

CHAPTER XXXVII

HYDRONEPHROSIS

OBSTRUCTION to the outflow of urine from the kidney is of two kinds: 1. Sudden complete obstruction. 2. Gradual or incomplete obstruction.

Sudden complete obstruction occurs clinically under two forms—viz., by a calculus, and by the surgeon's ligation. In either event the result is the same. The urine is dammed back upon the kidney, causing an acute renal congestion (Fig. 146) and a diminished secretion of urine; but even this increases the intrarenal pressure. The congestion is exchanged for atrophy, thus terminating the usefulness of the organ. The details of these changes do not interest us at present. They are fully described under Calculous Anuria.

Gradual, incomplete, or intermittent urinary obstruction sets up a very different train of events. Some urine escapes past the obstruction, continuously or from time to time, and affords partial relief to the renal tension, while still keeping up a very considerable pressure. Thus the organ does not atrophy. It continues to excrete an amount of urine equivalent to what can pass the obstruction, while the continued high pressure within the kidney causes a gradual dilatation of its cavity. Pelvis and calices gradually dilate—and there is hydronephrosis (cystonephrosis, nephrectasis, renal distention).

The above-described pathogenesis of renal atrophy and hydronephrosis has been experimentally worked out by Guyon,¹ Byron Robinson,² and others, and confirmed by observations in clinic and dead-house.

ETIOLOGY

The cause of hydronephrosis is gradual, incomplete, or intermittent urinary obstruction. The obstruction may be urethral or ureteral.

¹ Guyon's *Annales*, 1892, x, 161.

² *Annals of Surgery*, 1893, xviii, 402.

Urethral Obstruction.—The common urethral obstructions are stricture of the canal and hypertrophy of the prostate. But the former always and the latter usually damages the kidneys more by infection than by dilatation. The bladder bears the brunt of the distention, and, although the kidneys and ureters become dilated by chronic urethral obstruction (Fig. 38), this dilatation is clinically subordinate to the inflammatory features of the disease.

Ureteral Obstruction.—Ureteral obstruction acts differently. No distensible bladder intervenes to distribute the pressure, and infection is often entirely absent; so that the aseptic dilatation of kidney and ureter progresses rapidly and unobscured.

The ureteral obstructions are:

1. Obstruction from within by stone, tumour, or foreign body (Fig. 147).
2. Pressure from without by aberrant renal vessel (common) (Fig. 140) or by pelvic growth (uncommon).
3. Kinking of the ureter from nephroptosis.
4. Strictures and valves of the ureter, especially those caused by anomalous origin of the duct or by stricture at its termination (p. 480).

Roberts¹ has examined 52 cases in reference to their etiology. Twenty were bilateral and 32 unilateral. The cause was congenital in 20 cases. In 2 of these a supernumerary renal artery crossed and compressed the ureter near its origin; in 4 the ureter was congenitally imperforate; in 4 the ureter entered obliquely into the pelvis of the kidney; in 1 the ureter was kinked and adherent; in 1 there was stricture at the vesical extremity. Thirteen of these congenital cases were bilateral. Of these, 2 were still-born, 5 died within six months (3 within forty-eight hours) after birth. Four lived from five and a half to twenty years. One² survived to the age of thirty-eight.

Of the 32 cases of acquired hydronephrosis, 11 were due to impacted ureteral calculi (3 others were attributed to the same cause); 5 showed inflammatory or ulcerative stricture; 9 were occluded by external pressure—by peritoneal adhesions (3 cases), gravid uterus, ovarian cyst, cancerous growth.

Among Roberts's cases 25 were male, 23 female.

Morris has analyzed 142 cases, of which 128 were due to obstruction of the ureter, by cancer of the pelvic organs (118), cancer of the abdominal organs (3), ovarian cysts (4), and "constriction of the

¹ *Urinary and Renal Diseases*. Second American Edit., Phila., 1872, p. 482.

² Kinked and adherent ureters, doubtless not congenital.

ureter" (3). Yet hydronephrosis due to cancerous obstruction is rarely noted except post-mortem.

The so-called traumatic hydronephrosis is almost always an encysted perinephritic extravasation.

A special cause of hydronephrosis, a cause that figures but rarely in statistics and yet is commonly encountered in practice, is nephrop-tosis. Since so few movable kidneys become hydronephrotic it is an open question which is the antecedent condition. Certainly renal mobility is associated with practically every case of intermittent hydronephrosis, and I believe that in a great majority of hydronephroses due to kinked and adherent ureters, whether over an aberrant renal vessel or not, and to oblique implantation of the ureter in the kidney pelvis, the first kinking of the ureter or pouching of the pelvis is attributable to a nephrop-tosis (Fig. 140). Why so small a proportion of movable kidneys becomes hydronephrotic is not clear.

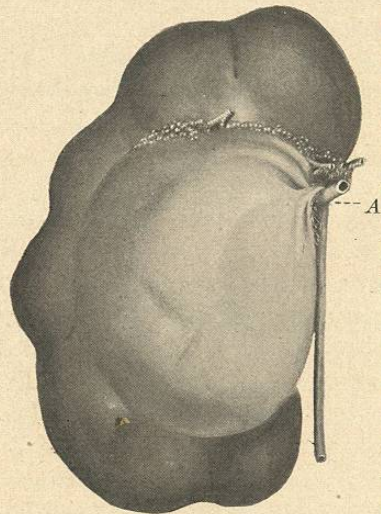


FIG. 140.—HYDRONEPHROSIS FROM URETERAL COMPRESSION (AT A) BY A BRANCH OF THE RENAL VEIN.

This obstruction caused an intermittent hydronephrosis, which was permanently cured by the liberation of adhesions and nephropexy.

MORBID ANATOMY

The morbid ureteral conditions at the point of obstruction require no detailed description. The strictures, adhesions, etc., present no peculiar features.

The Hydronephrotic Sac.—The tumour may consist of only a part of the kidney, whether because the kidney possesses two ureters only one of which is blocked, or because a single calyx becomes occluded by a stone. Either condition is very rare; as a rule, the sac consists of the entire kidney and its pelvis. The ureter may also be dilated.

The size of the tumour varies from that of a normal kidney to that of a child's head.

The sac wall consists of the renal pelvis and capsule. The kidney caps the tumour. The outer surface of the mass is irregularly ovoidal, the inner surface is irregular. If the hydronephrosis is small its interior consists of the dilated pelvis and calices (Fig. 141). If large, it is a great, smooth-walled cavity crossed by fibrous septa

representing the remains of the columns of Bertini (Fig. 142). The sac wall may be thin, but is usually tough and fibrous. Cartilaginous nodules have been observed in it.

Renal Changes.—The changes in the kidney substance are interesting. At first the kidney is congested, the canaliculi dilated, and the cells flattened. This process soon manifests itself macroscopically by the thinning out of the kidney tissue. Thus the kidney becomes more and more spread out on the surface of the sac with a great portion of its secreting substance atrophied.¹ But this is not the only change. The remaining parenchyma cells—for the kidney is never completely atrophied—undergo a compensatory hypertrophy. They grow to 3 or 4 times their normal size and their secretory capacity increases accordingly. It is for this reason that every hydronephrotic kidney should be recognised as a useful, though an impaired organ, and should not be sacrificed unnecessarily.

The hydronephrotic sac may be open or closed. If the ureter is merely kinked, the hydronephrosis is usually intermittent. If contracted or obstructed, the hydronephrosis is fixed or con-

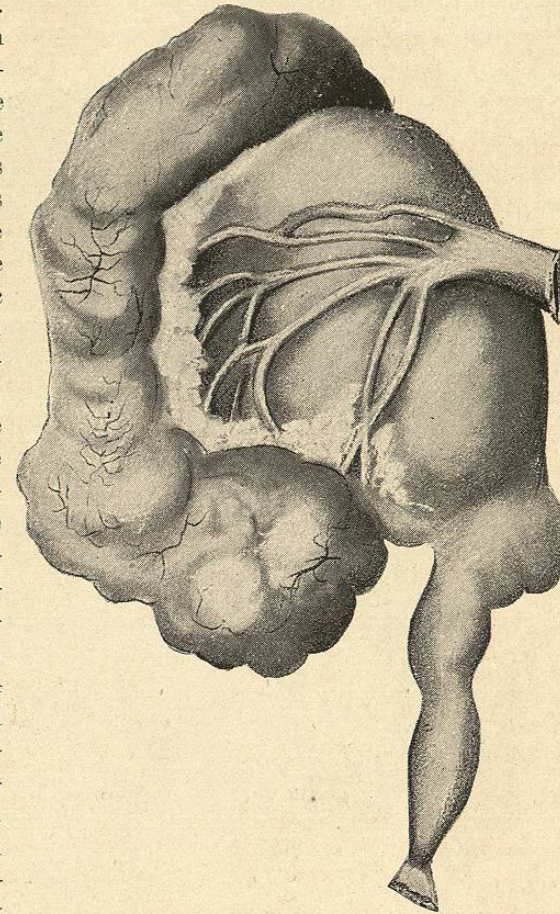


FIG. 141.—HYDRONEPHROSIS; FIRST STAGE (Le Dentu).

¹ There is no interstitial sclerosis, no production of fibrous tissue, in simple uninfamed hydronephrosis.

stant, and the orifice of the sac may finally become absolutely sealed.

The Fluid.—The quantity of fluid in a hydronephrotic sac often reaches 5 or 6 gallons. One case is reported (Glass) containing 30 gallons.

The quality of the fluid varies. It is usually a simple solution of sodium chlorid, though it may contain urea, albumin, urinary

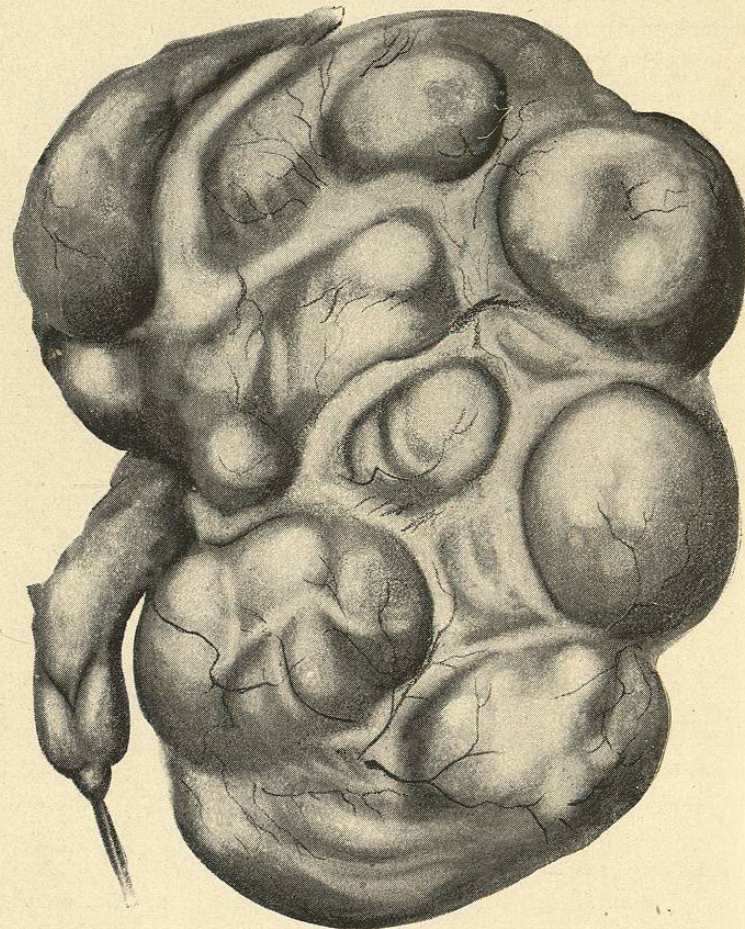


FIG. 142.—HYDRONEPHROSIS; SECOND STAGE, THE KIDNEY SUBSTANCE BEING COMPLETELY ATROPHIED (Le Dentu).

crystals, epithelial cells, and leukocytes, and less often blood, cholesterolin, or bacteria, and flakes of pus, indicating an impending suppuration. There may be a catarrhal pyelo-nephritis, with slight infection of the contents of the sac (uropyonephrosis), but this light

infection does not materially influence the clinical aspect of the case.

Physiology.—It has long been the generally accepted belief that the hydronephrotic kidney secretes a urine less rich in solids than that of a normal organ, but the functional activity of such an organ has never been accurately tested in man, except by Guyon and Albarran.¹ They have shown that even the kidney whose ureter has been occluded for a great while will begin to secrete when the obstruction is removed. Urea appears in the secretion, though it may have been entirely absent from the fluid in the sac; while the quantity of fluid secreted by the diseased organ may exceed that secreted on the sound side. In one case (uropyonephrosis) in which the renal tissue was so compressed that it was only 2 or 3 millimetres thick, the kidney excreted a litre a day after the pressure had been removed.

The kidney whose outlet has not been entirely closed acts in a similar manner. While a normal quantity of urine may be excreted by the diseased organ, it is poorer in urea and salts. It usually contains one quarter to one third of the total urea. A curious fact is that, while the total excretion of urea may vary widely from day to day, this variation takes place almost entirely in the sound kidney, the diseased organ excreting an approximately constant amount.

SYMPTOMS

The majority of kidneys found hydronephrotic post-mortem give no symptoms during life. The one characteristic symptom by which attention is called to the kidney is the presence of a tumour. There are clinically two varieties of hydronephrosis. When the tumour is constant the hydronephrosis is spoken of as fixed; when the tumour varies in size the hydronephrosis is said to be intermittent.

Fixed Hydronephrosis.—When the hydronephrosis is fixed the patient usually gives a history of a slowly growing *tumour* in his side. Or soreness and *pain* may first call attention to the kidney; but, as a rule, unless the kidney is misplaced and adherent, fixed hydronephrosis is uncomfortable rather than painful. The tumour grows very slowly. It may burst either into the peritoneal cavity, or into the perirenal space; either event is rare.

On examination a smooth, elastic, fairly movable, and, as a rule, insensitive tumour is found filling the side. The absence of systemic disturbance is remarkable. There is no fever, and, unless both kidneys are affected, no evidence of renal insufficiency.

¹ Guyon's Annales, 1897, xv, 1200.

Intermittent Hydronephrosis.—This condition presents an entirely different picture. The trouble begins with irregular attacks of severe pain in the side. These pains are habitually attributed to the intestines, to hysteria, or to renal colic. When the patient is examined between attacks the discovery of a movable and tender kidney only confirms the diagnosis of hysteria, and if the patient becomes thin and anemic and has flushes of watery urine, this only adds colour to the picture.

But affairs go from bad to worse. The attacks of pain become more and more severe, they recur every few days. During the attack the distended kidney may be felt filling the entire loin. The pain, after lasting several hours or days, is suddenly relieved by the passage of a large quantity of urine; but the relief is only temporary. At the end of the usual interval the pain recurs. In a personal case the pains began twenty years before the tumour was found, while in another the tumour reached enormous dimensions after less than ten years' growth.

Morris justly remarks that not all these cases are due to renal mobility, and cites instances attributed to stone and to vesical papilloma. Yet Terrier and Baudouin,¹ who collected 83 reported cases, showed that the condition was almost always associated with nephroptosis.

The usual outcome of an intermittent hydronephrosis is that it becomes fixed. The variations in size decrease and the pain becomes less constant and more severe.

DIAGNOSIS

It is scarcely possible to mistake a fully developed intermittent hydronephrosis. The large recurrent lumbar tumour is characteristic.

A fixed hydronephrosis may be distinguished as a chronic non-inflammatory renal tumour (p. 624). When large the cystic nature of the growth is obvious. It may then be mistaken for ovarian cyst. When small it is not always possible to distinguish a hydronephrosis from other tumours of the kidney. The occurrence of hematuria may obscure the diagnosis.

Rarely a pyonephrosis pursues so chronic a course and causes so little constitutional disturbance as to be mistaken for hydronephrosis.

PROGNOSIS

Unless both kidneys are affected hydronephrosis does not threaten life. The development of the tumour is very slow, and

¹ *Revue de chir.*, 1891, xi, 719, 833, 1055.

treatment is usually demanded for the relief of pain or on account of the size and discomfort of the tumour. Although secondary supuration may occur, transforming the hydronephrosis into a pyonephrosis, this is singularly rare. Rupture of the sac into the peritoneum—an accident usually fatal—is most exceptional. Rupture into the perirenal space, with the formation there of a false hydronephrosis, may occur. Morris noted the spontaneous and permanent disappearance of 6 or 7 out of 47 hydronephroses observed by him.

TREATMENT

Just as hydronephrosis has been known to disappear spontaneously, so massage and repeated aspirations of the cyst can boast their cures. I can see no advantage in massage, and if the dangers of aspiration are not great neither are its chances of success. Albaran has achieved some cures by the use of the ureteral catheter (p. 479). This has at least the advantage of pretending to straighten out the ureter. But in the majority of cases these palliative measures must fail; there is a definite ureteral obstruction, and until that obstruction is removed the hydronephrosis must persist. Hence the sole treatment in which confidence may be placed is operation.

Operative Measures.—Although a number of plastic operations upon the ureter for the relief of renal retention are described in another chapter (p. 486), and although some surgeons proclaim that they cure all their cases by this or that operation—by nephrotomy, by nephropexy, or even by nephrectomy—yet the only intelligent way to undertake the surgical cure of hydronephrosis is to recognise that the procedure is exploratory, the object sought being the discovery and relief of the ureteral obstruction.

When the hydronephrosis is intermittent, it may be fairly presumed that its cause is a nephroptosis, and that nephropexy, preceded by the loosening of adhesions, will effect a cure. The usual lumbar incision reveals the distended kidney. If the tumour is so large as to encumber the operative field, its contents are allowed to drain away through a small incision, preferably in the pelvis.¹ Then the kidney is forced upward under the ribs and its pelvis carefully freed of adhesions by blunt dissection until the ureter is reached; here the kink will usually be found. The adhesions must be carefully separated. When the obstruction is apparently relieved, the patency of the duct should be tested by passing a ureteral catheter from the pelvis of the kidney into the bladder.

In other cases, an impacted stone, a ureteral stricture, or exter-

¹ The line of incision should radiate from the neck of the pelvis.

nal pressure will be found to cause the obstruction (p. 486). While the operative technic must differ with each case, it may be said in general that—

1. The discovery and removal of the obstruction is the first object of the operation.

2. Until the ureteral catheter has been passed from the pelvis of the kidney down and into the bladder one cannot feel sure that the obstacle has been removed.

3. No matter how dilated the kidney, it is still of some service to the patient, and should not be extirpated unless nephrectomy is considered a less formidable procedure than the removal of the obstruction.

4. Operating to preserve the kidney does not imply the performance of any of the so-called conservative plastic operations for renal retention. Simple nephropexy, or even nephrotomy, is a far safer and, in all but the exceptional cases of ureteral valves and strictures, an equally certain procedure.

5. Yet to return to the original point, the ease with which certain cases may be cured is no excuse for overlooking the obstructive cause of the retention, since, unless this cause is known, we have no means of judging how much relief may be expected from the operation.

I have purposely consigned the description of the plastic operations upon the ureter to another chapter (p. 486) in order to emphasize the fact that they are rarely needed here. After what has been said it is scarcely necessary to repeat that nephrectomy for the relief of hydronephrosis is a last resort.

CHAPTER XXXVIII

ETIOLOGY, MORBID ANATOMY, AND GENERAL SYMPTOMATOLOGY OF SURGICAL INFLAMMATIONS OF THE KIDNEY

No common disease is so persistently and so comprehensively misunderstood as is pyelo-nephritis. The physician, encountering mild chronic cases, is contented with the diagnosis and treatment of chronic interstitial nephritis; while the surgeon is too apt only to see in the pyuria characterizing the severer inflammations an evidence of cystitis. Yet the only way to appreciate the frequency of the disease is to suspect of pyelo-nephritis every case of bacteriuria or pyuria that is not a urethritis. Investigation will show that almost every case of long-standing stricture or hypertrophied prostate, and many cases of stone and tumour of the bladder, show some pyelo-nephritis, while occasionally a case will be encountered in which the characteristic symptoms of cystitis—viz., frequent and painful passage of purulent urine—are the sole obvious indications of a suppurating kidney uncomplicated by cystitis.

Varieties.—The four varieties of pyelo-nephritis are—

Catarrhal pyelo-nephritis (pyelitis).

Suppurative pyelo-nephritis.

Pyonephrosis.

Abscess of the kidney.

These four conditions constitute the surgical inflammations of the kidney. They represent the various degrees and varieties of suppuration in the kidney and its pelvis. Hence it is convenient to group their etiology, morbid anatomy, and general symptoms all together, leaving the consideration of special symptoms, diagnosis, prognosis, and treatment for the next chapter.

The terms explain themselves. Catarrhal pyelo-nephritis is a light inflammation of the kidney and its pelvis productive of little pus. Suppurative pyelo-nephritis is a similar condition more severe in type, with much pus collected in the pelvis of the kidney and passed off with the urine. Pyonephrosis is suppurative pyelo-nephritis in a dilated kidney. Abscess of the kidney is suppuration within the organ uncomplicated by pyelitis.