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Original Research

Lateral Branches of the Testicular Artery Affect Testicular Shape in Adult Stallions

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ABSTRACT

The objective of this study was to investigate the arterial patterns of the stallion testis in relation to testicular shape. Two hundred and fifty-one stallion testes were evaluated for the presence of the lateral branches of the testicular artery. Seven specimens had their testicular arteries filled with latex milk, fixed in 70% alcohol, and dissected. Two hundred six specimens (82%) had a single testicular artery and no lateral branches; 39 testes (16%) had one lateral branch of the testicular artery; and six testes (2%) had two lateral branches of the testicular artery each. The lateral branches of the testicular artery obtained from the adult stallions, more than 5 years old, were associated with distinct lateral bulging, giving them a pear-like shape, whereas similar vascular pattern in young colts, less than 1 year old, did not cause similar shape change. Five distinct patterns of the branching of the testicular artery were determined. We concluded that the lateral branches of the testicular artery are present in approximately 20% of stallion testes. This anatomic pattern is associated with a lateral bulge that develops slowly over several years and is associated with a change in testicular shape from an ellipsoid in colts to a pear-like shape in adult stallions.

1. Introduction

Blood supply to the stallion testis is provided by the testicular artery, which branches directly from the caudal aorta [1]. This major vessel runs caudoventrally (pars recta a. testicularis), enters the inguinal canal through the internal vaginal ring, and joins the other structures of the spermatic cord [2–5]. It becomes very convoluted (pars convoluta a. testicularis) and is surrounded by a net of small venous vessels—pampiniform plexus [2,3,6]. Once the artery reaches the testicular surface, it strengthens out again and has a wavy course along the epididymal edge (pars marginalis a. testicularis), around the caudal testicular pole and along the free edge of the testis as a single vessel or as two or three branches [4,7]. Small arterial vessels branch off the testicular artery on the ventral aspect of the testis and run on the lateral and medial surfaces of the testis, toward the epididymal edge, until they penetrate testicular parenchyma as centripetal arteries [3,6]. This arterial pattern is seen in most stallions; however, other vascular patterns occur in a small number of individuals. Collin [4] and Smith [5] described specimens with one or two lateral branches of the testicular artery (rami testiculares laterales). In their studies, the marginal part of the artery ran around the caudal pole of the testis in these specimens but supplied blood to the caudal part of the testis only. One or two lateral branches ran on the lateral surfaces of the gonads, all the way ventrally, and branched over the cranial part of each testis, supplying blood to this region. The lateral branches of the testicular artery were observed in approximately 21%–26% of the examined specimens in these two studies (28 of 134 testes and 26 of 179 testes, respectively). In contrast to these results, we found the lateral branches of testicular arteries only in 8% of stallion

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testes (6 of 72 testes) [7]. Different breeds of horses or the relatively low number of specimens may have contributed to this difference. Interestingly, we noticed that all testes with one or two lateral branches of the testicular artery had a slightly different shape than the testes with one arterial vessel running around the caudal poles of the gonads [7]. All testes with more than one major arterial vessel had a pear-like shape, whereas all testes with one major artery had an ellipsoid shape. We speculated that additional arterial vessels had a trophic effect, causing the local hypertrophy of testicular parenchyma.

Testicular shape in stallions is usually compared with a laterally compressed ovoid or ellipsoid [8]. Veterinarians who routinely examine breeding stallions expect that the lateral surface of the normal stallion testis is always smooth and slightly rounded. Detection of any bulging structures on the testicular surface is concerning and suggestive of serious pathology, such as testicular tumor. However, our preliminary observations suggest that there are stallions with a distinct bulge on the lateral surface of their testes, which is not associated with any pathology but with the presence of the lateral branch of the testicular artery only [7]. Therefore, more data need to be collected to provide clinically relevant information to the veterinarians working with horses.

The goal of this study was to further investigate anatomic variations in the testicular vasculature in stallions and their effect on testicular shape.

2. Materials and Methods

2.1. Phase 1

Phase 1 of our study was conducted on 97 specimens obtained from a local slaughterhouse (Antonio S.C., Cracow, Poland) and on 18 specimens obtained from routine castrations performed by field veterinarians. All testes were assessed visually for the presence of the lateral branches of the testicular artery and for testicular shape. To determine where the lateral branches of the testicular artery separate from the main vessel, latex milk (Polgum, Cracow, Poland) was injected directly into the testicular artery of seven selected specimens with preserved spermatic cords. The latex milk was injected into the straight part of the testicular artery, using a 17G IV catheter (Becton Dickinson) and a 20-mL syringe. Once a vessel was completely filled, it was closed with a hemostat or tied up with a surgical suture, and the entire specimen was submerged in 70% ethyl alcohol for approximately 1 week, as described before [9]. Once the latex milk was hardened, the specimens were rinsed in tap water and the testicular artery and its branches within the spermatic cord, and on the surface of each testis, were carefully dissected (Fig. 1). Drawings of all patterns of testicular vascularization were done (Fig. 2).

2.2. Phase 2

One hundred thirty-six testes with epididymides were collected from castrations, performed in the Large Animal Hospital, College of Veterinary Medicine, University of Florida, the United States. Vascularization pattern, as well as testicular shape, was determined for each specimen. Each testis was photographed for documentation. The distribution of various vascular patterns and testicular shapes between three age groups (<1 year old; 1–5 years old; and >5 years old) were analyzed.

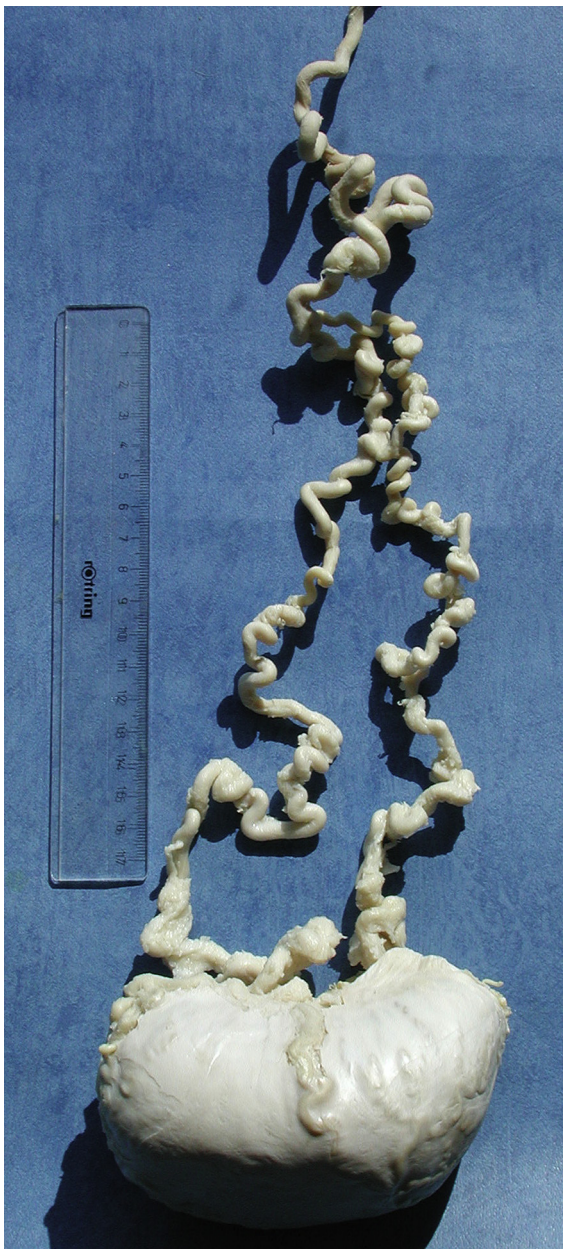

Fig. 1. A dissected specimen with the latex milk-filled testicular artery.

3. Results

3.1. Phase 1

Fifty-seven specimens were obtained from colts less than 1 year old, and 58 specimens came from stallions