LABORATORY INVESTIGATION

Human Cadaveric Specimen Study of the Prostatic Arterial Anatomy: Implications for Arterial Embolization

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ABSTRACT

Purpose: To describe and illustrate the prostatic arterial anatomy from human cadaveric specimens, highlighting implications for prostatic arterial embolization.

Materials and Methods: Dissection of 18 male pelves from white adults 35–68 years old was performed in the anatomy laboratory. Arterial branches were identified according to standard dissection technique using a 20-diopter magnifying lens for the prostatic sector. The branches were colored with red acrylic paint to enhance contrast and improve visualization.

Results: Two main arterial pedicles to the prostate from each hemipelvis were identified in all cadaveric specimens: the superior and inferior prostatic pedicles. The superior prostatic pedicle provides the main arterial supply of the gland and provides branches to both the inferior bladder and the ejaculatory system. The inferior prostatic pedicle distributes as a plexus in the prostatic apex and anastomoses with the superior pedicle. This pattern of prostatic arterial distribution was constant in all cadaveric specimens. In contrast, the origin of the superior prostatic pedicle was variable from different sources of the internal iliac artery.

Conclusions: The description and illustration of the prostatic arterial anatomy, as demonstrated by this cadaveric study, may provide useful information and guidance for prostatic arterial embolization.

ABBREVIATIONS

BPH = benign prostatic hyperplasia, IPA = internal pudendal artery, PAE = prostatic arterial embolization

The proposal of prostatic arterial embolization (PAE) as an alternative treatment for benign prostatic hyperplasia (BPH) has renewed interest in the prostatic arterial supply (1,2). Knowledge of the arterial anatomy is essential for interventional radiologists to provide proper treatment. Because prostatic angiography and embolization are uncommon in clinical practice, many interventional radiologists are unfamiliar with prostatic arterial anatomy.

Cadaveric anatomic descriptions of the prostatic arteries were first published 60 years ago (3–5). Recent reports on prostatic arterial anatomy are scarce and mainly oriented to in vivo vascular anatomy as observed on angiography or multidetector computed tomography (CT) (6–8). Because of the lack of consistency among published studies, we decided to perform a specific anatomic dissection of the prostatic arterial supply. The aim of this study is to describe the prostatic arterial anatomy from human cadaveric specimens, highlighting the issues that may be of interest to interventional radiologists.

MATERIALS AND METHODS

This study was performed under the ethical rules and regulations of the School of Medicine that allow dissection

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of human cadaveric specimens for scientific investigations. Dissection of 18 male pelves (36 hemipelves) from white adults 35–68 years old was performed in the anatomy laboratory. Anatomic dissections were performed by senior dissectors with > 10 years of experience. Each specimen required 30–45 working hours for vessel dissection and 10 additional hours for vessel painting.

The pelves included L4 as the upper limit and the upper third of the lower limb as the lower limit. The pelves were fixed with standard formaldehyde solution (embalmed corpses). Resection was performed in all cadavers at the level of the ischiopubic and iliopubic rami, preserving the pubis and disarticulating the hip.

Dissection began with the complete removal of the parietal pelvic fascia, and once the internal iliac artery trunk was identified, all the arterial branches toward the prostate and bladder were dissected. Arterial branches were identified according to standard dissection technique using a 20-diopter magnifying lens for the prostatic sector. When dissection was completed, the arterial vessels were colored with red acrylic paint to enhance contrast and improve visualization.

For didactic purposes, the arterial anatomic description was divided into two sections: (*a*) distal termination (ie, the vessels surrounding and supplying the gland) and (*b*) proximal origin (ie, the origin of the prostatic arteries at the hypogastric level). The names of the arteries and anatomic structures illustrated in **Figures 1–10** are listed in **Table 1**.

RESULTS

Distal Termination

Two main arterial pedicles to the prostate from each hemipelvis were identified in all studied specimens: the superior and inferior prostatic pedicles. Their direction and distribution were constant in all pelves dissected (**Fig 1**).

The superior pedicle, called the prostatic artery, entered the gland in the posterior-superior sector of its lateral border in all studied cases. Before reaching the prostate, it branched to the trigone and the seminal vesicles. The superior prostatic pedicle terminated into a medial branch and a lateral branch in all cases (**Fig 2a, b**). The medial branch distributed to and supplied the upper portion of the middle lobe and the urethra proximal to the urethral crest. The lateral branch descended caudally to the apex of the gland at the external side of the lateral lobe. It had perforating branches to the lateral lobe and supplied the distal urethra, anastomosing with prostatic branches from the inferior pedicle.

In 28 (77.8%) anatomic specimens, the medial and lateral prostatic branches emerged from a single superior prostatic pedicle. In the remaining eight specimens (22.2%), these branches did not emerge from a single pedicle but from separate vessels (**Fig 3**).

The inferior prostatic pedicle entered the prostate in the posterior-inferior sector of its lateral border in all studied cases (**Figs 2a, b, 4**). This inferior pedicle formed a plexus in the prostatic apex, at the union of the prostatic and membranous urethra, and anastomosed to the lateral branch of the superior prostatic pedicle. All prostatic branches from the superior and inferior pedicles ran under the prostatic capsule in all studied specimens.

Proximal Origin

The superior prostatic pedicle was identified as the main prostatic arterial supply of the gland in all studied cases and was found to arise from different arteries at the hypogastric level (**Fig 5**). In 28 (77.8%) hemipelves, a single dominant superior prostatic artery was found. In the remaining eight hemipelves (22.2%), there were multiple superior arterial feeders. A double prostatic supply was identified in 6 (16.7%) specimens, and a triple prostatic supply (**Fig 6**) was identified in 2 specimens (5.6%), for a total of 46 arteries in the 36 dissected hemipelves. The frequency and different arterial origins of the superior prostatic arteries are listed in **Tables 2** and **3**.

The most common origin was the anterior trunk of the internal iliac artery, as a prostatic-vesical or genito-vesical

Table 1. Glossary of Arteries and Anatomic Structures Shown in **Figures 1–10**

Arteries	Anatomic Structures		
1	Superior prostatic pedicle	B	Bladder
2	Medial prostatic branch	P	Prostate
3	Lateral prostatic branch	PB	Pubis
4	Inferior vesical	R	Rectum
5	Prostatic-vesical	SV	Seminal vesicles
6	Vesicle deferential	DD	Deferent ducts
7	Genito-vesical	IOM	Internal obturator muscle
8	Gluteo-pudendal trunk	IB	Iliac bone
9	Obturator	ISC	Ischium
10	Superior gluteal	U	Ureter
11	Inferior gluteal	S	Sacrum
12	Internal pudendal		
13	Middle rectal		
14	Inferior prostatic pedicle		
15	Superior rectal		
16	Inferior mesenteric		
17	Hypogastric		
18	Superior vesical		
19	Inferior rectal		