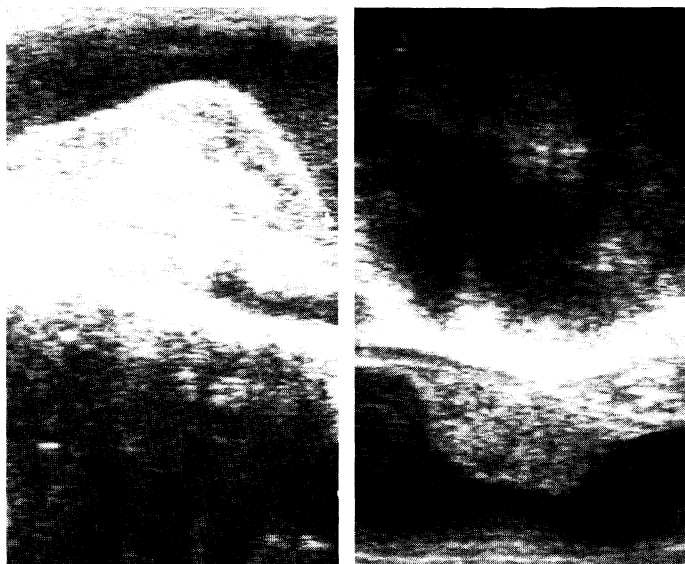


Figure 1—Ultrasonograms of thrombus originating from the dorsal wall of the terminal portion of the aorta from stallion 1 (left) and stallion 2 (right).

attempted. Because of the stallion's hind limb deficiencies, a wall with a circular opening (approximately 76 cm) at shoulder height was constructed to aid in ground collection.<sup>c</sup> The stallion was allowed to tease a mare positioned on the opposite side of the wall by extending his head and neck through the opening, with his shoulder leaning against the lower portion of the opening. Semen collection was attempted with the stallion thus maximally aroused yet with minimal exertion of the hind limbs. The stallion failed to ejaculate with any ground collection methods. The stallion was then allowed to mount a relatively short mare facing downhill (30 degree slope) on a grassy area with firm footing. To achieve maximal arousal, the stallion was teased for 5 to 10 minutes before the first mount. Using a Missouri model artificial vagina with hot water (55 C tap water) and high pressure, and with the addition of warm compresses (45 C) applied to the base of the penis for additional stimulation, the stallion ejaculated for the first time since hospitalization. Semen was collected 3 times weekly by this method. One to 3 attempts to mount were permitted in the morning of any given collection day. If the stallion did not ejaculate, the procedure was repeated in the afternoon.

The stallion was returned to the breeding farm with the recommendation to breed 3 times weekly, using the described successful procedure. During the subsequent breeding season, the stallion bred 25 mares, resulting in 20 pregnancies. A treadmill exercise program was initiated after the first breeding season to stimulate collateral circulation to the hind limbs. The horse initially tolerated only a few minutes of exercise, but worked up to 20 minutes of continuous exercise. During the subsequent breeding season, the horse was much stronger during breeding and routinely ejaculated on the first mount without medication.

An 11-year-old retired racing Standardbred stallion (stallion 2) was referred for evaluation of ejaculatory failure. The stallion had 2 successful years at stud but near the end of his second breeding season had shown intermittent ejaculatory failure. During the third breeding season and subsequent 18 months, he had not ejaculated despite numerous treatments at several locations. During this period of ejaculatory dysfunction, a stallion ring made of umbilical tape had been applied to inhibit spontaneous erection and masturbation that was suspected to be contributing to the ejaculatory failure. After the ring had been unattended for approximately 1 month, it was discovered embedded in the penis. The ring was excised and the wound healed with a circumferential scar, 4 inches proximal to the glans. The stallion was moved to a different farm. Upon arrival at that farm, the stallion had poor libido, which gradually improved over the next 3 months.

Our initial evaluation consisted of observing the horse during his routine breeding procedure on the farm. This included 10 minutes of treadmill exercise immediately prior to breeding, a regular practice for all stallions on this farm. The stallion had excellent libido, good coupling, and prolonged thrusting, but failed to ejaculate despite numerous mounts. The stallion tended to lie on the dummy mount and appeared weak in the hind limbs after prolonged thrusting. There was no obvious gait deficit at the walk or trot.

The stallion was admitted to the referral center for further evaluation. Initial attempts to collect semen yielded results similar to those on the farm, with the exception that the stallion appeared stronger in the hind limbs. Ultrasonography per rectum revealed no abnormalities of the reproductive tract; however, an aortic-iliac thrombus was revealed in the terminal portion of the aorta. The thrombus originated from the dorsal wall of the aorta and occluded the lumen approximately 70%

<sup>c</sup>Cooper WL. Lana Lobell Farm. Montgomery, NY: Personal communication, 1985.

(Fig 1). The thrombus also extended into both internal iliac arteries, but did not affect the external iliac arteries.

Therapy for ejaculatory dysfunction proceeded as outlined for stallion I, including phenylbutazone and gonadotropin releasing hormone<sup>b</sup> treatment. With a live mount mare, hot artificial vagina (50 C), and warm (45 C) compresses at the base of the penis, the stallion ejaculated on 2 of 6 occasions. The 2 ejaculations each occurred during a mount subsequent to one during which the scar on the penis split open as the glans flared. After each occasion when the scar had split, the stallion proceeded to copulate (and ejaculate) in a normal manner. Semen measures were within normal ranges.<sup>7</sup>

An alternate method of collecting semen was used when the stallion failed to ejaculate while mounted. This involved IV administration of 300 mg of xylazine hydrochloride<sup>d</sup> to the stallion standing quietly in his stall.<sup>8</sup> On 3 of 4 occasions, ejaculation occurred within 2 to 5 minutes of injection. Semen was collected in a plastic bag positioned over the prepuce and secured by a girth strap. Semen measures were within normal ranges.

The stallion was returned to the breeding farm with the recommendation to continue phenylbutazone treatment throughout the breeding season and to collect semen by use of the breeding shed procedure described. Treatment with gonadotropin releasing hormone<sup>b</sup> could be used when necessary to enhance arousal. In the event ejaculation was not achieved in the breeding shed, the xylazine method could be used.

At the farm, semen was collected 3 to 4 times weekly, within 2 to 5 mounts. Xylazine was used only once and was successful. Within 60 days of its return to the farm, the stallion was bred to 12 mares, and 10 of those mares were confirmed pregnant. Following that breeding season, the stallion's daily exercise was gradually increased and maintained at 1 to 2 hours-at the walk and trot daily throughout the year. During the subsequent breeding season, the stallion bred 13 mares, usually ejaculating on the first or second mount.

Ejaculatory failure in association with aortic-iliac disease may result from at least 3 mechanisms: (1) vascular compromise to the pelvic reproductive tract and penis, (2) disturbance of autonomic innervation mediating erection, emission, and the ejaculatory reflex, and (3) pain upon exertion resulting from vascular insufficiency. Both horses of this report had compromised circulation to the structures supplied by the internal iliac arteries. Branches of the internal iliac arteries supply the accessory genital glands as well as the ductus deferens and pelvic urethra.<sup>9</sup> Compromised vascular supply to the pelvic urethra and accessory glands may have adversely affected emission and the ejaculatory reflex. In men with aorto-iliac disease,

erectile, not ejaculatory, dysfunction is usually the primary complaint.<sup>10</sup> The erectile dysfunction is believed to be caused by vascular insufficiency to the penis. Human internal and external iliac arteries bifurcate from the common iliac arteries. Because the lesion usually is located at the point of bifurcation, both erectile and ejaculatory functions may be compromised. In horses, the internal and external iliac arteries branch directly from the aorta rather than from common iliac arteries. In the 2 stallions of this report, the lesion was caudal to the external iliac branches. The external iliac supply to the erectile bodies of the penis evidently was not affected and the vascular compromise was probably limited to the internal iliac arteries.

Neurologic deficits leading to ejaculatory disturbance in men with aorti-iliac disease have been explained in terms of mechanical pressure of the aortic aneurysm on the closely apposed sympathetic hypogastric plexus. In horses with aorti-iliac disease, the aorta as well as the internal and external iliac arteries may enlarge up to 3 times normal size.<sup>1</sup> These enlarged vessels may impinge on the closely apposed caudal mesenteric plexus and the hypogastric nerve,<sup>11</sup> and therefore disturb autonomic control of emission and the ejaculatory reflex. Both stallions of this report had marked enlargement of the terminal portion of the aorta, with the thrombus originating from the dorsal aortic wall.

Pain in the hind limbs (lower limbs) attributable to ischemia upon exertion is a component of aortic-iliac disease in horses<sup>1,12</sup> and men.<sup>13</sup> For the 2 stallions of this report, the major blood supply to the hind limbs via the branches of the external iliac arteries, was not obviously compromised. Pain and weakness on exertion, alleviated by treatment with phenylbutazone, may have been caused by compromised internal iliac supply to the muscles of the croup and buttock. The downhill arrangement of a small mount mare for stallion 1 reduced the amount of exertion required and weight on the hind limbs during mounting and thrusting.

Both stallions returned to stud, ejaculated regularly, and rendered mares pregnant. Although it is difficult to separate the specific components contributing to ejaculatory failure in these cases, treatment aimed at minimizing exertion, reducing pain, and increasing stimulation of the penis enabled the horses to continue breeding. In stallion 1, a rigorous long-term exercise program appeared to improve reproductive function. In stallion 2, treadmill exercise just before each breeding seemed to adversely affect breeding performance. Because many horses with this condition begin to have clinical signs after a rest period, clinicians sometimes recommend a gradually increasing exercise program to improve collateral circulation. An exercise program helped stallion 1 and may have been helpful for stallion 2 if initiated prior to the

<sup>d</sup>Haver Laboratories, Shawnee Kan.

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breeding season and not done immediately before breeding.

Azzie<sup>12</sup> described reduced fertility resulting from testicular atrophy in a stallion with aortic-iliac thrombosis. He postulated that the changes may have been secondary to ischemia. The testicular artery lies sufficiently cranial to the aortic quadrification to question whether aortic-iliac thrombosis would compromise blood supply to the testes.<sup>1</sup> Testicular atrophy was not clinically detectable in either stallion 1 or 2.

A confounding aspect of stallion 2 was the use of the stallion ring and resulting scar on the penis. The scar, by constricting the penis, complicated evaluation and probably contributed to the ejaculatory dysfunction. Spontaneous erection and masturbation are normal stallion behaviors that do not adversely affect fertility.<sup>14</sup> Therefore, devices to inhibit them should not be used in breeding stallions.

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