SOME ASPECTS OF CALCULOUS ANURIA.

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THERE are certain factors connected with the condition of calculus anuria concerning which there is a general agreement among surgeons and pathologists; these I shall merely enumerate. There are others which have either received but relatively slight attention or concerning which there is a difference of opinion; it is with some of the latter only that this communication is concerned.

The following belong to the first of these two classes:

1. In the majority of the cases of unilateral calculus anuria the unobstructed kidney is either destroyed, functionally useless, or there is a congenital absence of the organ on the side opposite that of the obstructed kidney.

2. The average time of the period of tolerance, so-called, that is the time which elapses between the beginning of the anuria and the appearance of uremic symptoms, is from five to seven days. The number of days before death occurs after the appearance of uremic manifestations is variable; so, too, is the length of time between the beginning of the anuria and death. Twenty-three days have been reported to have intervened between these times in one instance, and there are a number of cases in which death has not taken place before the sixteenth day.

3. The mortality in the cases of patients treated palliatively is very great (between 70 and 80 per cent.); that of those treated surgically is about one-half as great.

4. The nearer the beginning of the anuria the surgical treatment is applied, the smaller is the mortality attending the operations and the larger the number of patients who recover. It is, however, true that the presence of uremic manifestations, and the fact that the period of anuria has been very long, do not constitute contraindications to operation; nor is surgical treatment necessarily hopeless under these conditions.

5. Surgical intervention should not be delayed more than forty-eight hours, and in some cases the delay should be less.

6. Absence of uremic manifestations and an apparently good condition of the patient do not excuse a longer delay than this in applying surgical treatment.

7. The essential indications to be fulfilled in the surgical treatment are to supply a free avenue of escape for the uriae from the kidneys, and, if the patient's condition permits, to remove the calculus.

8. The first kidney to be operated upon should be the one which is believed to be the less damaged of the two.

9. The quickest and most effectual way of restoring the sup-

pressed urinary function of an obstructed kidney is by a rapidly performed lumbar nephrotomy and drainage of the organ for a time at least afterward.

The factors of the second class spoken of are as follows:

1. *The reno-renal reflex inhibition of the function of an unobstructed kidney produced by the sudden obstruction of the uterer of the kidney of the opposite side.*

It is frequently denied that this phenomenon can occur when the unobstructed kidney is normal, but that it may do so appears to be established by the clinical observations reported by Imbert, Israel, Kreps, Rovsing, and Broca, and by one postmortem examination reported by Legueu. It is undoubtedly very rarely that such an inhibition occurs in the unobstructed normal kidney, but what is not sufficiently remembered, although almost equally important, is the undoubted fact that the function of an unobstructed and more or less diseased or damaged kidney, which, however, retains a useful degree of functional capability, is frequently inhibited by what we call a reno-renal reflex. Moreover, there is a certain number of cases in which both kidneys retain a useful degree of functional activity, and in which the united work of both will be required to maintain the life of the patient, and in which neither one alone is capable of doing so. For these reasons we may not rely upon the oft-repeated dictum of Legueu with reference to calculous anuria: "Anuria does not occur except in patients who live with one kidney only."

The two following cases are of interest in connection with the question of the reno-renal reflex inhibition of the unobstructed kidney, and illustrate some of the points that have just been spoken of. The first was a case reported by Ransohoff, in which anuria was not present at the time the patient was subjected to a right-sided nephrolithotomy. The kidney was the seat of a suppurative process, but was still capable, as it afterward proved, of performing a very essential and useful degree of functional work. It was drained. Both kidneys continued to secrete for the next month, the lumbar drainage from the kidney already operated upon being maintained during the whole of this time. At the end of a month the other kidney became obstructed and anuria occurred. At the end of the third day of the anuria the second kidney was laid open. It was pyonephrotic, but still capable of performing useful functional work. This kidney was likewise drained. Both kidneys at once resumed their function. The first kidney operated upon performed two-thirds, and the second kidney one-third, of the total functional work of secretion. The two organs were permanently drained through the loins. The patient was in good condition at the time at which the report was made, three years after the second operation.

The second case is one personally communicated to me by Dr. Hugh Cabot. Anuria was not present at the time of the performance

of a unilateral nephrolithotomy. The kidney was drained through the loin, when, on the fourth day after the operation, anuria occurred. Dr. Cabot promptly cut down upon the second kidney and removed an obstructing calculus from its ureter. Both kidneys resumed their secretory function; the wounds healed in due course, the patient recovered, and was in excellent health eight months after the second operation. Neither kidney was normal in this case, but both were capable in a useful degree.

In this case, as in the first, there seems to be no way of explaining the suppression of the function of the kidney first operated upon except by assuming that it was produced by a reno-renal reflex inhibitory influence proceeding from the sudden obstruction of the ureter of the opposite kidney. The chiefly interesting point in both of these cases is that the suppression of function should have occurred at the moment when the kidney of the side first operated upon was draining freely through the loin. Another point to be noted is that the united work of both kidneys was required to sustain life in both of these cases, and that both kidneys in both cases were in a useful degree functionally capable, although neither of them was normal. It may be questioned whether the inhibitory influence was of the nature of a reno-renal reflex, but it cannot be doubted that whatever its nature may have been, it was, at any rate, such that the arrested renal function was set free again by virtue of providing an outlet for the escape of urine directly from the obstructed organ, and the patients' lives were thereby saved. This last fact is the one to be borne in mind from the standpoint of the practical surgeon, and it is that which should determine prompt action on his part in these cases.

2. *The differences which may exist between the renal conditions seen upon postmortem examination of the kidneys and those which may have been present at the beginning of the anuria, and the impossibility of asserting positively just what degree of structural change in a kidney necessarily renders it wholly incapable of further functional work.*

With regard to this point, it need only to be recalled that the changes of a destructive nature in the secreting elements of a kidney which is wholly obstructed, progress rapidly, and that it is not necessarily true that the renal conditions which at the time of postmortem examination may be such as to suggest that the kidneys could no longer be capable of useful functional activity were necessarily incapable at the time of the beginning of the attack of anuria. Equally is it impossible—except in the examples of extreme destruction of the kidneys—to state positively just what degree of destruction of renal substance must necessarily deprive a kidney of any further functional activity of a useful character. Most surgeons have operated upon kidneys in which there has been so small a layer of renal secreting substance as to make it

seem impossible that the organ should be capable of performing any useful degree of functional work, and yet in some of these cases the operator has been surprised to find that the patient not only continues to live, but may even enjoy a long period of good health. In such a case as this it is very possible that the conditions which were present at the beginning of the attack of anuria would have been such as to have allowed the patient to live had there been supplied a free escape for the urine from the kidney shortly after the attack began, and yet at the time of death, at the end of a considerable period of anuria, the kidney may present such conditions as to make restoration of functional activity impossible—at any rate, to the point of maintaining the patient's life. The practical lessons to be learned from these things is that the surgeon should operate early in the course of the anuria, and that he should be wary of assuming that a kidney, even when it possesses but a very small amount of renal secreting substance, is necessarily useless.

3. *The advantages that may sometimes be derived from simultaneous bilateral nephrotomy or nephrolithotomy in calculous anuria.*

The patient with calculous anuria needs most urgently to have all the capable renal substance of which he is possessed set at liberty to become again active if he is to be given the best chance of having his life saved. If the statement which has been quoted from Legueu, "Anuria does not occur except in patients who live with one kidney only," is true, it is obvious that it would be useless ever to incise the second kidney at, or soon after, the time of incising its fellow of the other side (unless it be in the cases in which the mistake has been made of laying open the wrong—useless—kidney in the first instance), for we should not be accomplishing any good whatever. If, on the contrary, there are cases in which both kidneys possess a useful degree of functional activity, and if, furthermore, the functional work of one of them alone is insufficient to sustain life, and if, on the other hand, it is capable of being maintained by the combined action of such renal substance as may be present and still capable in both kidneys, it is equally clear that in all the instances in which these things are true we shall not be giving the patient his best chance of life if we arrest our intervention with a unilateral operation, and that we should proceed to incise both kidneys at one and the same sitting.

It is for this reason that I urge that simultaneous bilateral nephrotomy or nephrolithotomy be done in some of these cases. Those in which I think this procedure is appropriate are the following: (1) All cases in which, upon cutting down upon the first kidney, it is found that there is not enough renal substance remaining to make it probable that the organ will be capable of sustaining life by the exercise of its function alone. The inference should always be that the greater the destruction in the kidney first operated upon,

the greater the probability that the kidney of the other side has a useful amount of renal secreting substance in it, and correspondingly greater becomes the importance of immediately incising that kidney, in order that the patient may have the benefit at once of all the functionally capable renal substance that he possesses. (2) All cases in which there is a simultaneous blocking of the ureters of both kidneys, or in which there is one ureter blocked and a calculus in the other kidney, it being always possible and fairly probable that the calculus in the second kidney, even though it is not at the moment blocking the ureter, may do so at any time subsequently.

The frequency with which calculous disease is bilateral may be judged from the 230 cases of renal calculus made up of the separate series published by Albarran, Morris, Legueu, Kraft, and Kummel: in 30 per cent. of these, calculi were present in both kidneys. In another series of cases that I collected, numbering 187, there were 52 (27.8 per cent.) of bilateral calculus, and in 29 of these there was simultaneous blocking of the two ureters. It is in the latter class that there is the greatest likelihood of capable renal substance being present in both kidneys.

The x-ray examination and radiography are, of course, our best means of determining the presence of a calculus in the kidneys or ureters; but in this special class of cases the patient is very critically ill—which makes such an examination difficult; an expert in making radiograms may not be available, and it may not be justifiable to delay to have such an examination made; consequently, we are frequently deprived of the assistance that we should otherwise have from it. This is often true also of the employment of the ureteral catheter. There may be, however, a great advantage derived from passing the ureteral catheters into the ureters, not merely for the purpose of detecting the presence of a calculus, but also to relieve—at least temporarily—the anuria, by passing the instrument beyond the stone, and thus overcoming the obstacle to the free escape of urine from the kidney. When this is successful the surgeon is given a better chance for removing the calculus subsequently under more favorable conditions than those which he faced at the outset. The ureteral catheter, however, should not be relied upon to secure permanent relief from the danger of anuria.

Returning to the consideration of the advantages of simultaneous bilateral nephrotomy or nephrolithotomy in some of the cases of calculous anuria, I would say that I have found but 6 cases in the literature in which this operation has been done in this class of cases. These are as follows: Lange, Turner, Maemunn, Mosehkowitz, Watson, and Babcock. The patients of Lange, Mosehkowitz, and Babcock lived; the other 3 died. It is, however, to be noted that in the cases of Turner and Watson the deaths were due to sepsis rather than to a failure of restoration of renal function.

Reference and name of reporter.	Duration of anuria and uremia.	Operation and result.	Condition of kidneys.
Lange (<i>Med. News</i> , January 16, 1886, p. 60).	Anuria 24 hours.	Simultaneous bilateral operation. First kidney lacked functional capacity. Calculus removed from pelvis; the latter was rendered non capable. Recovery.	First kidney incised was hydropneumatic and functionally useless. The second one contained a calculus and was capable.
Russeloff (<i>Clour. Amer. Med. Assoc.</i> , 1895, xvi, 1).	Anuria not present at time of first operation; 3 days before the second.	Bilateral nephrectomy. Stone removed from the first kidney. None in second, but a effusion of pus was evacuated. Both kidneys drained permanently. Patient in good condition 3 years after operations. One month's interval occurred between the two operations. Recovery.	Both kidneys pyonephritic. Both capable. Neither one alone was sufficient to have maintained life.
Albarban (from <i>Huck's Thesis</i> , Nanczy, 1901).	Anuria present; duration not stated.	Unilateral nephrectomy on unobstructed kidney. Kidney drained for 24 days; it then ceased to secrete. No operation done on other side. Death.	First or unobstructed and operated kidney was merely congested and enlarged. The second one, which was not operated upon, had calculus obstructing ureter.
Stevens (from <i>Huck's Thesis</i>).	Anuria 8 days; uremia none.	No operation. Death.	Both ureters obstructed by calculi. One kidney nearly normal. This other had some functionally capable substance.
Vitras (from <i>Huck's Thesis</i>).	Anuria 6 days.	Unilateral nephrectomy. Death 4th day from uremia.	Both ureters blocked by calculi. Both kidneys had a good deal of capable secreting substance.
Huck (<i>Huck's Thesis</i>).	Anuria 8 days. Uremia not noted. Anuria 10 days.	Unilateral nephrectomy. Death 7th day from uremia.	Same as in preceding case. Both kidneys had useful amount of capable renal substance. Both ureters blocked by calculi.
Balcock (<i>Ann. Surg.</i> , April, 1903).	Anuria 24 hours. No uremia.	Simultaneous bilateral nephrectomy. Recovery. The same operation had been done 3 years before.	Both ureters blocked. Both kidneys functionally capable in useful degree. One of them had moderate pyonephrasis.
Thomas (<i>Rev. med. la Suisse Rom.</i> , 1900, xxvi, 630).	Anuria 15 days; two slight remissions. Uremia unnoted.	Unilateral nephrectomy 18th day of anuria. Death 3 days later.	Both kidneys had a useful amount of capable secreting substance. Both had moderate degree of interstitial nephritis. Both ureters blocked.
Doering (<i>Deut. Zisch. f. Chir.</i> , 1907, lxxvi, 66). Doering (<i>ibid.</i>).	Anuria 8 days. Uremia unnoted. Anuria 10 days. Uremia unnoted. Anuria 2 days.	No operation. Death 8th day of anuria. Unilateral operation begun, but not completed. Death.	Both ureters blocked. Recent parenchymatous nephritis. Recurrent hemorrhagic inflammation in both kidneys. Both ureters blocked by calculi.
Moschikowicz (<i>New Yorker med. Monatsschr.</i> , 1904, xvi, 461).	Anuria 26 hours.	Spontaneous expulsion of calculus. Recovery.	Both kidneys were capable.
Adly (<i>Monit. Med. News</i> , Halifax, 1903, xv, 374).	Anuria 3 days. Uremia 30 hours.	Simultaneous bilateral nephrectomy. Death 3d day afterward. Urinary secretion was re-established. Death due chiefly to sepsis.	Pyonephrasis and perinephritic abscess of both kidneys. Both ureters blocked by calculi.
Watson (<i>Ann. Surg.</i> , September, 1907).	Anuria 24 hours. Uremia same. Anuria, uremia, both unnoted.	Same as in last case. Death on 11th day, due to sepsis chiefly. Death 6th day.	Both kidneys pyonephritic. Both ureters blocked by calculi.
Turner (<i>Trans. Clin. Soc. London</i> , 1891, xxiv, 151). MacLennan (Quoted by Morris, <i>Renal Surgery</i> , 1898, p. 287).			Neither kidney functionally capable. This case is one in which the fact of finding the first kidney operated upon incapable should, as it did, tend to the immediate incision of the other one, but in this special instance the combined work of both was not enough to save the patient.

The indications for the simultaneous bilateral operation in unilateral cases of calculus have already been stated. It would not be appropriate to do this operation in any case in which the surgeon judged that the first kidney operated upon would probably be capable, by its own unaided work, of sustaining the life of the patient, but only when the contrary is true.

The additional shock involved in the operation upon the second kidney, when it is done at the same time as the operation upon the first, is but little greater than that of the unilateral operation, so far as we may judge from my experience up to the present time. Both organs can be incised and drained very quickly, unless there are unusually difficult conditions present, such as adhesions, that necessitate a longer and slower procedure. It is true that any surgical intervention of magnitude, such as nephrotomy, carries with it a very considerable danger to life when it is undertaken under conditions such as those under consideration; but the condition, left to itself or but partially relieved, is far more dangerous than the complete operation is ever likely to be in the cases in which I have suggested the employment of the bilateral procedure.

The appended table of 16 cases is taken from the whole number of 33 in the series of 187 cases which I collected, and in which I believe that the renal conditions were such as would have made the simultaneous bilateral operation better than the unilateral one. The latter was practised in all but 6 of the cases (those already referred to); in 4 others a bilateral operation was done, with an interval between the two procedures. These 4 cases were those of Cabot, Kümmel, and Ransohoff. All these patients lived; in none of them was there a simultaneous blocking of the two ureters, while in the other 6 it was present. The renal conditions were also more favorable in the 4 than in the 6 patients. In no single instance in which a unilateral operation alone was done, did the patient live.

THE IMPORTANCE OF MODIFICATIONS OF THE SENSIBILITY IN THE DIAGNOSIS OF DISEASE.

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MANY of the difficulties in the examination of the sensibility were inherent in the imperfect methods due to a former want of knowledge of the different modalities of this function. These have been solved by the researches of Head¹ and his colleagues,

¹ Brain, 1905, xxviii, 89, 115.