

Use of chain écraseur for removal of retained abdominal testis in a bull

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Abstract

A 4 year old Banteng bull was presented to the University of Tennessee for a routine castration. On physical examination, it was determined that the bull's right testis had not descended and thus was deemed cryptorchid. Right testis was not palpable in the inguinal canal nor visible via ultrasonography of caudal abdomen. Due to the likelihood that the testis was located in the abdomen, surgery under general anesthesia was elected. Because of its location close to right kidney, manual removal became difficult. An écraseur was successfully utilized to remove the retained testis.

Keywords: Banteng bull, castration, cryptorchid, écraseur

Introduction

Cryptorchidism is a rare condition in bulls where 1 or both testes have not descended into the scrotum.¹ Incidence of cryptorchidism in bulls is 0.17% in North America, with Shorthorn and Polled Hereford the most represented breeds. There is an overall combined incidence of this condition of 1.4% in other breeds such as Hereford, Angus, and Holstein-Friesian.^{2,3} Incidence of cryptorchidism in Banteng breed is not reported. Undescended testis may be located in the abdominal cavity, or underneath skin in the scrotal region, usually away from its normal pathway of descent.⁴ During fetal development, pathway of testicular descension is characterized by 3 stages. Stages include nephric displacement, transabdominal passage, and inguinal passage that ends when the gubernaculum ceases to grow and testis migrate to inguinal opening. By week 22 of pregnancy, testis should reach the scrotum.⁵⁻⁷ In cases of cryptorchidism, spermatogenesis was negatively affected in retained testis due to exposure to elevated temperatures within the abdomen, whereas a descended testis remained normal.⁸ Despite the difference in normal spermatogenesis, testosterone production was not affected in the retained testis.⁸ Tumors have been reported in undescended testes in bulls.⁹ Diagnosis is usually via transrectal palpation or ultrasonography and may be inconclusive in some cases.² Measurement of testosterone concentrations following hCG or GnRH treatment in cryptorchid bulls was not rewarding as in other species, since cryptorchid bulls had a near normal serum testosterone concentrations in the presence of elevated serum concentrations of LH and FSH.^{7,10} A better alternative for diagnosis of cryptorchidism in bulls would be determination of anti-müllerian hormone and inhibin concentrations, reliable biomarkers for the presence of testicular tissue.¹¹ This technique report describes the use of a chain écraseur, for the first time, in the removal of cryptorchid testis, as used for removal of ovaries in mares.¹²

Method

A 500 kg, 4-year old Banteng bull was presented for routine castration. Bull was immobilized with Carfentanil (Carfentanil, 3 mg/ml, ZooPharm, Laramie, WY) and Xylazine (XylaMed, 100 mg/ml, Vet One, Boise, ID) in a squeeze chute for evaluation preceding routine castration. On physical examination, the right testis was not palpable within scrotum nor in the inguinal canal. Using an Aloka 1400 ultrasound scanner with a 3.5 MHz curvilinear abdominal probe, caudal abdomen and inguinal area were examined. Retained testis could not be identified. Due to bull's disposition, it was not possible to perform transrectal palpation. Due to the likelihood that the testis could be located in the abdomen, we requested the owner to bring the bull back for castration and for an exploratory laparotomy under general anesthesia.

Bull was held off feed for 24 hours and water for 12 hours prior to surgery. Anesthesia was induced intramuscularly with 0.013 mg/kg Carfentanil citrate in combination with 0.2 mg/kg of Xylazine HCl and was maintained with Isoflurane. Bull received intravenously 2 mg/kg ketamine HCl (Zetamine,

100 mg/ml, Vet One) during surgery. Bull was placed in left lateral recumbency. After sterile preparation of the surgical field, a 12 cm right parainguinal incision was made with a number 10 scalpel blade. Right testis was palpable caudal to right kidney and an attempt was made to exteriorize it. Due its location and attachment it could not be exteriorized. At this point a decision was made to use a chain écraseur (48 cm ratchet type écraseur [Chassaignac], Jorgensen Laboratories, Loveland, CO) to separate the retained testis from its attachment prior to exteriorization. Retained testis and its pedicle were identified by digital manipulation. Four fingers were inserted into écraseur's chain loop and slipped over the grasped testis to encircle the pedicle. The chain was tightened around the pedicle using the ratchet, with verification that the chain did not encircle other structures. Ratchetting continued until the pedicle was severed and the testis was extracted through the incision. The palm of the hand was held beneath the pedicle to check for bleeding (none was noted).

Peritoneum was closed with #1 polydioxanone suture (PDS) in a simple continuous pattern. Body wall and subcutaneous tissues were closed in a simple continuous pattern with #1 polydioxanone suture (PDS). Skin was closed in a Ford interlocking pattern with #1 polydioxanone suture (PDS). A closed castration technique was performed with a Serra Emasculator (35.5 cm, Jorgensen Laboratories, Loveland, CO) to remove the descended testis. A transfixing suture #1 polydioxanone suture (PDS) was placed to ligate the cord above the emasculator. Sedation was reversed with intravenous treatment of Naltrexone hydrochloride ([1.16 mg/kg] Naltrexone, 50 mg/ml, ZooPharm) and Yohimbine HCl USP (0.13 mg/kg [Yohimbine, 5 mg/ml, Letco Medical, Decatur AL]). Bull was treated intramuscularly with Penicillin G Procaine 20,000 IU/kg (PenOne Pro, Vet One, Madison, NJ) and intravenously with 1.1 mg/kg of Flunixin Meglumine (Banamine, 50 mg/ml, Merck, Madison, NJ). In addition, a tetanus toxoid was given subcutaneously on the left side.

Outcome

There were no complications and the animal appeared normal in a subsequent examination.

Discussion

Cryptorchidism ('hidden testis') is a postnatal phenotype that affects normal production of sperm^{1,13,14} and known to be hereditary.¹³ Testis can be in various locations (ectopic testis).^{1,13} Ectopic testes are commonly positioned on either side of the penis, cranial to the base of the scrotum and oriented with their long axis parallel to the penis.¹ Based on our observations, ectopic testis was lower in our differentials. Testicular monorchidism (presence of 1 testis) is a rare condition that has to be considered as a differential in cases such as this when the hidden testis is not palpable or identifiable by ultrasonography. Neoplasia^{9,15} may require removal of retained testis. Furthermore, it is advisable also to remove the descended testis for ethical reasons.

There are 5 typical laparotomy approaches for a cryptorchidectomy: flank, inguinal, parainguinal, suprapubic paramedian, and ventral midline.^{1,13,16,17} One of the options is a laparoscopic procedure if the testis is located in the abdomen. This procedure has less complications during and after surgery, but in this case, since the retained testis was not identified on palpation or ultrasonography, this technique was not an option. Recumbent position that was required for this bull would have made it difficult to access the testis via a laparoscope and also the possibility of its location in the inguinal canal. Abdominal testes are best removed via flank celiotomy.¹³ Apparently, a flank celiotomy using a chain écraseur removal was the best option given the location of the testis. Use of a chain écraseur provided a slow and controlled process for crushing in a steady state until transection. Ligatures were therefore unnecessary, as reported.¹⁸ None of the possible complications such as hemorrhage, swelling, redness and infection¹³ occurred in this case. Use of an écraseur is not a new idea, since this technique has been used in other species for removal of various structures (e.g. ovaries in cows or seminal vesicles in bulls, excision of a pharyngeal granuloma in a cow,^{17,19-22} transpalpebral enucleation, removal of the ovaries in mares,^{12,18} and castration in elephants²³). However, for the first time, an écraseur was successfully utilized to remove a retained testis.

Conclusion

Use of chain écraseur can be a viable tool in the removal of a retained testis from a cryptorchid bull. This was the first time using this technique and it has shown excellent results. Clinicians can consider the use of a chain écraseur in retained testis cases.

Conflict of interest

None to declare.

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