

main tumour or (b) to mistaking a carcinoma for a papilloma. The latter is the graver, and, unfortunately, the commoner error. Two conditions favour it. The carcinomatous degeneration may have only just begun, the tumour being still a pure papilloma to all appearances, and this malignant change, commencing in the pedicle, spreads as rapidly towards the base of the tumour as towards its periphery. In frank carcinomata the malignant epithelial infiltration is commonly found to extend 1 to 2 cm. into the muscular wall of the bladder beyond the area of manifest induration; and so in these cases the malignant change has often reached the muscle wall by the time the tumour is removed, and therefore this most dangerous portion of the neoplasm is overlooked and left behind unless a wide section of apparently normal muscle is excised. The prevention of this oversight—the elimination of that form of relapsing papilloma which ultimately declares its malignant character—is one of the ideals of genito-urinary surgery.

Albarran deserves the credit of explaining these transition tumours and relapsing papilloma. He showed that practically all these tumours of doubtful nature are carcinomatous, wholly or in part. Thus, among 132 vesical tumours examined, he found 100 carcinomata against 24 papillomata, a conclusion quite the reverse of what had previously been held. Guyon's aphorism expresses the same idea: "We still await in our practice the papillomata encountered in statistics."

Propagation.—Papilloma is apparently propagated only by the contact inoculation alluded to above. Carcinoma is propagated in 3 ways: (a) By contact inoculation, (b) by infiltration of the surrounding tissues, and (c) by lymphatic invasion.

A broad distinction may be laid down between the rapidity of dissemination in vesical and in prostatic growths. The former, whether carcinoma or sarcoma, progress slowly, remain for years confined to the bladder, and but rarely give rise to metastatic growths of any clinical importance. Pasteau¹ has shown that the glands along the iliac vessels are enlarged in 43% of all sessile tumours of the bladder and in 85% of infiltrated tumours; but the infection gets little further than this: the patient dies of secondary functional and inflammatory disturbances of the urinary organs. Prostatic growths, on the contrary, are disseminated throughout the pelvis with frightful rapidity, giving rise to the *carcinose prostato-pelvienn*e of Guyon (p. 321). The reason for this relatively slow dissemination of vesical

¹ État du système lymphatique dans les maladies de la vessie et de la prostate, Paris, 1898, pp. 46, 52.

cal tumours is not clear. It was originally attributed to the absence of lymphatics from the bladder, later to their fewness, and recently to the presence of the perivesical fibro-lipomatous inflammation which commonly occurs as a barrier to the extension of a neoplasm, as is the case in interstitial cystitis (p. 385). Though these theories are not by any means fully explanatory, the fact that bladder neoplasms grow slowly remains true.

Secondary Lesions.—Any tumour of the bladder may undergo fatty, granular, colloidal (malignant), or calcareous degeneration. It may also become inflamed, ulcerated, or encrusted with salts of lime. Perforation of the bowel and of the peritoneum are exceptional.

The secondary changes in the urinary organs are of greater importance. The tumour acts in very much the same way as a hypertrophied prostate. It offers a point of least resistance for the origin of cystitis, and, sooner or later, it obstructs the orifice of the urethra and interferes with the contractions of the bladder, thus setting up the long train of secondary phenomena of retention with infection—cystitis, atony, pyelo-nephritis (p. 265)—terminating only with the patient's death.

Other Tumours.—The other tumours of the bladder are not sufficiently frequent to require more than a summary consideration.

Sarcoma.—Round-celled, spindle-celled, mixed-celled, lympho-sarcoma, fibro-sarcoma, myosarcoma, myxosarcoma, alveolar, giant-celled, telangiectasic, and chondrosarcoma are described. The tumour usually encroaches but little on the cavity of the bladder. It appears either as a hard sessile growth or an intramural infiltration. Its surface may be smooth, papillary, or ulcerated.

Myxoma (Polyp).—Pure myxoma is exceedingly rare. The growth is usually a fibromyxoma or a myxosarcoma. The surface of the tumour is lobular and smooth, resembling polypus of other regions.

Fibroma.—Pure fibroma is very rare. The tumour being benign, usually small, and of firm texture, passes unnoticed during life, unless, as in Qahoubian's¹ case, it grows large enough to interfere with micturition.

Myoma.²—This tumour is benign, may be intravesical, interstitial, or subserous, and, like the fibroma, passes unnoticed unless it interferes with the mechanism of urination.

Cysts.—Several varieties of cysts occur in cystitis. They have no clinical significance. Urachus cysts receive special consideration at the end of this chapter. Albarran describes a cystadenoma.

¹ Guyon's Annales, 1897, xv, 839. ² Cf. Ramsay, Phila. Med. J., 1900, vi, 43, 86.

Dermoid cysts occasionally occur in the wall of the bladder. They are diagnosed only when, after rupture, hair from them is passed in the urine. This symptom, pilimiction, is pathognomonic.

Echinococcus cysts¹ grow in the pelvis and burst into the bladder. They very rarely develop primarily in the bladder wall.

SYMPTOMS

Hemorrhage.—The first, the last, and often the only symptom of a tumour of the bladder is hemorrhage. In general, the more villous the tumour the more profuse the bleeding. Hence with such tumours as myoma and fibroma, the surface of which is often covered with a normal mucous membrane, there may be no hemorrhage whatever.

The characteristic hemorrhage of a neoplasm, whether renal or vesical, begins without cause or warning, continues copious and painless, unaffected by rest, diet, or medication, and ceases, as it begins, without apparent rhyme or reason. Its cessation may leave the urine entirely normal and the patient lulled into a false sense of security by what he considers his happy escape from a perilous condition. A profuse hemorrhage of this character is almost pathognomonic of neoplasm. Yet bleeding from a tumour may not be characteristic. It may be mild and continuous, associated with cystitis evoked by instrumentation, or amenable to treatment. It may not be the initial symptom. In short, it may assume any form. But to be characteristic it must be spontaneous, profuse, unalterable, and unaccompanied by any other symptom.

Usually the hemorrhage grows more severe and recurs more frequently as the disease progresses. But this is by no means always the case. There may be intervals of years between the hemorrhages; indeed Albarran cites a few cases in which the hemorrhage stopped entirely after spontaneous detachment of the growth.

Hemorrhage from neoplasm of the bladder may be excited by the introduction of any instrument (especially a metal one) into that organ, and when thus produced it assumes its characteristics of profusion, painlessness (except for the passage of clots), resistance to treatment, and spontaneous cessation.

Pain and Dysuria.—These symptoms usually appear some days, weeks, or months after the first hemorrhage. Exceptionally, pain and dysuria precede the bleeding. This is alleged to occur most frequently in sarcoma. Pain may be evoked by the passage of clots; it may be due to cystitis, to obstruction of the urethra, or to the interfer-

¹ Deutsche Chir. v. Billroth u. Lücke, 1890, lii, 305.

ence of the bladder muscle by the tumour itself. Sharp, lancinating pains also arise spontaneously from malignant growths.

Retention.—The passage of urine may be suddenly arrested by a large clot or by the tumour. In the former case, a few moments of spasm and straining will usually expel the clot; but if the tumour itself obstructs the internal orifice of the urethra, the condition resembles prostatic hypertrophy. All the familiar forms of acute and chronic retention, with or without infection, are encountered. The sudden shutting off of the stream, which is a characteristic symptom of stone, may be due to tumour. Thus Nitze had a patient whose stream would be suddenly obstructed unless he urinated while lying on his back. Tumours in the region of the ureteral orifice sometimes obstruct that duct partially or completely. On the whole, however, retention is an unimportant feature of the disease.

Cystitis.—The course of the disease is commonly divided into two stages (1) before infection, (2) after infection. Yet there may be cystitis before the first symptom of tumour appears. At one time or another inflammation of the bladder is sure to occur. The tumour itself is a point of least resistance. The blood from it is an excellent culture medium. Instruments introduced into the bladder often bring germs with them, and thus in one way or another, at one time or another, cystitis occurs. When once the tumour has become inflamed there is little hope of overcoming the inflammation except by removing the tumour; and if this is not done early in the disease the inflammation persists, spreads to the kidney, and is largely instrumental in the patient's final taking off.

The symptoms of cystitis due to tumour of the bladder are often most distressing. The dysuria is usually severe, and small quantities of foul urine full of pus and blood are passed with infinite pain and straining.

Course of the Disease.—Among 140 cases collected by Albarran the *first symptom* was hematuria in 109 (78%), dysuria in 10 (7%), cystitis in 5, pollakiuria in 5, and in the remainder, various combinations of hemorrhage (in 10), dysuria (in 7), cystitis (in 2), retention (in 2), the passage of shreds and once the extrusion of the tumour from the urethra (in the female).

During the first period of the disease, before infection occurs, the symptoms are extremely mild. The dysuria is rarely severe, and, were it not for the hemorrhages that occur from time to time, the patient would give little thought to his urinary organs. These hemorrhages are rarely so profuse as to cause any grave anemia. This condition continues for months or years. The patient's general

health is excellent, and if he is shy he may bear his bleeding in silence and come to the surgeon only after cystitis has set in.

When cystitis occurs the symptoms promptly become more aggravated, and the patient, exhausted by the loss of blood and distressed by the constant spasm of his bladder, grows rapidly weaker. Albaran alleges that a sudden turn from the simple bleeding of papilloma to the lancinating pains and rapid cachexia of carcinoma can sometimes be made out. I confess that the progress of carcinoma has seemed to me almost as slow and mild as that of papilloma. I have several times watched patients pass years of comfort with a typical carcinoma of the base of the bladder. I should put the average duration of life with any malignant tumour of the bladder at from three to five years. A papilloma may last many years before it degenerates—as nearly all of them do in the long run—into carcinoma.

The Urine.—The appearance of the urine depends upon whether cystitis or hemorrhage is present at the time of examination. Between whiles it may be entirely normal, or there may be microscopical and chemical evidence of hemorrhage—viz., the presence of red blood cells and albumin. When cystitis exists there is commonly some hemorrhage as well, so that the urine contains both pus and blood.

The urine may also be searched for shreds of tumour tissue. These are especially common with papillomatous growths. They sometimes are as large as a pea, resemble blood clots in appearance, and are easily overlooked. If found, they confirm the diagnosis of tumour, but do not denote the character of the growth, since simple papillæ may sprout from almost any tumour of the bladder. Watson¹ lays much stress on the discovery of “a more or less abundant sediment, in which are found large numbers of epithelial cells of great variety of shapes with large nuclei.”

Casts and albumin from the kidney may appear in the urine, whether the tumour is in the bladder or the kidney.

DIAGNOSIS

The suggestion of tumour of the bladder usually comes from a typical hemorrhage (see above). Such a hemorrhage may, however, be caused by a neoplasm of the kidney, or it may be a spontaneous renal hemorrhage of obscure origin. There are several fine points of distinction between a renal and a vesical hemorrhage, as given in the table on the opposite page, but the best criterion is the cystoscope.

¹ Morrow's System of Gen.-Urin. Dis., 1893, i, 577.

Differential Table of Hematuria

Tubercle.	Stone.	Bladder tumour.	Kidney.
1. Slight and remittent at first.	Same.	Profuse and intermittent.
2.	Clots large.	Clots small, if any.
3. Blood bright or maroon.	Same.	Same.	Blood usually dark.
4. Little affected by exercise.	Brought on by exercise.	Little affected.
5. May be produced by instrumentation.	Same.	Same.	Unaffected.
6. Associated with characteristic pain.	Same.	No pain at first.

Cystoscopy.—Of all the instrumental manipulations employed in the diagnosis of tumours of the bladder, cystoscopy stands first, for it alone indicates the presence, the nature—as far as that can be determined—the location, and the number of tumours. The last point is especially important. Many small villous tumours, which may be distinctly seen floating in the urine (Fig. 96), are almost undiscoverable when the bladder is opened and a digital or a visual examination made of its empty cavity. Unless, therefore, the exact location of every villous papilla is definitely determined by cystoscopy previous to operation, some one of them may be overlooked. The relapse which inevitably results from such an oversight exposes the patient to renewed danger of carcinomatous change as well as to the inconvenience of a second operation.

There are only two contra-indications to cystoscopy. Hemorrhage may be so free as to make it impossible to gain any accurate data, even with the irrigating cystoscope, or the bladder may be so irritable as to frustrate the operation. In the former case a few days' delay, in the latter a general anesthetic, make the cystoscopy practicable.

The technic of cystoscopy has already been described (p. 330). Some authors insist on the advantages of the irrigating cystoscope for this work; they hold, with reason, that the hemorrhage often quickly obscures the field of vision. Yet I have not found that the irrigating device is of any great assistance in clearing the contents of the bladder.

In examining the bladder for tumour two things must be borne in mind: First, the tumour (if there is one) will be found, in almost every case, near the orifice of one or the other ureter or of the urethra; second, the tumours are multiple in a fair proportion of cases, and a complete cystoscopy should include a minute inspection of every portion of the bladder. Such an inspection is often impossible on account of the hemorrhage.

The characteristics of the different tumours, as seen by cystoscope or during operation, have already been described (Figs. 96 and 97).

Recto-abdominal Palpation.—Bimanual examination, with the patient in the dorsal or the knee-chest position, often affords valuable information about the nature of the growth. A papilloma or a small hard tumour cannot be felt, but any considerable infiltration of the base of the bladder is readily distinguished. Such an infiltration is definite evidence of the malignant character of the growth, and makes its successful extirpation impossible with the surgical means at our command. In making this examination the prostate gland should be delineated by the finger in order that a growth in the bladder wall may be clearly distinguished from one in the prostate.

The Stone-searcher.—When cystoscopy is impossible Thompson's searcher may be depended upon to give some evidence of the presence and nature of the growth. A large, hard tumour may be distinctly felt by this instrument, a villous growth will be made to bleed freely by its contact, and any considerable area of infiltration is distinguished by its rough, unyielding character.

Cystotomy.—Exploratory cystotomy should be performed above the pubes, not in the perineum (as suggested by Sir Henry Thompson twenty years ago), and the operation, like an exploratory abdominal section, should be performed for the purpose of removing the growth, if any is formed, rather than for a mere diagnosis.

Differential Diagnosis.—It is often impossible to distinguish between a benign and a malignant papilloma of the bladder. In general, infiltration of the bladder wall, solidity of structure, and a duration of more than two or three years may be looked upon as suggestive of malignancy. On the other hand, villosity, pedunculation, and a short history favour benignity.

The distinction between neoplasm, on the one hand, and stone, pericystitis, and hypertrophy of the prostate, simple or malignant, on the other, is made by the cystoscope and recto-abdominal touch, as described above.

TREATMENT

Palliative Treatment.—If there is any possibility that the tumour is benign, palliative treatment is entirely inappropriate. The tumour should be dealt with surgically and at once. The patient must be encouraged to submit to immediate operation on the ground that delay may prove fatal. Yet before undertaking operation it may be necessary, even in these cases, to check hemorrhage or to alleviate cystitis.

The Treatment of Hemorrhage.—It is customary when the patient is bleeding freely from a tumour of the bladder to put him to bed and to restrict his diet. I am not sure that either measure is particularly efficacious; but I am sure that beyond this we tread on uncertain ground. The internal administration of the fluid extract of *senecio-aureus*, in 2 c. c. doses 3 times a day, has given Dr. Chetwood very fortunate results. *Oil of turpentine*, so efficacious in kidney hemorrhage, has no certain value here, nor do I put any faith in other astringents administered by the mouth. In one case I have employed saturated solutions of *gelatin* with the idea of increasing the coagulability of the blood with no great success. Local measures are equally unreliable. *Silver nitrate* is praised by Thompson, and it certainly has a temporary hemostatic effect. *Alum* (2%) is equally good. Solutions of the *suprarenal extract* are somewhat irritating and produce only the most ephemeral results. A hot solution of gelatin seemed to do good at my hands in one case. *Antipyrin* has been praised. But, as a matter of fact, one of the features of the bleeding is its defiance of all medication. A desperate hemorrhage requires *cystotomy*.

The evacuation of clots may cause trouble. They are best evacuated by a large woven or metal catheter; a Bigelow evacuator is even better if the growth is not at the neck of the bladder. Through this instrument very hot (115°) salt solution or alum (0.25%) is injected repeatedly. If a clot obstructs the eye of the instrument it is drawn out by aspiration with a piston syringe. The bladder is thus emptied by repeated irrigations and aspirations. I do not care to use hydrogen peroxid in the bladder. It is irritating, the passage of the bubbles causes considerable spasm, and it is but little more efficient in disintegrating clots than is the hot salt solution.

The Treatment of Cystitis.—As in hypertrophy of the prostate, so in neoplasm of the bladder, the best way to treat cystitis is to prevent it. The *prophylactic measures* are the same in either case—viz., urinary antisepsis, and, if necessary, systematic catheterization (p. 278). There is this difference, however, that if the neoplasm is at the neck of the bladder, the passage of the instrument may do more harm than the evacuation does good. In this event the bladder is best let alone. *The cure* of an existing cystitis is quite as arduous a task as the checking of a hemorrhage. Any local medication excites the bleeding, while general treatment is of as little use here as in any other form of cystitis. The only course to follow is to administer whatever general treatment seems to suit the patient best and to use as much local treatment as circumstances permit. As a matter of fact, the unendurable dysuria of cystitis forms one of the chief indi-

cations for *palliative cystostomy* (p. 395). I have been forced to this expedient a number of times, and have always found it most serviceable. Simultaneous scraping or cauterization of the growth may be of material aid in ameliorating the symptoms and checking the cause of the disease for a time.

Operative Treatment.—Palliative suprapubic cystostomy is the operation suited to all desperate and incurable cases. Even though no pretence is made of eradicating the disease the patient's life is prolonged by the very fact that he is relieved of his worst symptoms. I have at present under my care a striking example of the value of this operation. Before operation the patient weighed 120 pounds, and was tortured day and night by incessant straining. Within six months after operation he gained 25 pounds, although the tumour, which was only curetted, was a typical villous carcinoma.

The radical operations employed for tumour of the bladder may be reduced to 4 types:

1. Intravesical excision.
2. Excision after cystotomy.
3. Resection of the bladder.
4. Extirpation of the bladder.

1. **Intravesical Excision.**—This may be performed upon the female bladder through the dilated urethra. But upon the male it must be performed by means of an operating cystoscope, such as Nitze¹ employs. The operation is performed as follows: A cystoscope is introduced into the bladder and the location and other characteristics of the tumour are observed. Then a specially devised electro-cautery snare is thrown about the base of the tumour. The current is turned on, the peduncle burned through, and the stump recauterized. The hemorrhage is slight. In the course of time the tumour is voided through the urethra.

According to Nitze, the instruments required for this operation number 15 at the very least; snares, cauteries, cystoscopes, etc., and no little skill is required as well. Moreover, the operation is manifestly suited only to small tumours, and, while it is true that the tumours most likely to elude the surgeon's eye when the suprapubic operation is undertaken are the very ones that are most conveniently dealt with by this process, it is small wonder that even the 31 operations without a death reported by Nitze have brought him few imitators.

2. **Excision after Cystotomy.**—This and the other operations about to be described are all performed through an epicystotomy

¹ Centralbl. f. d. Krankh. d. Harn. u. Sex. Org., 1896, vii, 377, 469, 601.

wound (p. 459). The bladder is opened in the usual manner by a vertical incision, and the wound in the abdominal wall enlarged, if necessary, by a transverse cut at its lower extremity. A previous cystoscopy has shown the surgeon the exact position of the tumour, which he now searches for with his finger, and draws into the wound by a volsella forceps or a Guyon clamp. A clearer field of operation may be obtained by putting the patient into the Trendelenburg position before proceeding to excise the tumour. This may be done in one of several ways. If the tumour is distinctly pedunculated, it is convenient to burn it away close to the bladder wall with the Paquelin or the galvano-cautery, or Watson's cautery clamp may be employed. For that form of papilloma which grows as a bunch of tufts from a circumscribed area of the mucous membrane, the best operation is a thorough curetting, with subsequent cauterization of the bleeding points. The advantage of using the cautery to check bleeding is obvious. But this treatment is not entirely appropriate to the excision of sessile or frankly malignant infiltrating tumours. These require resection of the bladder wall.

After the tumours have been burned away, a final minute search is made over the bladder wall with the aid of a headlight or mirror (Fenwick employs a tubular speculum to keep the field dry, both in the search and in operating), and any other growths that are thus found are treated similarly. The suprapubic wound is then closed by Gibson's suture (p. 463) about a drainage-tube. There are no special features in the after-treatment.

3. **Resection of the Bladder.**—Resection of that part of the bladder wall surrounding a tumour is essential in the removal of every sessile or infiltrating growth of the bladder (except the myomata), whether it is frankly malignant or not. Papillomata that are apparently benign in character and have stout peduncles require excision or thorough cauterization of the surrounding mucous membrane. But if the tumour is truly sessile, or if there is any evidence whatever of infiltration of the bladder wall, a section of the whole thickness of this muscle must be excised, including an area of apparently normal tissue 1 cm. beyond the limit of induration.

If the tumour lies on the upper or the lateral wall of the bladder the operation is comparatively simple. Peritoneum is stripped away if possible, the requisite section removed, and the gap sutured with two layers of catgut, the one buried for the muscle, the other for the mucous membrane. If the tumour is conveniently situated, the suture may be re-enforced by a layer of subperitoneal Lembert stitches. A wick of gauze may be inserted between the peritoneum