# Recent advances in Penile Curvatures

**Essay**

**For Partial Fulfillment of Master Degree in Urology**

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| | |
|---|---|
| **CAD** | **Coronary artery disease** |
| **DC** | **Dupuytren's contracture** |
| **DM** | **Diapetes Mellitus** |
| **ED** | **Erectile dysfunction** |
| **EM** | **Electron microscope** |
| **HTN** | **Hypertension** |
| **MR** | **Magnetic resonance** |
| **PD** | **Peyronie's disease** |
| **PDE5i** | **Phosphodiesterase type 5 inhibitors** |
| **Potaba** | **Potassium para-aminobenzoate** |
| **S2-4** | **Sacral nerves 2-4** |
| **SWL** | **Extracorporeal shock wave lithotripsy** |
| **VC** | **Ventral curvature** |

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# INTRODUCTION

In modern medicine, penile curvatures are defined as curve-like deformations of the penis during erection **(Yachia 2007)**.

Penile curvatures can be *congenital* or *acquired:*

Devine and Horton classified **congenital** curvatures identifying five separate types of curvatures. Types I–III can be collectively termed chordee without hypospadias. Type IV curvature is commonly referred to as congenital curvature of the penis by the authors. Type V curvature is the rarest of all types and some even question whether it exists. This type is known as the congenitally short urethra **(Drogo Montague 2008)**.

*Congenital curvatures* usually associated with urethral disease (hypospadias mainly or epispadias), but also can present with no urethral defect **(Ho, et al. 2006)**.

The simple congenital penile curvatures (i.e. with normal position of meatus) are characterized by normal flaccid penile appearance associated with curvature in erection. The bending can be toward any direction: to the right, to the left, dorsal, or ventral. Some cases can even have a combination of these curvatures **(Okeke, et al. 2005)**.

**Acquired penile curvatures** develop along the penile shaft on a previously normal-looking penis, they have various etiologies; most commonly as a result for Peyronie's disease. Other causes include:

traumas, or chronic inflammatory diseases of the urethra may cause spongiofibrosis, resulting in curvature **(Smith, et al. 2005)**.

**Peyronie's disease** (PD) is a localized, sometimes disabling condition usually affecting the tunica albuginea of the corpus cavernosum. It is a well known but the least understood cause of acquired penile curvatures. The condition has major impact on quality of life and significant psychological effects **(Egydio 2008)**.

**Treatment of penile curvatures:**

**Congenital penile curvature:**

Only surgical treatment is helpful but fortunately it is usually one stage surgery is needed.

- Excisional corpoplasty as in Nesbit's operation or Kelami modification **(Yachia 2007)**.
- Incisional corpoplasty : The longitudinal incisional corporoplasty technique is based on an inverted Heineke–Mikulicz principle **(Raimoldi, et al. 2004)**.
- Plicational corpoplasty as in The Ebbehoj-Metz technique **(Raimoldi, et al. 2004)**.
- Grafting and penile disassembly to avoid penis shortening **(Perovic, et al. 1998)**.

**Treatment of Pyeronie's disease:**

***Conservative treatment:*** There are a wide variety of medical treatments that are available to the practicing urologist, including oral agents, topical creams and gels with or without iontophoresis, intralesional injection therapy, radiation therapy, extracorporeal

shockwave therapy, and laser therapy **(Akin-Olugbade and Mulhall 2007)**.

Medical management of Peyronie's disease might be a valuable treatment option for debilitating disorder, especially in the early symptomatic stages of the disease **(Trost, et al. 2007)**.

***Surgical treatment:*** Most acquired penile curvatures are surgically treatable conditions. Only about 10% of Peyronie's disease curvatures need to be surgically corrected **(Kovac and Brock 2007)**. Surgical procedures for the repair of Peyronie's disease are divided into three major groups:

- Plaque surgery: incision or excision of the plaque and grafting or incision through the plaque.
- Corporoplasty.
- Penile prosthesis implant with or without plaque manipulations, or corporoplasty **(Carson 2006)**.

# AIM OF THE WORK

This essay is a review for the updated information in the literature as regards: Etiology of penile curvature, different types, shapes, and severity of penile curvatures, evaluation of penile curvature patients and the variable methods of treatment available for such condition.

# ANATOMY OF THE PENIS

## Gross Anatomy:

The penile shaft is composed of 3 erectile columns, the 2 corpora cavernosa and the corpus spongiosum, as well as the columns' enveloping fascial layers, nerves, lymphatics, and blood vessels, all covered by skin. The 2 suspensory ligaments, composed of primarily elastic fibers, support the penis at its base **(Jordan and Schlossberg 2002)**.

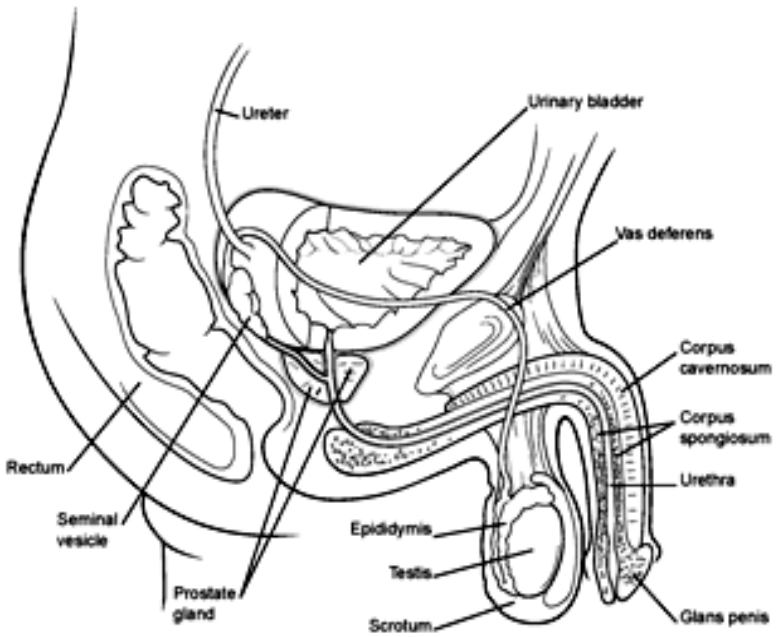


**Figure (1):** Male reproductive organs, sagittal section **(Loreto, et al. 2013)**.

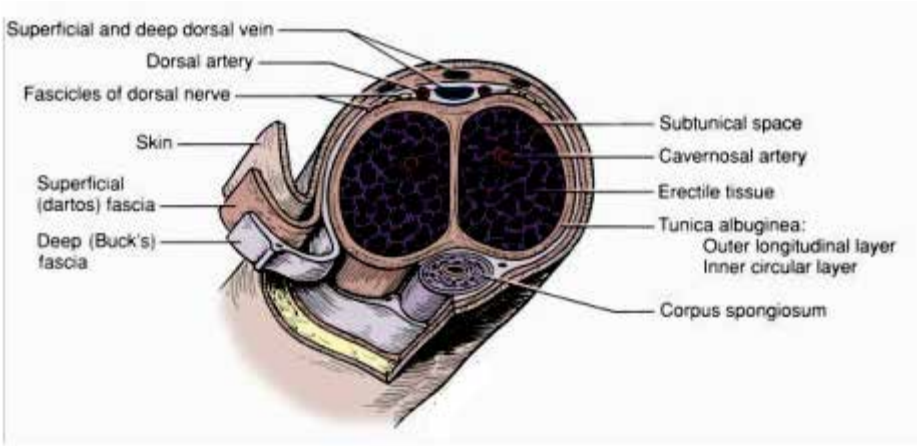


**Figure (2):** Penis and coverings, cross-section **(Loreto, et al. 2013)**.

The paired corpora cavernosa contain erectile tissue and are each surrounded by the tunica albuginea, a dense fibrous sheath of connective tissue with relatively few elastic fibers. The corpora cavernosa communicate freely through an incomplete midline septum. Proximally, at the base of the penis, the septum is more complete; ultimately, the corpora diverge, forming the crura, which attach to the ischiopubic rami. The tunica albuginea consists of 2 layers, the outer longitudinal and the inner circular. The tunica albuginea becomes thicker ventrally where it forms a groove to accommodate the corpus spongiosum. The tunica albuginea of the corpus spongiosum is considerably thinner (< 0.5 mm) than that of the corpora cavernosa (approximately 2 mm). Along the inner aspect of the tunica albuginea, flattened columns or sinusoidal trabeculae composed of fibrous tissue and smooth muscle surround the endothelial-lined sinusoids (cavernous spaces). In addition, a row of structural trabeculae arises near the junction of the 3 corporal bodies and inserts in the walls of the corpora about the midplane of the circumference **(Shier, et al. 2007)**.

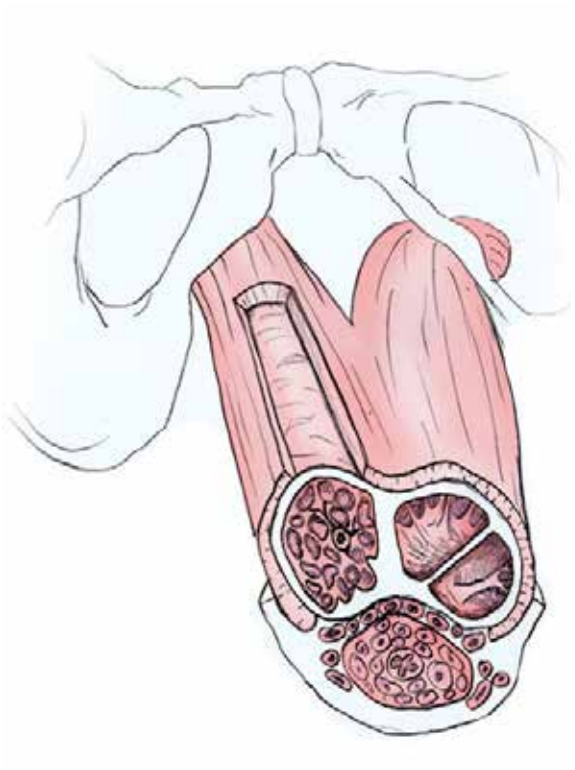

**Figure (3):** Structure of the tunica albuginea. **(Loreto, et al. 2013)**.

The erectile tissue within the corpora contains arteries, nerves, muscle fibers, and venous sinuses lined with flat endothelial cells, and it fills the space of the corpora cavernosa. The cut surface of the corpora cavernosa looks like a sponge. There is a thin layer of areolar tissue that separates this tissue from the tunica albuginea. Blood flow to the corpora cavernosa is via the paired deep arteries of the penis (cavernosal arteries), which run near the center of each corpora cavernosa. The single corpus spongiosum lies in the ventral groove between the 2 corpora cavernosa. The urethra passes through the corpus spongiosum. The corpus spongiosum possesses a much thinner and

more elastic tunica albuginea to allow for distention of the corpus spongiosum for passage of the ejaculate through the urethra. The thinner tunica albuginea of the corpus spongiosum also allows the corpus to become less rigid during erection. Hence, the distal extension of the spongiosum, the glans penis, covers the tips of the corpora cavernosa to provide a cushioning effect. The urethral meatus is positioned just slightly on the ventral surface of the glans and is slit like. The edge of the glans overhangs the shaft of the penis, forming a rim called the corona **(Shier, et al. 2007)**.

The 3 erectile bodies are surrounded by deep penile (Buck) fascia, the dartos fascia, and the penile skin. The deep penile (Buck) fascia is a strong, deep, fascial layer that is immediately superficial to the tunica albuginea. It is continuous with the deep fascia of the muscles covering the crura and bulb of the penis, the ischiocavernosus and bulbospongiosus. On the dorsal aspect of the corpora cavernosa, the deep dorsal vein and paired dorsal arteries and branches of the dorsal nerves are contained within the deep penile (Buck) fascia. This fascia splits to surround the corpus spongiosum, and it extends into the perineum as the deep fascia of the ischiocavernosus and bulbospongiosus muscles. The deep penile (Buck) fascia encloses these muscles and each crus of the corpora cavernosa and the bulb of the corpus spongiosum adhering these structures to the pubis, ischium, and the urogenital diaphragm Bucks fascia fuses with tunica albuginea proximally. Therefore rupture of tunica albuginea contained within Buck's fascia – aubergine deformity **(Gray 2009)**.