acute as well as the most common of all. It may or may not be due to the gonococcus. It occurs during a gonorrhea, during severe simple urethritis, or even during gleet—if the gleet depend upon stricture—by direct continuation of the inflammation backward upon the mucous membrane. The inflammation is confined to the region of the neck, and does not attack the body of the bladder.

It rarely appears until after the first week of a gonorrhea, and is commonest during the third week, when the inflammation has reached the posterior urethra. It is frequently seen in practice as a result of simple extension of inflammation later in the course of the disease. Often, however, a second or provoking cause has been in action, and without its assistance the complication of gonorrheal cystitis might have been escaped. These provoking causes are anything which will irritate the urethra: alcoholic beverages, sexual intercourse, abortive treatment of gonorrhea, catheterism, jolting, violent or sometimes even moderate exercise. Any of these causes may light up a cystitis of the vesical neck in any patient with urethritis.

The symptoms of gonorrheal cystitis vary from a hardly appreciable irritability—with congestion—up to the very highest grade these symptoms (of irritability) can assume, with a tenesmus so constant as to amount to actual incontinence, the patient voiding a few drops of blood or milky fluid every few minutes. The tenesmus is particularly painful, although the mere passage of urine is often attended by great pain. A noteworthy feature of gonorrheal cystitis is the absence of general phenomena. Fever is sometimes inappreciable, and rarely runs high. Anxiety, *malaise*, and nervous distress are, however, disproportionately prominent. Constipation is habitual. The urethral discharge becomes greatly lessened, or even disappears on the advent of the bladder symptoms; as the latter disappear, however, the former returns. Gonorrheal cystitis varies in duration from a few days, in abortive cases, up to many weeks, and sometimes leaves permanent trouble behind in the pelvis of the kidney, in the prostate, or in the seminal vesicle. It is not followed by chronic cystitis unless retention, stone, or tumour perpetuates the inflammation.

The Urine.—The urine of acute cystitis is usually acid, thickly purulent throughout and often bloody. If an attack of acute cystitis occurs during the course of a chronic ammoniacal inflammation the urine remains ammoniacal, but the other symptoms are the same as described above. Chemical examination reveals the presence of albumin derived from the blood in the urine. The microscope shows great quantities of pus cells and bacteria with a variable number of red blood cells and desquamated epithelia.

Chronic Cystitis.—Chronic cystitis is very common, so much so that there are few diseases of the lower urinary passages of which it does not form a part. Chronic cystitis, moreover (unlike many other chronic inflammations), rarely commences as an acute disease, but is chronic from the first. It never occurs as an idiopathic affection, but is invariably a secondary result arising from other morbid conditions of the urinary passages (p. 359). Once started, it does not tend to get well spontaneously, but to become slowly and steadily worse. Fortunately, its causes are well known, and most of them easy of demonstration. Many of these can be removed, and with them the chronic inflammation which they keep up. Some cases are incurable on account of permanent structural alterations in the bladder walls, or because the cause cannot be reached. All, however, may be benefited by careful and judicious management, and there are few abnormal conditions of the body whose amelioration is more satisfactory to the surgeon, or more grateful to the sufferer.

The symptoms of chronic cystitis resemble those of the acute form, in a degree proportionate to the grade of the inflammatory process. They are often complicated by retention (p. 346), by atony (p. 344) or hypertrophy of the bladder (p. 341), by stone, by tubercle, by tumour (pp. 402, 417), etc. There may only be slightly increased frequency of urination, with slight cloudiness of the fluid, in very chronic cases; or the calls may be very frequent, and the pains excessive, varied, and constant, as in the acute disease. In fact, chronic cystitis is liable at any time to be lighted up into an acute state by the continued action of its own cause, or by the supervention of other causes (cold, violent exercise, abuse of alcohol, acid urine, instrumentation, etc.). Between these acute attacks the symptoms of the disease are so slight that the patient may fancy himself well, and rejoice over the fancied cure while the spark of future and worse inflammation is yet smouldering within him. Even the surgeon might be deceived by such a case were it not for the persistent urinary evidence of disease.

The Urine.—The urine in chronic cystitis is clouded by pus and bacteria. It is rarely bloody unless there is tubercle, stone, or cancer. It may be acid or alkaline.

Chronic Acid Cystitis.—When the urine is acid and the cystitis chronic the vesical inflammation is usually mild (unless it be tubercular). The amount of pus in the urine is not great, and the subjective symptoms are slight or entirely absent. This form of cystitis is often encountered with hypertrophy of the prostate, associated with slight pyelo-nephritis. The inflammation, though mild, is usu-

ally quite unconquerable, except by removal of the prostatic obstruction. The dangers connected with it are: (1) The pyelo-nephritis, and (2) the development of ammoniacal cystitis, and it is against these that the treatment is chiefly directed. The acid cystitis may be controlled by intelligent treatment, and, if the kidneys are protected and alkaline fermentation prevented, the patient gets along very well at the expense of systematic local treatment, which he is, as a rule, quite ready to accept in lieu of an operation calculated to relieve all his sufferings. (See Treatment.)

Chronic Alkaline Cystitis.—This form of chronic cystitis is of serious import. Its severity is usually in marked contrast with the mildness of a chronic acid cystitis. Urination is frequent and painful, the urine foul and ammoniacal (it may be only slightly alkaline) and filled with clots of ropy muco-pus mingled with crystals of triple phosphates and often tinged with blood. A complicating pyelo-nephritis is as common as with acid cystitis; but the symptoms of the bladder inflammation are far less tolerable and often no less difficult to control. Unless checked by appropriate treatment the disease tends to grow more severe by successive attacks of acute inflammation, until, finally, the patient succumbs, worn out by his ceaseless agony. The kidneys give out after a time, and it is through them that the patient usually meets his end (p. 553).

Interstitial Cystitis.—During interstitial cystitis the bladder gradually contracts down, undergoing concentric hypertrophy, its walls thicken enormously, possibly reaching the thickness of an inch. Abscess may form in them; the cavity becomes nearly obliterated, perhaps down to 25 c. c.; incontinence ensues; the mass, like a hard, smooth, wooden ball, may be felt in the hypogastrium, or from the rectum. It is not necessarily very sensitive to pressure, and is smooth and of even hardness on its surface. This condition of bladder disease is not curable. The bladder walls cannot be redilated. But removal of its cause will make life bearable for the patient by relieving the pain, even though he still has to urinate frequently.

Diagnosis

Acute Cystitis.—This can be confounded only with acute prostatitis, from which it may be differentiated by rectal touch, which detects a hot, throbbing, swollen prostate in the one case, nothing of the sort in the other.

Chronic Cystitis.—It is a common error to label every case of pyuria "cystitis." This is most fallacious. There may be pus in the urine for years and yet no cystitis. Indeed, the three characteristic symptoms—pain, pus, and frequency—are again and again due to

PLATE V

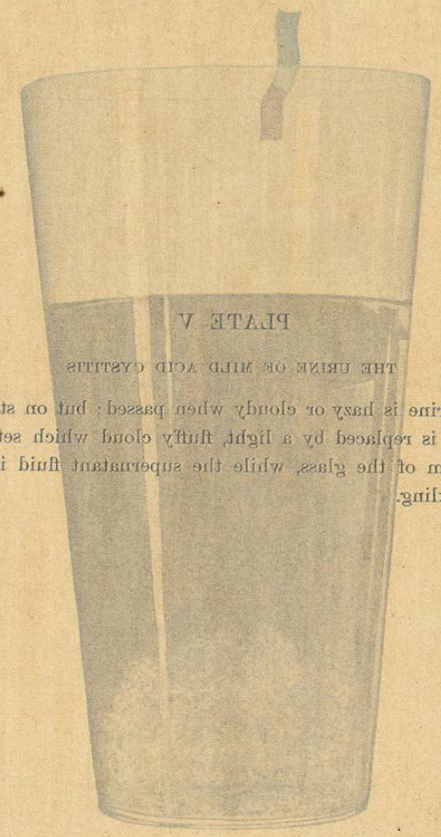

PLATE V

THE URINE OF MILD ACID CYSTITIS

The urine is hazy or cloudy when passed; but on standing this haze is replaced by a light, fluffy cloud which settles at the bottom of the glass, while the supernatant fluid is clear and sparkling.

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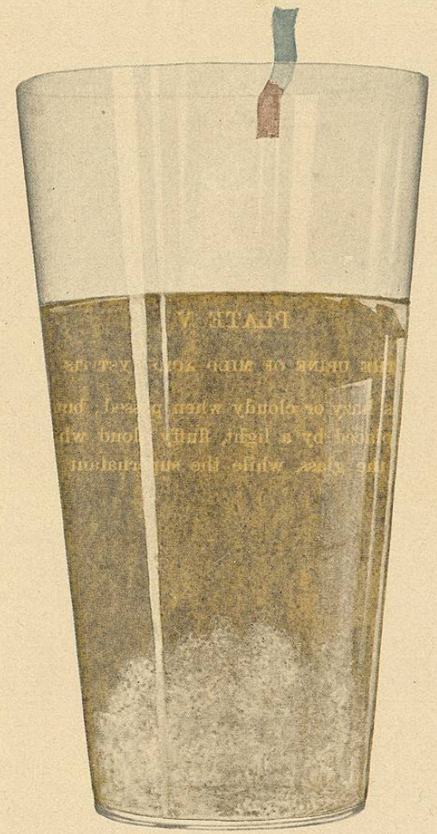


such widely divergent causes as pyelo-nephritis, prostatitis, and vesiculitis without the presence of any cystitis whatever. Another source of misapprehension is the fact that the inflammation of the bladder is often only an element of the inflammation of the whole urinary tract, in which case its treatment, whether successful or not, has little bearing on the far more important inflammation of the renal pelvis. The surgeon must therefore face two difficult problems of diagnosis:

1. The existence or the absence of cystitis, and
2. The presence or the absence of pyelo-nephritis, prostatitis, and vesiculitis.

The existence of cystitis may oftentimes be affirmed with certainty without any very searching examination. Thus the clinical features of the cystitis of stone or tumour, or of severe chronic ammoniacal cystitis, are usually quite unmistakable. But, on the other hand, there are a great number of cases showing acid or alkaline urine and more or less characteristic symptoms of cystitis that are not inflammations of the bladder at all. So deceptive are these cases that they may mislead the most expert. Thus Rovsing refuses to accept the diagnosis of cystitis unless it is confirmed by a cystoscopic examination. This is all very well from the bacteriologist's point of view, but for the clinician the cystoscope can have no charms; for if a cystitis does exist no manipulation is better calculated than cystoscopy to aggravate the symptoms of the disease. Yet, like many other diseases of the urinary organs, cystitis can only be diagnosed by its physical signs; its symptoms are often most misleading. The physical signs of cystitis are found chiefly in the urine. *When there is cystitis the urine is always purulent throughout* in both the first and the second flow (p. 83). Again, *when the urine is ammoniacal there is always cystitis.* But pyuria does not always indicate cystitis, and ammoniacal cystitis may often be accompanied by pyelitis and other lesions, the diagnosis of which is most important. Indeed, *when the urine is purulent and acid, pyelitis must always be suspected.* Finally, *a chronic pyuria, in the absence of retention, stone, tubercle, or tumour, is always due to prostatitis or to pyelitis, never to cystitis.*

Differential Diagnosis

Although the differential diagnosis between pyelo-nephritis and cystitis rests largely on an understanding of the signs of the former disease, there are certain striking points of differentiation that may be brought out by a careful urinary examination and merit discussion here, inasmuch as pyelo-nephritis is mistaken for cystitis far more often than cystitis is mistaken for pyelo-nephritis. This con-

fusion arises chiefly from the fact that the two inflammations often exist together, in which case the more acute symptoms of the less important cystitis blind the surgeon to the existence of a pyelo-nephritis which, in the long run, will do the patient far more harm than will his bladder lesion. A less frequent cause of confusion is the fact that a diseased kidney sometimes produces symptoms of cystitis when the bladder is entirely sound (p. 571). The surgeon, confronted with a case whose symptoms are pyuria and dysuria, may struggle for months to heal an uninflamed bladder, overlooking, all the while, a pus kidney that stares him in the face. Every surgeon who has had any experience with renal diseases has met such cases, and probably has sometimes been deceived himself. The distinguishing feature of *renal pus* is that it *sinks to the bottom of the glass and there forms a compact level base like sand* (Plate IX). *Bladder pus*, on the contrary, *forms a billowy, fluffy deposit, and often* does not sink fully to the bottom of the glass, but *remains more or less suspended in the fluid* (Plate V).

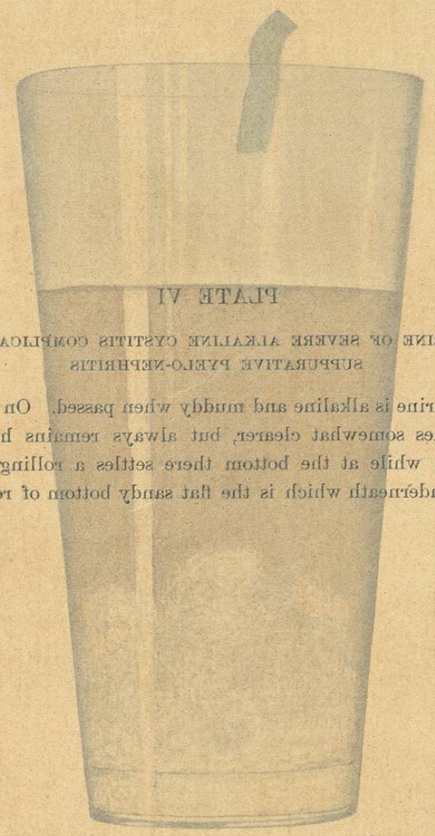
When cystitis and pyelitis exist together (Plate VI) a very simple test suffices to distinguish them. After the patient has urinated in two glasses his bladder is gently irrigated with a hot boric-acid solution until the fluid returns clear. On withdrawing the catheter the anterior urethra is also flushed with the solution. An hour later the urine is withdrawn with a catheter (in order to avoid possible prostatic contamination), and if it is then as purulent as before, the pus comes from the kidney. This test fails if catheterization causes bleeding or if a clean return flow cannot be obtained from the wash. The remittent character of renal pyuria, as well as the chemical and microscopical characteristics of kidney urine will be commented upon elsewhere (p. 558). Suffice it to say that an expert physiological chemist can always distinguish pyelo-nephritis from cystitis by the presence or the absence of bladder epithelia on the one hand, and albumin, casts, deficient excretion of solids, and renal and pelvis epithelia on the other.

Prostatitis and vesiculitis are distinguished by an examination of their secretions expressed by rectal touch as well as by the sensation imparted to the finger in the rectum (p. 89). Tubercular cystitis is distinguished by its marked peculiarities (p. 404).

Prognosis

Acute cystitis recovers spontaneously or under treatment, or becomes chronic. *Chronic cystitis* is curable with its predisposing cause (retention, stone, tumour) or even without it. Thus many cases of cystitis due to prostatic obstruction are cured though the

PLATE VI



THE URINE OF SEVERE ALKALINE CYSTITIS COMPLICATED BY SUPPURATIVE PYELO-NEPHRITIS

The urine is alkaline and muddy when passed. On standing it becomes somewhat clearer, but always remains hazy with bacteria; while at the bottom there settles a rolling mucous cloud, underneath which is the flat sandy bottom of renal pus.

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