

Anatomy of the human penis: the relationship of the architecture between skeletal and smooth muscles

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摘要

Abstract

To investigate the anatomy of the ischiocavernosus muscle, bulbospongiosus muscle, and tunica albuginea and to determine their relationships to smooth muscle, which is a key element of penile sinusoids, we performed cadaveric dissection and histologic examinations of 35 adult human male cadavers. The tunica of the corpora cavernosa is a bilayered structure that can be divided into an inner circular layer and an outer longitudinal layer. The outer longitudinal layer is an incomplete coat that is absent between the 5-o'clock and 7-o'clock positions where 2 triangular ligamentous structures form. These structures, termed the ventral thickening, are a continuation of the anterior fibers of the left and right bulbospongiosus muscles. On the dorsal aspect, between the 1-o'clock and 11-o'clock positions, is a region called the dorsal thickening, a radiating aspect of the bilateral ischiocavernosus muscles. In the corpora cavernosa, skeletal muscle contains and supports smooth muscle, which is an essential element in the sinusoids. This relationship plays an important part in the blood vessels' ability to supply the blood to meet the requirements for erection, whereas in the corpus spongiosum, skeletal muscle partially entraps the smooth muscle to allow ejaculation when erect. In the glans penis, however, the distal ligament, a continuation of the outer longitudinal layer of the tunica, is arranged centrally and acts as a trunk of the glans penis. Without this strong ligament, the glans would be too weak to bear the buckling pressure generated during coitus. A significant difference exists in the thickness of the dorsal thickening, the ventral thickening, and the distal ligament between the potent and impotent groups ($P < .01$). Together, the anatomic relationships between skeletal muscle and smooth muscle within the human penis explain many physiologic phenomena, such as erection, ejaculation, the intracavernous pressure surge during ejaculation, and the pull-back force against the glans penis during anal

constriction. This improvement in the modeling of the anatomic-physiologic relationship between these structures has clinical implications for penile surgeries.