Comparison of the diagnosis and management of unilaterally castrated and cryptorchid horses at a referral hospital: 60 cases (2002–2006)

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Objective—To determine the incidence of unilaterally castrated horses among horses admitted to the hospital for castration and to compare horses that underwent previous unilateral castration with horses that had cryptorchism.

Design—Retrospective case series.

Animals—16 unilaterally castrated horses and 44 cryptorchid horses.

Procedures—Medical records of horses that were admitted to the veterinary medical teaching hospital for castration, including cryptorchid and unilaterally castrated horses, between January 2002 and December 2006 were reviewed. Medical records of unilaterally castrated horses and cryptorchid horses were examined for age, breed, history, diagnostic procedures, surgical technique of cryptorchidec- tomy, location of the retained testicle, and cost of surgery.

Results—Of 160 horses admitted for castration, 16 (10%) had undergone previous unilateral castration and 44 (27.5%) had cryptorchidism. Unilaterally castrated horses were significantly older than cryptorchid horses. No significant difference was found in left versus right distribution of testicles. No significant difference was found in abdominal versus inguinal distribution of left-sided testicles. Unilaterally castrated horses had a significantly lower proportion of right inguinal testicles, compared with cryptorchid horses. The cost of diagnosis and management of unilaterally castrated horses was significantly greater than in cryptorchid horses.

Conclusions and Clinical Relevance—Results indicated that the distribution of retained testicles is significantly different in unilaterally castrated horses, compared with cryptorchid horses, which may affect the selection of diagnostic and surgical approaches to unilaterally castrated horses. (J Am Vet Med Assoc 2007;231:931–934)

Cryptorchidism is a frequently occurring congenital defect in horses and is a commonly encountered condition in equine practice.1,2 Retention of the testicle occurs with equal frequency on the left and right side. However, left-sided cryptorchid testicles are more frequently located in the abdomen (75.2%) and right-sided cryptorchid testicles are more frequently located in the inguinal region (58.2%).3 It is recommended that, prior to performance of a castration, the horse be examined to locate both testicles to select the appropriate anesthetic and surgical method.1 However, when failure to remove the second testicle occurs, through an inability to locate or physically remove the testicle, the result is a unilaterally castrated horse. The practice of unilateral castration should be condemned because of the detrimental effect on the welfare of the horse, the possibility of fraud, and the resulting difficulties faced by the veterinarian in the surgical treatment of a horse for unilateral castration.4 Unilateral castration occurs most frequently as a result of failure to completely castrate the unilateral cryptorchid stallion.5 The prevalence of unilateral castration among stallions undergoing castration has been described as 4.5%6 and 18.1%.7 Findings of previous studies6–8 indicate that unilateral castration occurs in 5% to 41% of cryptorchid horses undergoing castration. The horse with an unknown castration history or gelding displaying stallion-like behavior may require the use of diagnostic techniques including physical examination, hormone assays, ultrasonography, and laparoscopy to identify the testicle prior to surgical removal.1,2

The purposes of the study reported here were to determine the incidence of unilaterally castrated horses among horses admitted to the veterinary teaching hospital between January 2002 and December 2006 for castration and to compare horses that underwent previous unilateral castration with horses that had cryptorchism. In particular the aim was to compare the distribution of retained testicles between groups to identify differences that may aid in surgical management.

Criteria for Selection of Cases

Medical records of horses that were admitted to the Boren Veterinary Medical Teaching Hospital at the Oklahoma State University for castration, including cryptorchid and unilaterally castrated horses, between January 2002 and December 2006 were reviewed. Horses that did not have 2 normally descended testicles were grouped as horses that had undergone a previous surgical procedure during which 1 testicle was removed (ie, unilaterally castrated horses) or horses that had not previously had a testicle removed (ie, cryptorchid horses).
Procedures

Medical record review—The total number of horses admitted for castration was determined from the medical records. Only data of horses that underwent previous unilateral castration or that had cryptorchidism were included in further analysis. For both groups of horses, medical records were examined for age, breed, history, diagnostic procedures, surgical technique, location of the retained testicle, and cost of surgery. The history obtained for each horse included the reason for hospital admission, whether the horse was purchased as a gelding, and any previous medical or surgical procedures. Diagnostic procedures that were performed either by the referring veterinarian or at the veterinary medical teaching hospital were recorded. The surgical technique used to remove the retained testicle and the cost of diagnostic procedures performed at the veterinary medical teaching hospital and surgery were recorded. Because of changes in the structure of professional surgical fees during the study period, professional fees were not included in the cost of diagnosis and surgery. The location of the cryptorchid testicle was classified as left or right and as inguinal or abdominal.

Statistical analysis—Age of horses and the cost of diagnosis and surgery were compared between groups by use of the Wilcoxon rank sum test (data were not normally distributed). Comparison of the breed of horse and location of the cryptorchid testicle between groups was performed by use of the $\chi^2$ test or a Fisher exact test as appropriate. Statistical analyses were performed with a standard computer software program. Values of $P < 0.05$ were considered significant.

Results

One hundred sixty horses were admitted to the veterinary medical teaching hospital for castration between January 2002 and December 2006. Of the 160 horses admitted for castration, 16 (10%) horses underwent unilateral castration previously and 44 (27.5%) horses had cryptorchidism. The unilaterally castrated group consisted of 14 Quarter Horses or American Paint Horses, 1 Pony of the Americas, and 1 other breed of horse. The cryptorchid group consisted of 34 Quarter Horses or American Paint Horses, 3 Ponies of the Americas, 2 Thoroughbreds, and 5 other breeds. No significant difference was found in the distribution of breeds between groups. The mean ± SE age of horses in the unilaterally castrated group (4.09 ± 0.49 years) was significantly ($P < 0.001$) greater than in the cryptorchid group (2.36 ± 0.22 years).

Eight of the 16 unilaterally castrated horses were described as geldings when purchased by the current owner. The remaining 8 horses were admitted to the veterinary medical teaching hospital following the removal of 1 testicle while under the care of the current owner. The owner reported a normal castration in 2 of the 8 horses, and in both instances, the epididymis of the retained testicle was found to have been removed during the previous surgery. The most common reason for hospital admission among the 16 unilaterally castrated horses was stallion-like behavior in 14 horses. One horse was admitted when the owner was informed by the previous owner that the horse may not have been completely castrated.

Hormone assays were performed in 9 of the 16 unilaterally castrated horses and 1 of 44 cryptorchid horses. Of the 16 unilaterally castrated horses, 3 underwent a human chorionic gonadotropin stimulation test, 3 underwent a baseline testosterone test, and 3 underwent an estrone sulphate test. Two of the 3 human chorionic gonadotropin stimulation tests were performed at the veterinary medical teaching hospital. A blood sample was collected prior to administration of 10,000 units of human chorionic gonadotropin$^4$ IV. A second blood sample was collected 60 minutes later, and the blood samples were submitted for analysis of testosterone concentration. One cryptorchid horse had a human chorionic gonadotropin stimulation test performed prior to hospital admission to the veterinary medical teaching hospital and was diagnosed as having bilateral abdominal cryptorchidism by laparoscopy. Transabdominal ultrasonography was used to identify the retained testicle in 4 of the 16 unilaterally castrated horses as previously described.$^9$ In all 4 horses, the retained testicle was positively identified. Laparoscopy was used to identify and remove the retained testicle in 8 of the 16 unilaterally castrated horses. Laparoscopy was used to identify the cryptorchid testicle in 3 of 44 cryptorchid horses, all of which were bilateral cryptorchid horses. All laparoscopic procedures were performed under general anesthesia with the horse positioned in dorsal recumbency as described by Fischer.$^10$

Retained testicles of the 16 unilaterally castrated horses were found on the left in 9 horses and the right in 7 horses. Retained testicles of 44 cryptorchid horses were found on the left in 21 horses, the right in 16 horses, and bilaterally in 7 horses. Overall, the 44 cryptorchid horses had 28 testicles retained on the left side and 23 testicles retained on the right side. No significant difference was found in left versus right distribution of testicles between groups.

The 16 unilaterally castrated horses had 3 inguinal and 13 abdominal testicles. The 44 cryptorchid horses had 18 inguinal and 33 abdominal testicles. No significant difference was found in inguinal versus abdominal distribution of retained testicles between groups.

Of testicles retained on the left side of unilaterally castrated horses, 3 of 9 testicles had an inguinal location and 6 of 9 testicles had an abdominal location. Of the testicles retained on the left side of cryptorchid horses, 6 of 28 testicles had an inguinal location and 22 of 28 had an abdominal location. No significant difference was found in inguinal versus abdominal distribution of left-sided retained testicles between groups.

Of testicles retained on the right side of unilaterally castrated horses, 0 of 7 testicles had an inguinal location and 7 of 7 testicles had an abdominal location. Of the testicle retained on the right side of cryptorchid horses, 12 of 23 testicles had an inguinal location and 11 of 23 had an abdominal location. Unilaterally castrated horses had a significantly lower proportion of right-sided inguinal testicles, compared with cryptorchid horses.
In the 16 unilaterally castrated horses, surgical removal of the retained testicle was performed by an inguinal approach in 4 horses, a parainguinal approach in 4 horses, and laparoscopy in 8 horses. In the 44 cryptorchid horses, surgical removal of the retained testicle was performed by an inguinal approach in 35 horses, a parainguinal approach in 6 horses, and laparoscopy in 3 horses. The mean ± SE cost of diagnosis and surgery of the unilaterally castrated group ($605.97 ± 51.87) was significantly greater than the cryptorchid group ($493.07 ± 20.59).

Discussion

Previous studies1,2,8 of cryptorchidism in horses have focused on the cause of the condition and management options. The aim of the study reported here was to describe the incidence, diagnosis, and management of horses found to have undergone unilateral castration. Furthermore, the study reported here aimed to compare unilaterally castrated horses with cryptorchid horses to determine whether significant differences exist in the distribution of retained testicles between groups that may aid veterinarians in the surgical management of unilaterally castrated horses.

The incidence of unilateral castration among horses admitted to the hospital for castration in our study was 10% (16/160), which is higher than the incidence of 4.5% reported in a previous study of a mixed animal veterinary practice,9 but lower than the incidence of 18.1% reported for a referral hospital.10 However, this may reflect the fact that the population of horses in our study included primary care and referral cases. A unilaterally castrated horse may be sold fraudulently as a gelding.4 This is illustrated by the fact that 8 of the 16 unilaterally castrated horses included in our study were described as geldings when purchased by the current owner. The most common reason for hospital admission of unilaterally castrated horses was stallion-like behavior in 14 of 16 horses. This is reflected in the significantly greater mean age of the unilaterally castrated group, compared with the cryptorchid group, which may correspond to the development of sexual maturity 2 to 4 years after the onset of puberty at around 18 months of age.11 On the basis of the results of the study reported here, it may be prudent for the examining veterinarian to advise the use of a suitable hormone assay as part of a pre purchase examination where doubt exists as to the castration history of a gelding.

The left and right distribution of cryptorchid testicles in the unilaterally castrated and cryptorchid groups was similar to previously published studies3,8 and was not significantly different between groups. The approximately equal left and right distribution of testicles in the unilaterally castrated group does not support the suggestion by a previous study12 to explore the left side first because of the tendency for left cryptorchid testicles to be abnormally retained. However, a limitation of the study reported here is the low number of unilaterally castrated horses in the study population. Future studies of unilaterally castrated horses involving a larger population of horses may be required to more accurately determine the best surgical approach to a unilaterally castrated horse.

The abdominal and inguinal distribution of testicles in cryptorchid horses in the study reported here was similar to previously published studies.1,3,9 A significant difference was found in the distribution of right-sided retained testicles when comparing groups, as a result of a lack of right-sided inguinally retained testicles in the unilaterally castrated group. This finding is similar to the findings of Cox et al.,8 who described a difference in the distribution of inguinal and abdominal testicles in unilaterally castrated horses. The reason for our low incidence of right-sided inguinally retained testicles may be related to the significantly older population of horses in the unilaterally castrated group. Results of a previous study11 indicate that the prevalence of inguinal cryptorchidism decreases with age, possibly as a result of the descent of inguinal testicles into the scrotum between 2 and 4 years of age. Therefore, it is possible that the low incidence of right-sided inguinally retained testicles is the result of later descent of the testicle into the scrotum and subsequent routine castration.

The cost of diagnosis and management of the unilaterally castrated group was significantly greater than that of the cryptorchid group. Cost analysis of both groups was performed on the basis of diagnostic procedures, hospitalization, anesthesia (determined by duration of procedure, surgery supplies, and perioperative administration of medication to minimize variability in charges. The study reported here does not include the cost of diagnostic procedures performed prior to hospital admission or the cost of previous surgery. Therefore, the actual cost associated with unilateral castration may be greater than reported.

Several reasons have been previously suggested for the practice of unilateral castration including pressure from the horse owner, the belief that removal of the scrotal testicle will promote the descent of the retained testicle, and the desire for financial gain through the creation of 2 separate procedures.4 Unilateral castration results in horses undergoing diagnostic procedures in addition to another anesthetic episode and surgery. Furthermore, unilateral castration results in a greater cost to the horse owner. The results of the study reported here reinforce the view of the veterinary profession that unilateral castration of horses is an unethical procedure. The results also indicate that, despite current recommendations for the complete castration of horses, the practice of unilateral castration still occurs.

References