Study of the correlation between chronic prostatitis and subfertility and its effect on spermiogram

Thesis

Submitted In Partial Fulfillment Of Requirement
Of M.D. Degree In Urology

By
Dr. Ahmed Abdo Salama

Supervised by

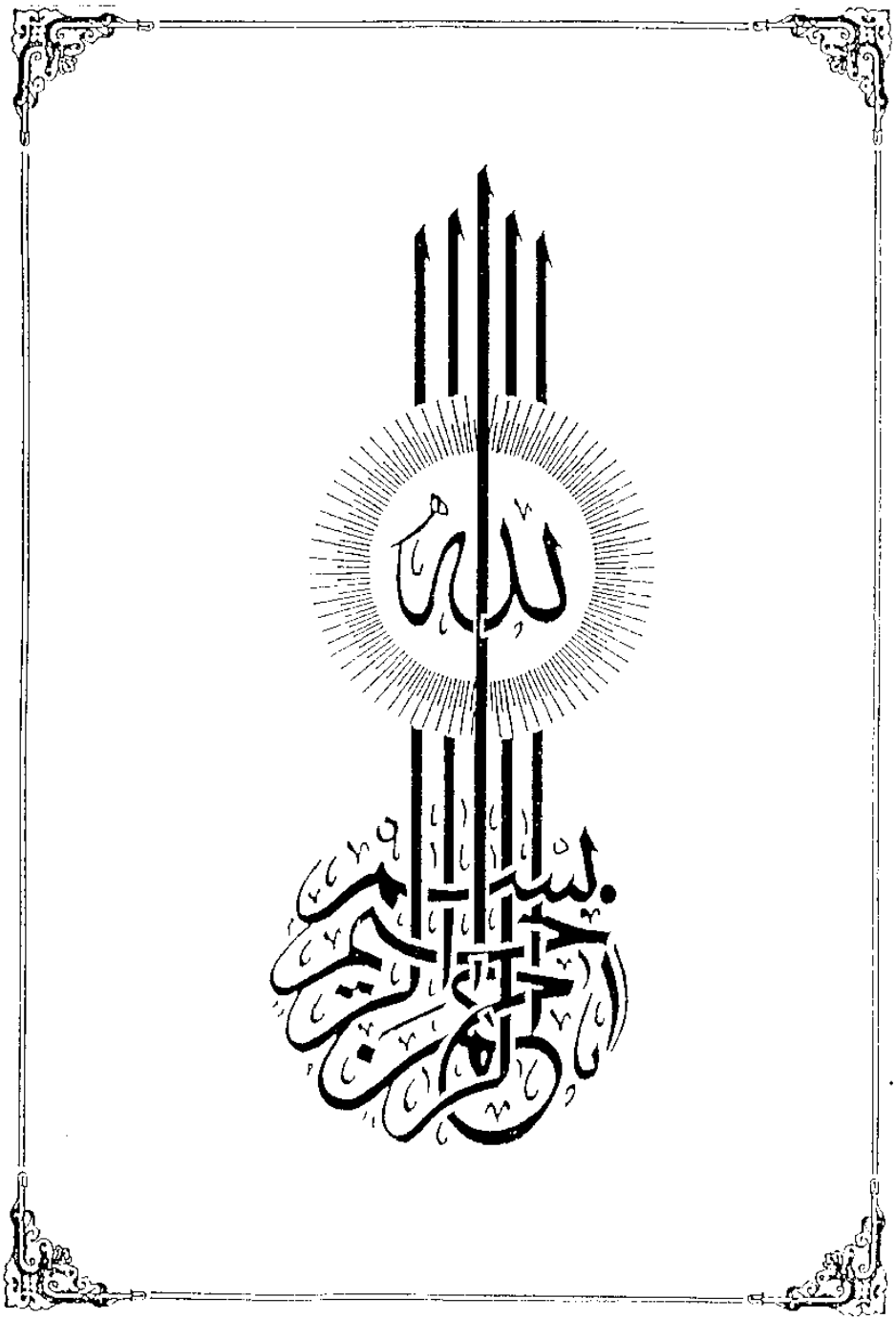
Professor Dr. Mohamed Amin Taha
Professor Of Urology
Faculty of Medicine
Ain Shams University

Professor Dr. Adly Farid
Professor Of Pathology
Faculty of Medicine
Ain Shams University

Professor Dr. Eslah El Falaky
Professor Of Clinical Pathology
Faculty of Medicine
Ain Shams University

2000

Contents



Abbreviations

Acute Bacterial Prostatitis (ABP)

Chronic Bacterial Prostatitis (CBP)

Colony Forming Unit (CFU)

Expressed Prostatic Secretion (EPS)

Immunoglobulin (Ig)

In Vitro Fertilization (IVF)

Mid Stream Specimen (MSU)

Non Bacterial Prostatitis (NBP)

Red Blood Corpuscles (RBCs)

Seminal Fluid Analysis (SFA)

Transrectal Ultrasonography (TRUS)

Urinary Tract Infection (UTI)

White Blood Cells (WBCs)

World Health Organization (WHO)

Introduction

According to Young, the prostate was first described in the sixteenth century, by Massa. Francisco Diaz (1515) described the condition of prostatism and attributed it to sexual abuse. He called it " Carnosities of the prostate ". In 1760, Morgangi provided the first detailed pathological description of prostatic hyperplasia and its associated complications. McNeal (1981) had expanded the understanding of adult prostate morphology.

The physiology of the male sex accessory organs, including the prostate, has been always a matter of continuous research and investigations. What do they contribute to the well being of the spermatozoa? Ask the andrologist and gynecologists. While the pathologists and urologists wonder regarding " How does its diverse secretory products affect the development of a prostatic disease?. Finally, the endocrinologists are co-operating with the biochemists to find out " How the hormones regulate the production and release of separate secretory products.

Prostatic diseases are common complaints in both the adults and elderly males. It is now recognized that prostatitis occurs in several distict forms or syndromes. These syndromes have separate causes, clinical features and sequelae. Proper clinical management is therefore possible only if the clinician is specific in diagnosis and therapeutic strategy.

While genital infection is an important cause of infertility in veterinary medicine, its role in humans is less clear (Berger and Rothman, 1994) Much attention has been given to the infection of the male genital system as a probable cause of infertility. Donavan and Lipshultz, (1988) presumed the following mechanisms of infection causing infertility (a) bacterial attachment to sperm,(b) an immobilizing factor produced by Escherichia coli, (c) immune system recruitment, and (d) alteration of glandular function.

Some studies (Stamy, 1981; Orland et al,1985) do not relate prostatitis as a cause of infertility, but others (Comhaire et al., 1980; Gavriliuk and Gavriliuk, 1977; Satoh et al., 1990 ; Leib et al., 1994) correlate prostatitis with deteriorating sperm parameters.

Aim of Work

The following work is aimed and designed to be a sharing step in the way towards understanding relationship between chronic prostatitis and subfertility and its effect on the spermiogram.

Review of literature

Embryology of the prostate

The prostate gland makes its appearance during the third month of intrauterine life. The male urethra is composed of two portions, the true urethra which lies above the opening of the Wolffian ducts, and the urogenital sinus which lies below. The prostatic urethra comprises the entire true urethra and small portion of the urogenital sinus.

The prostatic urethra is of dual origin.the proximal part extending from the vesical neck to the opening of the Wolffian duct, in common with the vesical trigone, takes origin from the terminal portion of the primary excretory ducts which are mesodermic. The distal part, extending from the openings of the two Wolffian ducts to the membranous urethra, arises from an endodermal origin; to this septate origin has been attributed the fact that benign hyperplasia of the prostate almost develops from the region of the proximal urethra (Weyrauch (1959).

Lobes of the prostate

Middle lobe :

Develops from a group of tubules springing from the midline of the urethral floor between the vesical neck and the openings of the wolffian ducts . It is composed of 9 or 10 tubules.

Lateral lobes :

The right and left lateral lobes comprise the bulk of the gland. The tubules are large and more numerous from 26 to 46. During early embryonic life lateral lobes are widely separated from each other and from the other lobes but as growth progresses the distance gradually lessens.

Posterior lobe:

Walled off by a septum and developed from tubules distinct from those of the other lobes, the tubules are usually about 8 in number. They develop from the floor of the urethra immediately distal to the opening of the ejaculatory ducts and grow obliquely downward and backward toward the base of the bladder.

Anterior lobe:

It is formed by approximately 13 tubules that grow out from the anterior wall.

Accessory prostatic glands

In addition to the main prostaic glands, two accessory groups develop, the subcervical lobe of Alberan, which in latter life gives rise to the middle lobe prostatic hyperplasia, and the subtrigonal glands of Home, which may serve as the origin of subtrigonal lobe prostatic hyperplasia (Weyrauch 1959).

Anatomy of the prostate

General description

The prostate is a composite structure which includes glandular elements and a stroma of collagenous and muscular tissues. It surrounds the commencement of urethra in the male. The prostate varies in size, an average measurement being; length 3.4 cm and thickness 2.6 cm. Its weight is about 20 grams in adult male.

The prostate is situated in a low level in the lesser pelvis, behind the inferior border of the pubic symphysis and the pubic arch, and anterior to the ampulla of the rectum, through the wall of which it can be palpated. (Figure 1).

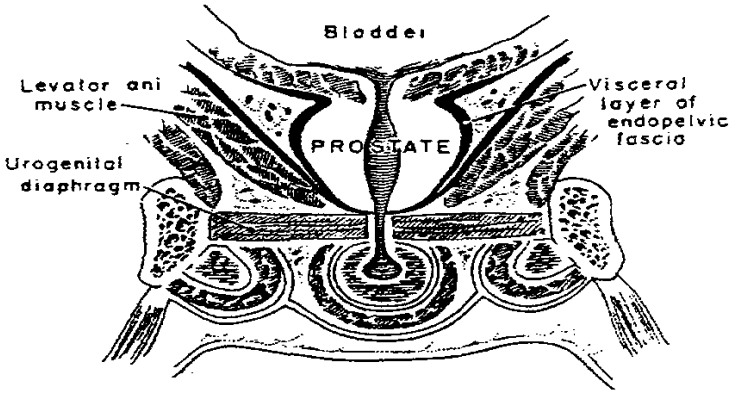


Figure 1 The relation of the prostate to the bladder and the urogenital diaphragm, showing deflection of the pelvic fasciae upon the prostate.. (From Kovi J : Surgical pathology of the prostate and seminal vesicles, Boca Raton Fla, 1989. CRC Press), (after Lipshultz)

The prostate is somewhat conical in shape, and thus presents for examination a base or " vesical aspect" an apex, posterior, anterior and two inferolateral aspects.

The base is, for the greater of its extent, directly contiguous with the neck of the urinary bladder, superior to it. The urethra enters this surface nearer to its anterior border. There is further continuity between bladder and prostate in the downward extension of the deep trigone into the prostate as a "muscular sleeve" surrounding the upper part of the posterior urethra which McNeal (1972) has called it " the preprostatic sphincter"

The Apex is inferior and is in contact with the fascia on the superior aspects of the urogenital diaphragm.

The posterior surface is transversally flat and vertically convex. It is separated from the rectum by the Denonvillier fascia. Near to its superior border, is a depression where the two ejaculatory ducts penetrate the prostate, dividing this surface into a smaller superior and larger inferior parts. The inferior part displays a shallow median sulcus which is usually considered to mark a partial separation of the right and left lateral lobes, which account for the main mass of the prostate, and are really continuous posterior to the urethra. Anteriorly, a band of fibromuscular tissue, ventral to the urethra, joins the two lateral lobes together, and is often referred to as the anterior lobe, which contains fewer glandular structures than are found in the rest of the gland. The superior smaller part is variable in size and is usually regarded as the external aspect of the median lobe. This simplified view of the lobation of the prostate gland is based primarily on the classical one ready for palpation during per rectal examination of the prostate (Figure 2).

The anterior surface is transversally narrow and convex, and extends from base to apex. It lies about 2 cm behind the symphysis pubis, separated by a plexus of veins and some loose adipose tissue. Near its superior limit, it is connected to the pubic bones by the puboprostatic ligaments. The urethra emerges from this surface a little anterosuperior to the apex of the prostate.

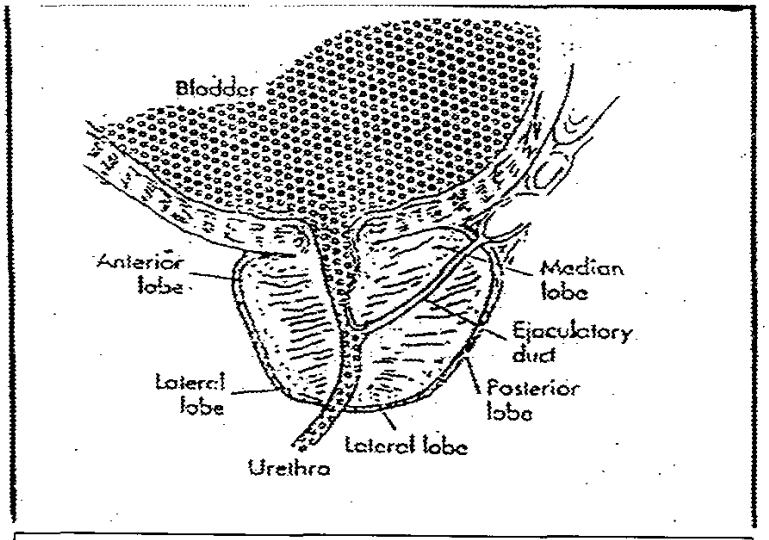


Figure 2 Schematic illustration of a transverse section of the prostate identifying the anterior lateral and posterior lobes of the prostate. (From Kovi J : Surgical pathology of the prostate and seminal vesicles, Boca Raton, Fla, 1989. CRC Press), (after Lipshultz)

The infero-lateral surfaces are prominent and are related the anterior parts of the levatores ani, which are, however separated from the gland by a plexus of veins embedded in fibrous tissue which forms the lateral part of the prostatic sheath.

The anterior portions of the levatores ani pass posteriorly from the pubis and embrace the sides of the prostate; giving a support to the prostate. This part of the levatores ani is called the " levatores prostate".

The prostate is traversed by the urethra and ejaculatory ducts and contains the prostatic utricle. The urethra usually lies along the junction of its anterior with its middle one third. The ejaculatory ducts pass obliquely anteroinferiorly through the posterior part of the prostate, and open into the prostatic urethra.

The prostatic architecture is composed of three elements; the fibrous, the muscular and the glandular elements.

1. **The fascial investment:** The prostate has two investing fascial layers. First is the true "true prostatic capsule " which is a thin but tough fibrous capsule derived from the pelvic fascia. It is firmly adherent to the prostate and is structurally continous with a median septum in the urethral crest, which separates the lateral masses below the level of the colleculus seminalis. It sends prolongations into the interior of the gland, separating its external portion into lobules whose apices converge towards the posterior urethral surface. The inner portion of the prostate is not lobulated and is made up of periurethral glands .

   Secondly, is the prostatic sheath which is a condensation of the endopelvic fascia.. It is separated from the true capsule by the paraprostatic venous plexus. Anteriorly, it is continuous with the puboprostatic ligaments. Inferiorly, it blends with the

fascia on the deep surface of the urogenital diaphragm. The posterior wall of the sheath is vascular and is called " the Denonvillier`s fascia" . The posterior wall of the prostatic sheath has a different constitution as it results embryologically through obliteration of the caudal part of fetal rectovesical pouch. That double-layered nature of the posterior prostatic sheath is of surgical significance because it results in a plane of cleavage between the rectum and the posterior surface of the prostate.

2. **The prostatic musculature :** It can be classified according to its function into two categories; that is the sphincter musculature and the musculature of the seminal emission.

a) **Sphincter musculature** is formed of 2 parts:

1- the circulatory-orientated smooth muscle fibers of the bladder neck and its downward extension into the prostate as the preprostatic sphincter (McNeal,1972). 2- The striated and smooth muscle complex which is located on the anterior and antero-lateral aspects of the prostate. This muscle complex is less prominent above the level of the verumontanum, but inferiorly fuses with the external sphincter.

The preprostatic sphincter is the downward tubular extension of the deep trigone into the prostate which extends to the level of the veumontanum. McNeal (1972) observed that its fibers have the same compactness and precise orientation as the internal sphincter with which it is continuous .The fibers become more separate as they sweep forward around the urethra and fan out

in the midline anteriorly to interdigitate with transversely orientated smooth muscle fibers on the deep aspect of the striated muscle of the urethra (Figure 3).

McNeal (1981) had expanded the understanding of adult prostate morphology. Prostate is an organ that is anatomically homogenous being composed of four morphologically distinct regions, only one of which is concerned with BPH. The urethra represent the primary anatomic reference point, dividing the prostate into an anterior fibromuscular and posterior glandular portion (central, peripheral and preprostatic regions).

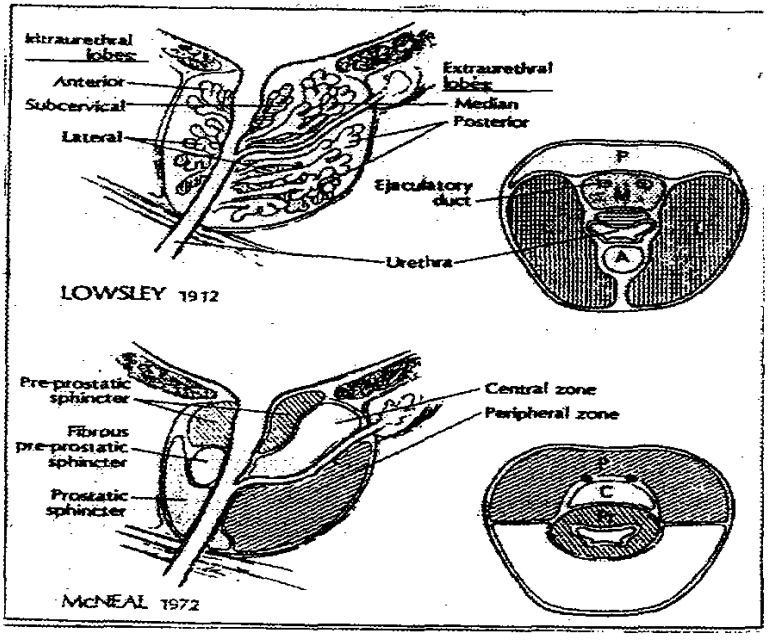


Figure 3 Concepts of prostate lobe as described by Lowsley and McNeal. After Redman JF. 1997.