



Urinary Bladder Papilloma – An Overview

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ABSTRACT

Urinary bladder papilloma or urothelial papilloma is a benign lesion of the urothelial lining of the urinary bladder. It is a rare benign neoplasm that chiefly affects males. The male-to-female ratio is 1.9:1 and is observed at a younger age than in other urothelial tumors. Urinary bladder papilloma usually occurs on the posterior or lateral bladder walls in the vicinity of the ureteric orifices (Dutta S et al.,2021). Urinary bladder papilloma is characterized by exophytic papillary projections supported by a thin, delicate fibrovascular core covered by normal urothelium. Although it is unequivocally benign, its morphology is similar to low-grade papillary urothelial carcinoma, and there is a tendency for recurrence. Recurrence can be multiple and may occur years after the initial diagnosis; therefore, long-term surveillance is mandatory. However, it rarely progresses to carcinoma. A clear concept of urinary bladder papilloma is vital for exact diagnosis, follow-up, and appropriate treatment. Hence, this review was undertaken (essential) to explore aetiology, pathophysiology, clinical manifestations, prophylactic strategies, treatment protocols, and surveillance.

Keywords: urinary bladder, urothelial papilloma, bladder tumors, urothelial carcinoma.

INTRODUCTION

The urinary bladder is a hollow muscular organ present in the pelvic cavity, situated at the base of the pelvis, posterior to the pubic symphysis.

The urinary bladder is a vital part of the urinary system that continuously receives urine from the kidneys via the ureters, stores it, and discharges it in a controlled manner via the urethra. Its size, shape, and position vary according to the volume of urine present.

Gross Anatomy:

For descriptive functions, the urinary bladder is divided into:

1. An Apex, also known as the Vertex, is the anteriorly pointed end of the bladder and is directed towards the pubic symphysis. It is connected to the umbilicus by the median umbilical ligament.
2. A broad fundus is the posterior part of the bladder, which is directed backward and downward, and receives the ureters.
3. A body that extends from the apex to the base. It is the main central part of the bladder.
4. The neck is the lowest and most fixed part of the bladder, which is continuous inferiorly with the urethra.

Internal structure

The bladder wall is thin, usually 3 to 5 mm thick (10), which becomes less than 3mm when distended. The wall consists of four layers, from outside to inside: they are



1. Serous layer -the superior surface is covered by peritoneum, while other parts are covered by connective tissues.
2. Muscular layer, i.e., urinary bladder muscle has three layers -inner spiral layer, middle circular layer, and outer longitudinal layer. This is responsible for bladder contraction during micturition.
3. Submucosa is made of connective tissues containing blood vessels and nerves. The blood vessels meet metabolic needs.
4. Mucous membrane lined by multi-layered transitional epithelium known as urothelium. The cells show polarity, and there are tight junctions between the cells; therefore, the urothelium becomes impermeable. The umbrella cells provide an absolute barrier. The basement membrane separates the urothelium from the lamina propria. The intact basement membrane provides an additional barrier. When the bladder is empty, the mucosa is folded. The folds are known as Rugae. The mucous membrane stretches when the bladder fills. The urothelial cells modulate afferent nerve activity via ATP and Nitric Oxide during bladder filling.

The trigone of the bladder is a triangular smooth area present on the internal surface of the bladder. This area is smooth and directs urine towards the urethra.

The urinary bladder has three openings -the two ureters enter the bladder at ureteric orifices, and the urethra enters at the trigone of the bladder. These ureteric openings have mucosal flaps in front of them that act as one-way valves to prevent backflow of urine into the ureters, a condition known as Vesicoureteral reflux.

Relations of the Urinary Bladder

1. Pubic symphysis is present anterior to the urinary bladder, from which it is separated by the 'space of Retzius' (retropubic space), filled with fat and connective tissues.
2. Rectum, seminal vesicles, and the vas deferens are posterior to the urinary bladder in males and the uterus and the upper part of the vagina in females.
3. Superiorly, loops of the small intestine and sigmoid colon are related to the urinary bladder in males and the body of the uterus in females.
4. Inferiorly, the prostate gland is related to the urinary bladder in males and the pelvic diaphragm and anterior vaginal wall in females.

Blood supply is mainly by the superior and inferior vesical arteries and to some extent by the obturator and other arteries. In females, the inferior vesical artery is replaced by the vaginal artery.

Venous drainage is in the vesical venous plexus and ultimately to the internal iliac vein.

Nerve Supply

The pelvic splanchnic nerve (S2-S4) is a parasympathetic nerve that causes contraction of the detrusor muscles and relaxation of the internal urethral sphincter. Therefore, responsible for micturition.

The hypogastric plexus (T11-L2) sympathetic nerve causes contraction of the internal urethral sphincter and relaxation of the detrusor muscles. This action leads to urine retention.

Somatic Pudendal nerve (S2- S4) controls the external urethral sphincter. Therefore, responsible for voluntary control of micturition.

Functions of the urinary bladder

1. Receive urine continuously from the kidneys
2. The store's urine bladder capacity is 400 to 600 ml.
3. Expulsion of urine
4. Maintains urinary continence



These functions are possible because of specialized properties of urothelium, which can accommodate repeated stretching and relaxation and provide a very strong barrier against urinary toxins.(Apodaca,2004).

Any change in urothelium can lead to a wide spectrum of diseases, ranging from benign proliferation to highly aggressive malignancies (Humphrey et al., 2016).

Urinary bladder papilloma is a rare benign neoplasm that accounts for a very small proportion of bladder neoplasms (Eble et al., 2016). Even in large, well-equipped hospitals, about one case per year is reported (2)/6, causing limited experience for any observer. Therefore, a review of the literature will highlight the diagnostic criteria and management protocol.

Urothelial papilloma is clinically significant because it may recur and resemble a malignant papillary lesion on cystoscopic examination, which may result in unnecessary treatment and follow-up strategies (Cheng et al., 2012).

In the late nineteenth century, the advent of cystoscopy recognised papillary growth of the urinary bladder. Due to a lack of histopathological facilities, all papillomas were considered malignant. Later, due to the absence of well-defined histological criteria, it was difficult to determine which was benign and which was malignant. (Mostofi,1954).

In 2004 and 2016, the WHO recognised benign urothelial papilloma as a separate disease and established diagnostic criteria. These criteria are very restrictive. Histopathologically, the papilloma's hierarchical branches are lined by normal urothelium, 6 to 8 layers thick. The papilloma has a delicate fibrovascular core. Immunohistochemistry is not essential for diagnosis. Advances in histopathology now allow doctors to distinguish benign urothelial papilloma from malignant urinary bladder lesions. The standardised criteria affect diagnosis, prognosis, and treatment, and guide long-term surveillance planning (Epstein et al., 1998).

Aetiology:

The aetiology of urothelial papilloma is unclear. It has no strong association with well-recognised carcinogens such as aromatic amines or tobacco smoke (Burger et al., 2013). However, a definitive relationship has not been established; many factors may contribute to the development of urothelial papilloma. Some of them are

- 1.localized urothelial proliferation that retains normal polarity, differentiation, and maturation patterns leading to papillary growth (Lopez-Bethorn et al.).
- 2.Persistent bladder mucosal irritation due to any cause, e.g., bladder calculi, chronic recurrent bladder infections, may cause epithelial hyperplasia and subsequent papilloma formation (Rosai,2018).
3. Urothelial papilloma lacks genetic alteration (van Rhijnet et al.,2009; Knowles and Hurst, 2015).

Histopathological features of urothelial papilloma include a delicate, fragile fibrovascular core lined by normal urothelium with normal architecture and thickness. Cellular polarity is maintained, tight junctions are present, and mitotic figures are absent (Eble et al.,2016). Genetic alterations, including mutations in FGFR3 and TP53, indicate its benign character.

Functions of the urinary bladder are not disturbed. Bladder compliance, contractility, and coordinated voiding mechanisms are usually not affected. In some cases, local disruption of the urothelial surface may disturb sensory signalling pathways and urothelial neuronal interactions, leading to dysuria and increased frequency (Birder and Andersson, 2013).

Discussion:

Urothelial papilloma is a unique benign condition in which disturbance of overall bladder function is absent or, if present, it is minimal, in spite of structural abnormality.

In Urothelial papilloma differentiation is retained despite focal proliferative activity. There is no invasion of the lamina propria. This causes a localized morphological change in the urothelium without a marked overall functional disturbance. Bladder biomechanics is not disturbed. The patient may have lower urinary tract symptoms due to changes in urothelial neural interactions, changes in urothelial surface, and the release of neurotransmitters during bladder filling. Such disturbances are responsible for causing urgency and frequency. The delicate fibrovascular core of the Urothelial papilloma predisposes to minor, painless hematuria that occurs spontaneously, without inflammation or tissue invasion.



Hematuria is the most common presenting feature of urothelial papilloma.

Urothelial papilloma is well recognised and documented for its tendency to recur. So long-term follow-up is essential. Recurrence reflects persistent local proliferative potential. Biological stability explains why repeated lesions usually retain benign characteristics, illustrating the importance of accurate diagnosis.

Patient counselling and surveillance strategies:

In Urothelial papilloma, localized epithelial abnormalities coexist with preserved bladder physiology. The structure–function relationship explains its benign clinical features and supports conservative management with strict follow-up rather than radical treatment.

Clinical features

Asymptomatic – In the majority of cases, urethral papilloma is diagnosed incidentally on ultrasound or CT scan for another cause.

Painless gross hematuria is the most common presenting feature (Ramrez D et al., 2016) of urothelial papilloma, which is detected either macroscopically or microscopically on routine urine examination. Painless hematuria is due to the fragile capillary network of the papillary core (Kumar et al., 2023).

Minor urinary symptoms such as urgency, increased frequency, and dysuria may occur due to mechanical irritation of the bladder mucosa (Humphrey et al., 2016).

Diagnosis

Definitive diagnosis is based on cystoscopic identification, followed by histological confirmation to exclude lesions with malignant potential (WHO, 2016). Typical findings in cystoscopy include a small, solitary exophytic lesion with a smooth papillary surface. The urothelium is of normal thickness, measuring 6 to 8 cells.

Cytologically, no atypia or mitosis is present. Immunohistochemistry is not required for the diagnosis. The lesions show positive CK20 expression in the umbrella cells only, similar to that of normal epithelium.

Urine cytology is usually unremarkable, indicating the absence of cytological atypia.

Microscopic hematuria may be present.

Prevention

As there is no specific risk factor responsible for urothelial papilloma, general measures for a healthy lifestyle and healthy bladder habits are supposed to prevent the lesion. These include cessation of smoking, including passive smoking, avoidance of pollution, especially reduction of occupational chemical exposure (Burger et al., 2013).

Early management of UTI and renal stone.

Regular examinations are the mainstay of a normal, healthy life.

Surveillance

Surveillance enables early detection of recurrence, allowing newly developing lesions to be promptly treated (Humphrey et al., 2016). The duration of surveillance is not consensual in the literature (Rebeiro A et al., 2017). The time of surveillance should be proportional to the risk of recurrence and progression. But the literature on predictive features distinguishing papillomas with different risks of recurrence or progression is lacking (Al Bashir S et al., 2014). Opinions differ for program and methods of surveillance, some suggest a two-year follow-up with cystoscopy every six months, while others recommend clinical examination and ultrasound at three, six, and twelve months, and then annually, usually the patient is examined with urinalysis, ultrasound, and diagnostic cystoscopy at three, six, and twelve months, and then annually (Rebeiro A et al., 2017).



Conclusion

Urinary bladder papilloma is a rare benign urothelial lesion with specific histological criteria and minimal physiological impact. Its accurate diagnosis is important due to its close resemblance to malignant papillary tumors, from which its treatment is quite different. Accurate histopathological assessment and long-term surveillance are the mainstay of patient management.

Recommendation

We recommend further study into the molecular and biological characteristics of urinary bladder papillomas to refine diagnostic criteria and follow-up protocols. Health awareness activities may be carried out.

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