The use of MAGPI technique in surgical management of Distal Penile Hypospadias; indications and results.

A Thesis
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INTRODUCTION

Hypospadias is one of the most common congenital anomalies .In patients with severe hypospadias the genitalia may look ambiguous at birth resulting in emotional and psychological stress for parents in that the gender assignment of their baby immediately comes into question. Left-uncorrected patients with hypospadias may need to sit down to void and tend to shun intimate relationships because of the fears related to normal sexuality (**Baskin, 2000).**

The incidence of hypospadias is 8.2 for every 1000 male newborn and seventy to eighty per cent of the cases are distal lesions. Surgical intervention was not a method of therapy until the last decade but since then patients have been treated successfully with the MAGPI procedure described by Duckett in 1984.This method is widely accepted because of its ease and low complication rate **(Unluer et al, 1991)**

The MAGPI technique allows the surgeon to avoid a urethroplasty and provides a reliable, reproducible procedure for reconfiguring the glans and meatus without the use of catheters and with a very low morbidity rate **(Unluer et al, 1991).**

After description of the MAGPI procedure that can replace 1 cm or more of the proximal meati by Duckett's method the procedure has been widely accepted all over the world as a simple operation giving good cosmetic and functional results and as a reliable surgical method **(Unluer et al, 1991).**

AIM OF THE WORK

This study aims at evaluating the possibility of using MAGPI technique (Meatal advancement and glanuloplasty incorporated) with a new modification in surgical management of cases with Distal Penile Hypospadias, especially in cases with sub-coronal type of hypospadias.

CHAPTER 1
ANATOMY AND EMBRYOLOGY OF THE MALE EXTERNAL GENITALIA

Penis

Structure:

The root of the penis is fixed to the perineum within the superficial pouch. The corpora cavernosa join beneath the pubis (penile hilum) to form the major portion of the body of the penis. They are separated by a septum that becomes pectiniform distally, so that their vascular spaces freely communicate. They are enclosed by the tough tunica albuginea, which is predominantly collagenous **(Goldstein et al., 1982).** (Fig. 1-1).

The outer longitudinal and inner circular fibers of the Tunica albuginea form an undulating meshwork when the penis is flaccid and appear tightly stretched with erection; Smooth muscle bundles traverse the erectile bodies to form the endothelium-lined cavernous sinuses. These sinuses give the erectile tissue a spongy appearance on gross examination **(Goldstein et al.,1982).**

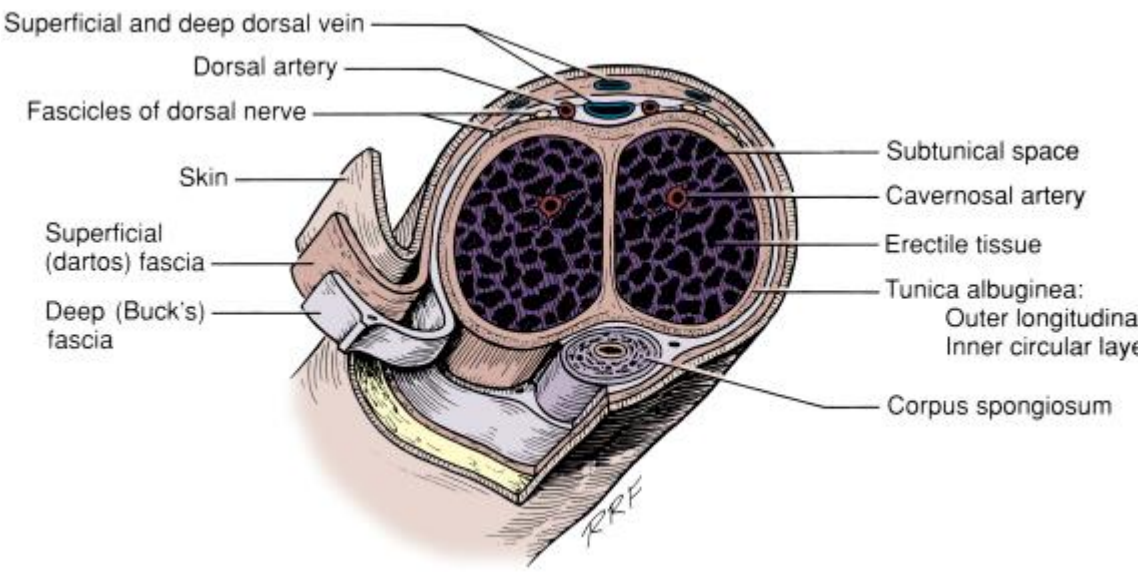

Figure 1-1 ***Cross section of the penis, demonstrating the relationship between the corporal bodies, penile fascia, vessels, and nerves.*** **(Devine and Angermeier, 1994)**

Distal to the bulb, the corpus spongiosum tapers and runs on the underside (ventrum) of the corpora cavernosa and then expands to cap them as the glans penis. The corona separates the base of the glans from the shaft of the penis. The spongiosum is traversed throughout its length by the anterior urethra, which begins at the perineal membrane. The anterior urethra is dilated in its bulbar and glanular segments (fossa navicularis) and narrowest at the external meatus. Proximally, it is lined by stratified and

pseudostratified columnar epithelium, distally by stratified squamous epithelium. The mucus-secreting glands (of Littre) may be seen as small outpouchings of the mucosa **(Goldstein et al, 1982)**.

Coverings:

Buck's fascia surrounds both cavernosal bodies dorsally and splits to surround the spongiosum ventrally . Elastic and collagenous fibers from the rectus sheath blend with and surround Buck's fascia as the fundiform ligament of the penis. Deeper fibers from the pubis form the suspensory ligament of the penis. In the perineum, Buck's fascia fuses with the tunica albuginea deep to the muscles of the erectile bodies**.** Distally, it fuses with the base of the glans at the corona. Bleeding from a tear in the corporal bodies (e.g., penile fracture) is usually contained within Buck's fascia, and ecchymosis is limited to the penile shaft **(Uhlenhuth et al., 1949).**

The skin of the penile shaft is highly elastic and without appendages (hair or glandular elements), except for the smegma-producing glands at the base of the corona. It is devoid of fat and quite mobile because of the loose attachment of its Dartos backing to Buck's fascia. Distally,

it folds over the glans as the foreskin and attaches firmly below the corona. Its blood supply is independent of the erectile bodies and is derived from the external pudendal branches of the femoral vessels . These vessels enter the base of the penis to run longitudinally in the dartos fascia as a richly anastomotic network. Thus, penile skin may be mobilized on a vascular pedicle as the ideal tissue for urethral reconstruction. The skin of the glans is immobile as a result of its direct attachment to the underlying thin tunica albuginea **(Uhlenhuth et al, 1949).**

Blood supply:

Arterial supply.

The common penile artery continues in Alcock's canal, above the perineal membrane, and terminates in three branches to supply the erectile bodies. The Bulbourethral artery penetrates the perineal membrane to enter the spongiosum from above at its posterolateral border. This large, short artery can be difficult to isolate and control during urethrectomy. It supplies the urethra, spongiosum, and glans. The cavernosal artery pierces the corporal body in the penile hilum to near the center of its erectile tissue. It gives off straight and helicine arteries that

ramify to supply the cavernous sinuses **(Uhlenhuth et al., 1949).**

The dorsal artery of the penis passes between the crus penis and the pubis to reach the dorsal surface of the corporal bodies. It runs between the dorsal vein and the dorsal penile nerve and with them attaches to the underside of Buck's fascia. As it courses to the glans, it gives off cavernous branches and circumferential branches to the spongiosum and urethra. The rich blood supply to the spongiosum allows safe division of the urethra during stricture repair **(Devine and Angermeier, 1994).**

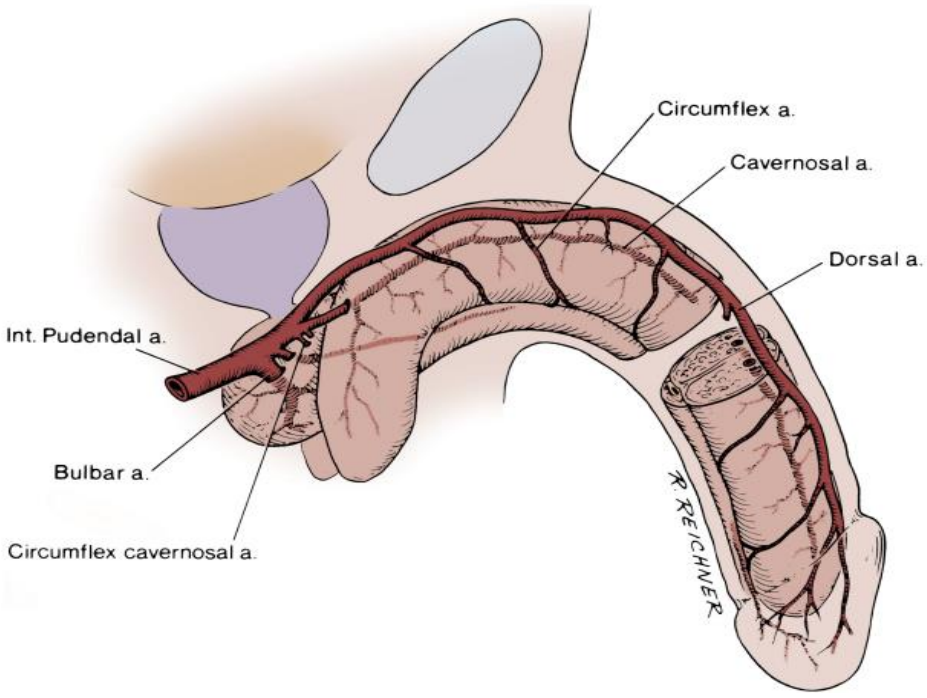

Figure 1-2 ***Arterial supply of the penis (*****Uhlenhuth et al., 1949).**

The surgeon contemplating penile revascularization must be aware that the penile arteries are highly variable in their branching, courses, and anastomoses **(Bare et al., 1994)**.

It is not uncommon for a single cavernosal artery to supply both corporal bodies or to be absent altogether. Alternatively, an accessory Pudendal artery may

supplement or completely replace branches of the common penile artery . This artery usually arises from the obturator or inferior vesical arteries and runs anterolateral to or within the prostate to reach the penis in the company of the dorsal vein **(Breza et al., 1989).**

Venous drainage.

At the base of the glans, several venous channels coalesce to form the dorsal vein of the penis, which runs in a groove between the corporal bodies and drains into the Preprostatic plexus. The circumflex veins originate in the spongiosum and pass around the cavernosa to meet the deep dorsal vein perpendicularly. They are present only in the distal two thirds of the penile shaft and number 3 to 10. Intermediary venules form from the cavernous sinuses to drain into a subtunical capillary plexus. These plexuses give rise to emissary veins, which commonly follow an oblique path between the layers of the tunica and drain into the circumflex veins dorsolaterally **(Sohn, 1994).**

Nerve supply of the penis:

The dorsal nerves provide sensory innervation to the penis. These nerves follow the course of the dorsal arteries and richly supply the glans. Small branches from the perineal nerve supply the ventrum of the penis near the urethra as far as the glans distally**.** These nerves must be anesthetized when performing a penile block to numb the ventrum of the penis **(Uchio et al., 1999).**

The route of the cavernous nerves has been described. After piercing the corporal bodies, they ramify in the erectile tissue to supply sympathetic and parasympathetic innervation from the pelvic plexus. Tonic sympathetic tone inhibits erection. Parasympathetic nerves release acetylcholine, nitric oxide, and vasoactive intestinal polypeptide, which cause the cavernosal smooth muscle and arterial relaxation necessary for erection It is thought that during erection, the subtunical venules are occluded by being compressed against the nondistensible tunica albuginea. Insufficient venous occlusion, particularly in vessels draining into the deep dorsal and cavernosal veins, is thought to cause vasculogenic impotence **(Burnett, 1995)**.

Embryological Development of External Genitalia

Unlike the rest of the developing embryo, the cloacal membrane, along with the oropharyngeal membrane (future oral cavity), is a bilayered structure in which the outer ectoderm remains in close contact with the underlying endoderm without the intervening mesoderm. Initially, the cloacal membrane represents an elongated midline structure that extends from the root of the umbilical cord to the future site of perineum distally **(Vermeij-Keers et al., 1996)**.

During the subsequent development, the bilayered cloacal membrane "retracts" into the perineum as a result of cranial and medial migration of mesodermal cells into the anterior body wall between the ectoderm and the endoderm layers of the cloacal membrane. This mesenchymal migration brings about the closure of the inferior part of the anterior abdominal wall and causes the caudal portion of the cloacal membrane to position itself in the perineal region. These migrating mesodermal cells give rise to the musculature of the medial portion of the anterior abdominal

wall, the mesenchymal portion of the anterior bladder wall, the pubic symphysis, and the rudiments of the external genitalia **(Vermeij-Keers et al., 1996)**

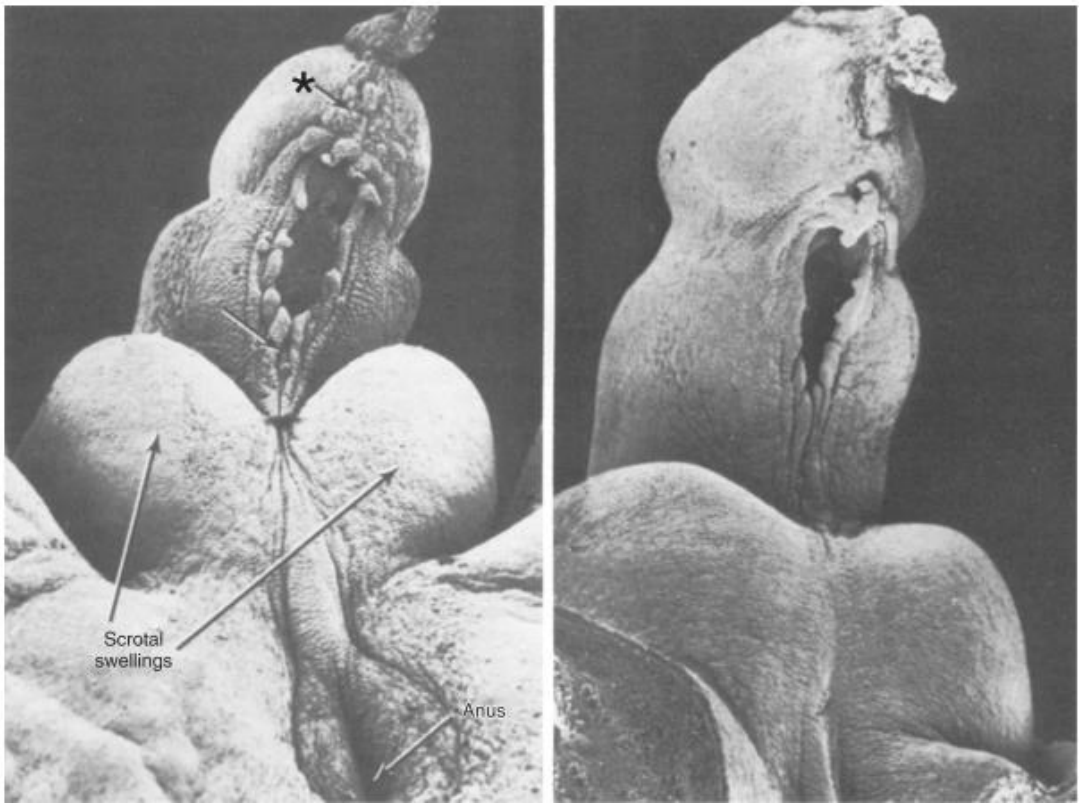

Figure 1-3 The epithelial tag and fusing urethral folds in the developing male external genital. *(From Waterman BE, 1982.)*

The early development of the external genitalia is similar in both sexes. Migrating mesenchymal cells spread themselves around the cloacal membrane and pile up to form swellings. Early in the 5th week, a pair of swellings