

Milestones in the study of bladder tumors and the contribution of Sir Henry Thompson (1820-1904)

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Summary

We tried through this paper to present briefly the history of the study of bladder tumors and to underline the contribution of Sir Henry Thompson – outstanding British urologist – on that field.

Key words: Henry Thompson, bladder tumors, etiology, history, investigation, study

Henry Thompson: father of british urology

Henry Thompson is one of the most colourful personalities in surgical history. Thompson, the son of a lay preacher, was born in Framingham. He entered University College Hospital as a student in 1846. He qualified 3 years later and became house surgeon to Erichsen. After his training he decided to specialize in urological surgery. He became professor of clinical surgery at the University College and the Royal College of Surgeons. Besides his fine contributions to urology, including several methods of operation, he published many scientific works in the field. His two most important texts were *Diseases of the Urinary Organs* [1] and *Tumors of the Bladder* [2]. He also was awarded two Jacksonian prizes for essays on urethral strictures [3] and prostatic enlargement [4]. His name is associated with the two-glass test, in which the urine from a patient with gonorrhea is passed into two glasses; if the gonococci and gonorrheal threads are found only in the first glass, the probability is that the process is limited to the anterior urethra [5].

When, in 1863, King Leopold I of Belgium was seriously troubled by his vesical calculus, Civiale carried out lithotripsy on 7 times, but still calculi remained and the patient was no better. Queen Victoria enjoyed tampering with her relatives' illness, and sent Thompson to treat him in Brussels. Three lithotripsies were performed, and the King made a fast recovery – with no infection in the urinary tract, which had been thought an unavoidable effect of such operations. This success established Thompson's reputation as the world's leading urologist and he became a national hero in Belgium, receiving the huge fee of 3,000 pounds from his patient, and a knighthood from his own Queen in 1867, to be followed by a barony in 1899. Thompson tactfully wrote to Civiale acknowledging that his skill was the result of his former master's training [6].

The emperor Napoleon III, driven to England by the Franco-Prussian war had previously shown symptoms of bladder stones. Now they grew unbearable: unable to lie down without feeling the pressure of trapped urine, he tied a mattress on his back and leaned against a wall to sleep. In July 1872, Thompson was summoned to him at Chislehurst Castle, and proposed to insert a bladder catheter. The emperor refused until Christmas, but conceded that an operation was inevitable. In two sessions, stone fragments were removed with a lithotript. Yet, when the third was about to begin, he suddenly died of a heart attack. The autopsy revealed that his kidneys were virtually destroyed by the long infection which complicated the disease [7].

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Thompson wrote romans with the pseudonyme Pen Oliver : *All but; Charley Kington's Aunt.*

But not only that: he painted well enough to exhibit at the Royal Academy, collected antique chinese porcelain, studied astronomy, and was an early supporter of automobiles - at the age of 82 took up motoring and wrote a book on the subject - and of cremation! Also an avid gastronomer, he earned a reputation by his "octaves", dinners of 8 courses for 8 male guests, which became important social events and almost every famous man of the day, including royalty, attended [8].

It was a pity that Sir Henry Thompson, who was generally regarded as the leading urologist of his time, in his later years became over-conservative, and his discouraging opinion concerning the value of the cystoscope, Bigelow's litholapaxy, McGill's prostatectomy and the suprapubic approach to bladder tumors carried considerable weight. This, however, was of little importance compared to the great advances achieved by Thompson in the development of urology and its recognition as a specialty.

Bladder tumors

Prior to the 17th century, no reports of bladder tumors are found. Some passages in the writings of Alphonse Ferri [9] and Thierry de Héry [10] concerning caruncles could refer to bladder neoplasms. Fabricius Hildanus [11] was the first surgeon to describe the unintentional removal of a tumor during lithotomy, and other lithotomists had similar experiences. In 1639, Joseph Covillard [12] removed a tumor by means of forceps. C. Drelincourtt [13] and Stephen Blankaart [14] described neoplasms found at autopsy. Frederik Ruysch [15] published the first illustration of vesical tumors, one of which was pedunculated and caused retention requiring catheterization for relief. François Colot [16] removed such a tumor more by chance than deliberate intention. Fragments of tumors were probably removed by Charles Soemmering [17], but he, too, did so unintentionally. The first deliberate removal of bladder tumor was performed by Claude Le Cat [18] on a female patient, by means of forceps introduced along the urethra. Soon afterwards, Pierre-Joseph Desault [19] extracted a calculus and then removed two bladder tumors with forceps. Chopart's description of such a growth was the start of a dispute which went on during the 19th century, concerning fungus and carcinoma of the bladder.

François Chopart [20] noted that "fungus", or papillary tumors differed from infiltrating growths, and he emphasized the importance of hematuria as the key symptom of this condition. He reported Desault's avulsion of

a pedunculated tumor found at lithotomy. A similar pedicled tumor was found at lithotomy in 1820 by Marc-Antoine Petit [21], who decided against removing it. In 1834, John Crosse [22] performed lithotomy on a boy, and instead of a calculus, he found multiple tumors which he partly removed. Pierre-Louis-Aimé Nicod [23] published his monograph *Mémoire sur les polypes de l'urètre et de la vessie* in 1827. Many other early observations of bladder tumors were reviewed by Joachim Albarran [24] in 1892. The 19th century instruments designed to grasp calculi were used to try to remove tumors of the bladder. Jean Civiale [25] used his trilobe for this purpose in 1827, and a similar attempt was made by Leroy d'Étiolles [26] in 1833 by means of forceps. In female patients, access was gained by dilatation or incision of the urethra, and the tumor was then ligated, curetted or avulsed with forceps or an écraseur. Operations of this type were performed by John Warner [27] in 1750, H. Plieninger [28] in 1834, Gabriel Guillon [29] in 1846 and Jonathan Hutchinson in 1857 [30]; in 1864, Thomas Bryant [31] and Sir Henry Morris [32] used écraseurs for this purpose.

In the last quarter of the 19th century, surgeons turned their attention to bladder tumors which, until then, had been considered as incurable. In 1874, Theodor Billroth [33] performed the first suprapubic removal of a vesical neoplasm. Henry Thompson [2], in 1880, introduced his method of blind extirpation of bladder tumors through a perineal urethrotomy, and in 1884, Eduard Sonnenburg [34] reported the first partial cystectomy. The first total cystectomy for tumor of the bladder was carried out by Bernhard Bardenheuer [35] in 1887. While these advances in surgery were going on, cystoscopic methods of investigation and treatment were being developed.

Etiology

The influence of chronic irritation of the bladder due to calculi and infection has been recognized since Percivall Pott [36] remarked on this in 1775. Bilharzial infestation was noted as a cause of vesical neoplasm by Reginald Harrison [37] in 1887. The increased incidence of bladder tumors in those working with aniline dyes was reported by Louis Rehn [38] in 1895, and more recently it has been shown that several intermediate products in the manufacture of dyes are responsible rather aniline itself. These include benzidine, B-naphthylamine [39] and xenylamine, which was found by W. Melick [40] and his co-workers to give rise to bladder tumors in 11% of exposed workmen. In the general population, the importance of derivatives of tryptophan metabolism as urinary carcinogens was investigated by E. Boyland and others [41].

Investigation

The first to diagnose cancer of the bladder by cytological smears from the urine of 8 patients, urine cytology as a diagnostic laboratory method, was Wilhelm-Dusan Lambl [42] in 1856. Probably the first observation of tumor tissue in the urine proved histologically was that of W. Sanders [43] in 1864. Henry Thompson, in 1873, reported the presence of cancerous cells and tumor particles in the urine, and he suggested bladder lavage to obtain specimens suitable for histological examination [44]. In 1884 Henry Thompson [2] described his method of “digital exploration of the bladder” through a perineal urethrotomy and drew diagrams of the tumors found in this way. The invention of the cystoscope revolutionized the investigation of the bladder tumors, and probably the first surgeon to observe such a neoplasm with an endoscope was Josef Grünfeld [45] in 1885. Leopold-Ritter von Dittel [46] was the first to view a neoplasm through the Nitze instrument. In 1891 Max Nitze [47] published a paper on the cystoscopic diagnosis of bladder tumors and the procedure became generally adopted, although Henry Thompson was dubious of its value.

Although primitive cystoscopes were first devised in 1806, it was not until 1877 that Max Nitze [48] developed a practical instrument with an improvised electric light source and lens system. After Edison’s invention of the incandescent lamp was announced in 1880, Nitze immediately recognized the advantages of this light source for his work. However, it was not until 1887 that he was able to obtain a small bulb that could be adapted to his instrument.

In 1945 the Greek pioneer researcher George Papanicolaou [49] -founder of exfoliative cytology and of the after him named test -introduced the cytological examination as a simple, easy-to-use and practical diagnostic method [50]. In 1947 Papanicolaou published another article [51], where the methodology and results from the study of 83 cases were presented and analysed. In 1952 H.Comwell and G. Papanicolaou [52] advocated the use of cytology for the detection of tumor cells in the urine of workers exposed to carcinogens, and in the same year J. Crabbe [53] suggested cytology as an alternative to cystoscopy in the routine follow-up of patients treated for bladder tumors.

The introduction of new radiologic methods (cystography, intravenous pyelography etc) revolutionized the diagnosis of bladder tumors and influenced treatment by revealing the extent and fixity of the lesion [54].

In 1906 F. Voelcker and Anton von Lichtenberg [55] attempted the first successful retrograde pyelogram. The first cystogram was reported by A. Wittek [56] in

1903, who filled a bladder with air and demonstrated that calculi might be detected in this way. This method was used in 1904 by S. Koller to establish the presence of a diverticulum of the bladder [57]. The dangers of air embolism were soon appreciated and radiopaque solutions were found to be safer and better media for cystography. In 1904, P. Wulff [58] showed a bladder anomaly by opacifying the organ using a mixture of bismuth subnitrate, starch, and water. The next year Voelcker and von Lichtenberg [59] described their successful use of a suspension of a colloidal silver.

Urethrography was described for the first time in 1910 by John Cunningham [60]. The difficulty was to outline the prostatic urethra with available media and techniques. Rubin Flocks [61], in 1933, solved this difficulty by using opaque fluid made viscous by tragacanth, and he introduced an effective technique for cystourethrography.

Tumors of the bladder are usually not investigated by micturating cystourethrography. In 1961 F. Doyle [62] described a technique for cystography in tumors. Angiography in conjunction with endovesical and perivesical gas studies was advocated by E. Lang in 1969 [63], as the method of choice to assess accurately the extent and operability of these tumors. Double-contrast, air-barium cystography would seem to be a good technique for demonstration of a tumor in a diverticulum of the bladder. Massive vesicoureteral reflux was demonstrated on the micturating cystourethrography (MCU) as well as additional tumor in the ureter. Vesicoureteral reflux has been reported in association with bladder tumors [64]. The tumor may infiltrate the region around the ureteric orifice and render the valvelike mechanism incompetent. MCU is indicated as an examination for reflux before treatment of carcinoma of the bladder. In 1971 H. Williams et al. found vesicoureteral reflux in 58% of patients with bladder tumors treated by interstitial irradiation [65].

MCU in male and female patients with carcinoma of the bladder is performed only rarely, as it seems to add little to diagnosis. Carcinoma of the bladder is less common in females than in males [66]. A rare cause of carcinoma of the bladder is bilharziasis. On the cystogram a filling defect is usually visualized and calcification of the bladder wall will indicate the diagnosis of bilharziasis as the cause of the carcinoma [67].

Although cystography and retrograde pyelography permitted accurate determination of some diseases of the urinary tract, the procedure required urethral and ureteral catheterization with the risk of developing a serious infection in this preantibiotic era. There was clearly the need for a simple, painless method for depicting the kidney, ureters, and bladder. Intravenous pyelogra-

phy was founded by Leonard Rowntree [30] and his co-workers at the Mayo Clinic in 1923. They used sodium iodide, both orally and by intravenous injection, and faint outlines of the urinary tract were observed. Anton Roseno [68], in 1928, achieved better contrast in pyelograms by using a combination of sodium iodide and urea. The high iodine content of selectan neutral, used for treating infections, led M. Swick [54] to employ this as a contrast medium, again with mediocre results. Arthur Binz and C. Rath [54], who had synthesized selectan, modified the molecule and, in 1929, they produced uroselectan, which was found by von Lichtenberg and Swick [54] to provide the first good-quality pyelogram with safety. Since then, other drugs have been developed, with steady improvement in the quality of intravenous pyelography.

Cross-sectional techniques have become an essential component of the radiographic evaluation of urological disorders. In most institutions, ultrasound has become the most commonly performed examination for evaluating the urinary tract. Ultrasound can detect bladder masses, discriminate between stones, foreign bodies, fluid – filled cysts and solid tumors. Because an ultrasound study does not require contrast material and is not affected by renal function, this modality is routinely used in patients with renal failure to evaluate the urinary tract [69].

Computed tomography (CT) combines an unsurpassed definition of the anatomy of the urinary tract and surrounding structures with the ability of contrast studies to differentiate normal parenchyma from areas of inflammation, cysts or tumor. CT is the modality of choice for staging malignancies of the urinary tract and detecting recurrences.

The magnetic resonance imaging (MRI) with its direct multiplanar imaging capability and absence of any need for intravenous contrast material to show vessel patency permits accurate preoperative staging of urinary tract neoplasms. The extent of tumor and lymphadenopathy can be well demonstrated.

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