hydrotherapy. Wearings of jackets resemble wearings of plaster casts after fractures; both may be extremely desirable, yet both are liable to result in extremely undesirable stiffness if not discontinued soon enough.

Too scanty local protection, on the other hand, is observed rather commonly among industrial accident cases. Insurance companies find that drawbacks of too much protection in the majority of cases are greater than risks from minimum amounts of medical care. They encourage injured workmen to use their backs as soon and as much as possible. And some of the latter have delayed recoveries from too much activity when backs are weak.

Combinations of adhesive strappings with tonic-eliminative drugs give very satisfactory results in cases of average severity and of average duration. They are better than either one alone. Drugs and diet regulations, in combination with plaster casts, likewise are beneficial; and, in fact, very few patients' conditions are so purely mechanical that they will not be improved more or less by measures that improve qualities of circulating blood. Yet, very commonly patients are treated as though they are only defective mechanical machines.

Manipulations of sacro-iliac joints happen not to have been made in any of this series of cases; nevertheless, manipulations occasionally are extremely beneficial. They sometimes terminate in a few minutes pains that have lasted for months, and some patients are so greatly relieved after moderately forcible manoeuvres that they beg to have them repeated. Care has to be exercised, however, with forcible manipulations not to aggravate latent tuberculosis which is simulating sacro-iliac troubles, or not to increase existing strains of sacro-iliac ligaments, as may readily happen when patients are etherized. Since it is impossible to detect slight slippings of sacro-iliac joints, manipulations have to be made rather blindly, attempting to force joints back into their original position by pressures and pulls in directions opposite from the ones which have produced displacements.

Patients who have felt something "give way" in their backs can be manipulated gently very soon. Those who are not making satisfactory progress at the end of two months also should be gently stretched and pulled without anesthesia. Long-standing, severe cases occasionally obtain prompt relief from the continuous pull of extension weights attached to the leg while patients lie in bed.

All variations in combinations and variations in lengths of administrations of different therapeutic measures cannot be discussed in this paper, although upon them depend shortenings or prolongations in times of recoveries.

Enough has been said, however, to show that unsatisfactory states of affairs now can be traced often to utterly inadequate theoretical conceptions or to inadequate, bungling treatments.

There is a justifiable optimistic view possible from contemplating the very great achievements of medical science recently, yet, in fairness, a balance has to be struck, with some pessimistic consideration of the vastness of our present failures. An opinion is thus reached that progress in care of back cases is being slowly made, and that there are tremendous opportunities for improvements with the facts and tools at hand, depending simply on greater carefulness, thoughtfulness and skill.

In conclusion, the writer wishes to acknowledge his indebtedness to Dr. E. G. Brackett of Boston, for many privileges at the Massachusetts General Hospital; and to Dr. F. D. Donoghue, medical adviser to the Massachusetts Industrial Accident Board, for numerous suggestions on phases of the subject not generally considered.

LITHIASIS WITH BILATERAL RENAL INVOLVEMENT.*

By W. F. BRAASCH, M.D., ROCHESTER, MINN.,

The Mayo Clinic, Rochester.

WHEN lithiasis is found to exist with bilateral renal involvement, certain problems of diagnosis, prognosis and treatment arise which merit special consideration. The various conditions in which such involvement is present may be as follows:

1. Bilateral nephrolithiasis, including stone in the ureter on one or both sides.
2. Lithiasis in one kidney and disease in the other.
3. Lithiasis in a solitary kidney.
4. Lithiasis in a fused kidney.

Bilateral Nephrolithiasis.—On reviewing the records of the Mayo Clinic from Jan. 1, 1910, to Oct. 1, 1917, it was found that 62 patients had been operated on for bilateral nephrolithiasis. During the same time, 504 patients with unilateral lithiasis were operated on, making a percentage of 12.3 of bilateral lithiasis occurring in the operative cases. It is, however, difficult to determine the exact proportion in which bilateral nephrolithiasis occurs because of the many associated factors. It would be necessary to include, (1) all cases of bilateral nephrolithiasis and ureterolithiasis, which for various reasons were not operated on, (2) cases of ureteral stones on the opposite side previously removed by operation and cystoscopic manipulation, since they are in fact dislodged renal stones, and (3) all stones passed spontaneously from one or both kidneys and ureters.

General Statistics.—In the series of 62 patients operated on, there were 40 males and 22 females, which is in keeping with the relative occurrence of sex as noted in cases of unilateral lithiasis. It is of interest that lithiasis should

* Presented before the New England Branch of the American Urological Association, Boston, November 16, 1917.

occur practically twice as often in the male as in the female. This relative proportion also holds good in other forms of chronic renal infection, and is suggestive of the infectious etiology of the condition. The average age of the patients was forty years, and the average duration of symptoms was nine years. It is unfortunate that the symptoms associated with lithiasis should be allowed to remain without treatment during so long a period. Their long duration is in a large measure responsible for the comparatively poor prognosis and the various complications so frequently seen with bilateral lithiasis.

Localization of Pain.—The pain was localized definitely to both sides in only 14 cases, to one side in 26 cases, and in 14 cases to one side recently with a previous history of more or less definite pain on the other side. Renal pain was absent in 8 cases. The large number in which the pain was entirely or predominating on one side (64.51 per cent.) should emphasize the necessity of making a complete roentgenographic exposure of the kidneys and ureters on both sides in every case. In cases in which the pain was absent, attention was called to the possibility of nephrolithiasis by the presence of microscopic pus in the urine. In the majority of instances the kidney causing the most pain, particularly in recent years, was found at operation to be the better of the two. The kidney which in former years had caused most of the pain, with little or no pain recently, was, in the majority of instances largely destroyed, and a nephrectomy was necessary.

Location of Stones.—The location of the stones in cases in which both sides were operated on was: pelvis and calices, bilateral, 10; pelvis and calices on one side and cortex on the other, 7; pelvis and calices on one side (nephrectomy on the other), 9. When one side only was operated on the stones were found located as follows: pelvis and calices, 14; cortex, 6. There were 7 nephrectomies and 2 negative explorations. No attempt was made to localize the stones in the cases of pyonephrosis with stones, since the destruction of the kidney-tissue was so great that it was impossible to determine their exact situation. It is evident that in cases of bilateral nephrolithiasis the majority of stones are situated in the pelvis and calices, as in cases of unilateral stones. Literature on the subject would lead us to believe that stones are most commonly situated in the cortex with bilateral lithiasis, but judging from our series, such localization is less frequent. Many cortical stones described as such in the operation records were probably situated originally at the end of the calices.

Estimation of Renal Function.—Estimation of the combined renal function may, in a few cases, be of considerable aid to prognosis. Phenolsulphonephthalein is, for all practical purposes, as valuable as any functional test. When the return in two hours is only a trace or persist-

ently very low, the prognosis is necessarily grave, and operation is usually not advisable unless there are urgent indications. We have, however, observed two patients in whom there was a persistent low phenolsulphonephthalein output, 5 and 8 per cent. respectively, several years after operation. When the phenolsulphonephthalein return is moderately low, varying from 20 per cent. to 40 per cent., I have frequently observed that it will later become much higher following operation. This is particularly true in the presence of marked infection relieved by drainage subsequent to lithotomy, and it may be inferred that toxic absorption as well as reflex irritation may be the cause of temporarily reducing the renal activity. A high return, 50 per cent. or more, is of value when clinical symptoms, or the general appearance of the patient, are suggestive of renal insufficiency. Particularly is this true in the presence of marked renal infection with toxic absorption, which frequently causes symptoms simulating advanced renal insufficiency. A high phenolsulphonephthalein return would assure the existence of one good kidney at least. The combined functional test, therefore, is of practical value only with a normal or extremely low return where the clinical appearance is doubtful.

It may be desirable to determine the comparative degree of function remaining in the two kidneys. This is not always possible but frequently may be done, (1) by the size and character of the stone, (2) by cystoscopic inspection, and (3) by a differential functional test.

Radiographic Data.—Very large stones, and more particularly large branched stones will, as a rule, cause so much tissue-destruction that nephrectomy will be necessary. Occasionally, however, the amount of secreting-tissue remaining is surprising in spite of the existence of large branched stones. The difficulties in removing such stones entirely, particularly when soft and crumbling, without too much damage to the kidney-tissue, are considerable. Single round stones, even though of large size, may cause comparatively little damage to the kidney-substance, and usually offer a better prognosis. Multiple stones, particularly when of large size and scattered throughout the kidney, usually indicate complete destruction of the kidney.

Cystoscopic Inspection.—Such inspection may be sufficient to determine the comparative functional ability. If thick pus is seen exuding occasionally, or only on pressure, the destruction of the kidney may be taken as very evident and ureteral catheterization will be unnecessary. When, however, the urine on one or both sides is clear or only moderately cloudy, a differential functional test may be of some value. As I have previously stated, pyelography may give more accurate data as to the extent of renal destruction than any other method. When the pelvis and calices are seen to be markedly dilated and irregular, it may be inferred that comparatively

little healthy tissue remains. Pyelography should, however, be employed only when other methods fail, and then only when a comparative estimate of renal function is of practical value.

Differential Functional Test.—The irritation caused by stone in the kidney will usually interfere greatly with the accuracy of the estimate of renal function. It is difficult to explain the variable degree of reflex inhibition of secretion exerted by renal stone. One kidney containing a stone may have a phenolsulphonephthalein return of but 4 or 5 per cent. in fifteen minutes, while another, with a stone similar in size and position and with the same degree of infection, may have a normal return. As a rule, small stones of recent origin and without marked infection, will cause comparatively little functional disturbance. Low functional return in the presence of stone is usually succeeded by a normal phenolsulphonephthalein output after the stone has been removed. Renal functional tests can give us only an estimate of the functional activity of the kidney at the time of the examination, and not what the kidney is capable of doing under normal conditions. Too much reliance cannot, therefore, be placed on the amount of normal tissue in the kidney, as shown by the phenolsulphonephthalein test. This was well illustrated in one of our recent cases with stone in the left renal pelvis in which the differential phenolsulphonephthalein estimate from the left kidney was 7 per cent. in fifteen minutes. From this it might be inferred that considerable healthy tissue remained and a conservative operation would be indicated. At operation, however, a large abscess was found in one pole, together with several soft areas in other portions, so that a nephrectomy was clearly necessary. In several other instances in which branched stones were present the phenolsulphonephthalein return was surprisingly good, and on surgical exploration the kidney was found to be so markedly diseased in areas that a nephrectomy was obviously indicated. On the other hand, if the phenolsulphonephthalein return is zero or only a trace, it may usually be inferred that the kidney is so largely destroyed that a nephrectomy is indicated. If, however, the phenolsulphonephthalein test is only comparatively low, the functional test is of uncertain value, and unless the other data obtained by physical, cystoscopic or roentgenoscopic examination are of definite value, surgical exploration only will determine whether or not the kidney can be saved.

INDICATIONS FOR OPERATION.

After it has been decided that an operation is advisable the question arises: Which of the two kidneys should be operated on first? Rules as follows may be made:

1. In the presence of recent acute pain, repeated and continuous hemorrhage or toxic absorption from advanced renal infection referred to one kidney, that kidney must necessarily be operated on first.

2. If conditions do not necessitate this operation, the kidney with the better function should be operated on first in order to take advantage of the function remaining in the kidney on the other side during the acute stages following operation. This is particularly imperative when the stone is so situated that the drainage from the kidney with the better function may be obstructed. When the irritation, infection and danger of obstruction have been removed by the lithotomy, the other kidney may be operated on and removed if it seems advisable.

3. In cases in which the patient is in excellent physical condition, and the stones are of moderate size and advantageously situated, the renal function only slightly reduced and but little or no infection present, both stones may be removed at the same time.

PATIENTS NOT OPERATED ON.

There were 33 cases in which a very evident diagnosis of bilateral nephrolithiasis was made, and the patients were not operated on. No operation was advised, for various reasons, in 21 cases, and in 9, operation was advised but the patients did not return. Two patients were operated on for coincident malignancy in other parts of the body, and in one case the patient is awaiting operation.

Of the patients regarded as inoperable the predominating symptoms in nine were those of renal insufficiency. The history of pain was either entirely absent or of secondary importance. Our attention was called to the possibility of renal lithiasis by the presence of pus in the urine. It was found necessary to make a roentgenogram in every case in which there was pus in the urine, even if there had been no history of pain. While this necessitated a large number of negative x-ray exposures, nevertheless the frequency with which lithiasis was thus discovered made the procedure worth while. The renal insufficiency is usually the result of longstanding infection. Of particular interest is the fact that five patients in this group complained primarily of gastric symptoms which were frequently the only subjective evidence of renal insufficiency to be noted. The clinical data of renal insufficiency differ from those usually observed with the ordinary type of nephritis, in that there is no increase in blood-pressure, and little or no evidence of other circulatory disturbance. In practically every case the phenolsulphonephthalein output was markedly reduced, and in four instances the estimate was either zero or a faint trace. The stone was exceptionally large in the majority of instances, which explains the absence of acute pain, since large stones seldom obstruct urinary drainage.

In five other patients, although there was more or less clinical evidence of disturbance of renal function, the predominating symptom was that caused by marked secondary infection. Puru-

lent urine was secreted by both kidneys and the symptoms were marked by frequent attacks of chills and fever. In three of these cases there were multiple stones of variable size, and it was evident that their removal would be followed by considerable destruction of the kidney-tissue. It is this form of bilateral nephrolithiasis which offers the poorest prognosis following operation. One of the patients with multiple large stones was allowed to return home, and three years later was reported to be in fair health. Had she been operated on and the stone removed, it is a question whether she would have lived as long. In the other two patients the stones were small and evidently secondary to well-advanced pyelonephritis, the symptoms being due to renal insufficiency as well as to infection in one; the other was markedly benefited by pelvic lavage, but because of the absence of acute symptoms, operation has been deferred.

Two patients had bilateral hydronephrosis, complicated with stones; a point of unusual interest, in that the stones were very evidently of secondary formation in a primary hydronephrosis. The stones were small and round and could scarcely be the etiologic factor of the urinary obstruction; they were evidently secondary deposits in the alkaline residual urine. Neither of these patients had secondary complication to warrant immediate operation, and when last heard from they were in fair health.

In two instances the stone was discovered accidentally. One patient complained of gastric symptoms only, and was operated on for acute duodenal ulcer. The other had symptoms of marked circulatory disturbance and hypertension. Operation was not done in the case of one patient because the degree of cardiac insufficiency made it inadvisable. One patient was discovered to be pregnant at the time of examination, and operation was deferred until after pregnancy terminated. The patient had previously gone through an uncomplicated pregnancy without symptoms of nephrolithiasis and it seemed advisable to allow the pregnancy to progress.

Two patients had been previously advised of stones in both kidneys, but they had not had symptoms of any kind in recent years. There was little or no evidence of infection in the urine and the renal function was but slightly impaired. Because of the previous history and evident tolerance of these patients, it did not seem best to remove the stones. In the presence of large or multiple stones which are not causing acute pain, suppuration or hemorrhage, the advisability of operation is questionable. The patient acquires a tolerance to the stones and will often have a better prognosis than if they are removed. If the stones are small and the function is not too greatly diminished, operation may be advisable in spite of the fact that there are no acute symptoms. If, however,

there is considerable kidney-destruction, the removal of large stones causes so much damage to the kidney-tissue that death frequently results soon after operation. The possibility of stones recurring and then being situated so as to cause urinary obstruction, must also be considered.

Stone-Forming Kidneys.—A considerable group of patients, with pain referred to both kidneys, have been examined who gave a history of having passed stones repeatedly, but who at the time of examination were found to be negative. Several of these patients had passed a stone within a week or so following thorough examination, including repeated roentgenography, cystoscopy, and pyelography. With a definite history of colic referred to the kidney, in spite of negative roentgenographic and cystoscopic data, a negative diagnosis of lithiasis should be made with caution. The inability of the x-ray to show this type of stone would lead us to believe that the occurrence of bilateral lithiasis is more frequent than can be ascertained by our present methods of diagnosis. The tendency to repeated stone-formation on the part of the kidney is most interesting. That it may be due to some disturbance in metabolism is suggested by the frequency with which the formation ceases after the diet has been corrected. Several of the patients with bilateral nephrolithiasis gave a history of having passed stones. In the presence of large or multiple stones it is probable that the stones passed spontaneously have been either single stones from a group or portions of single large stones.

PATIENTS OPERATED ON.

Both kidneys were operated on in 33 patients and one only in 29 patients. Seven of the 29 patients were advised to have both kidneys operated on but they refused. In the remaining cases, either the stone was so small that it was believed that it would be passed spontaneously, or the condition of the patient did not permit of operation. Five of this group passed the stone from the other side spontaneously. The destruction of renal tissue consequent to the search and removal of very small stones is so great, that it is usually best to await further developments, providing the patient can be kept under observation. When it is found advisable to remove such stones, pyelography has proved of great aid in their identification and localization.

Nephrectomy.—In 22 patients a nephrectomy of one kidney was found advisable because of the advanced destruction of the organ. In 7 of these patients a nephrectomy alone was made; in 15 it was found necessary to do either a pelviolithotomy or nephrolithotomy on the other kidney.

POSTOPERATIVE RESULTS.

There was no operative mortality, which would indicate that patients with bilateral nephro-

lithiasis, when properly selected, offer no greater operative risk than with unilateral lithiasis. There were ten deaths reported subsequent to operation, all within less than a year, the majority presenting clinical evidence of renal insufficiency.

SUBSEQUENT EXAMINATION.

Twenty patients were examined at varying times following operation, and recurrences were found in 5. In correspondence with other patients, 3 gave a history of having passed stones from the kidney operated on, and 4 gave a history of severe pain, which we regarded as probably due to recurrence, thus making the total number of recurrences 12 (19.35 per cent.). A previous review of patients with unilateral lithiasis showed a total recurrence of less than 10 per cent. It is evident, therefore, that the recurrence in bilateral nephrolithiasis is fully twice as great as with unilateral lithiasis.

In the 22 cases in which it was found necessary to do a nephrectomy because of calcareous pyonephrosis, six patients died within a year following operation. The prognosis, therefore, in cases of advanced calcareous pyonephrosis on one side is very grave. Subsequent examinations were made in 5 of these patients, recurrence being noted in but 1. Later, letters were received from 3 patients, all of whom appear to be fairly well.

UNILATERAL LITHIASIS WITH DISEASE IN THE OPPOSITE KIDNEY.

There were fifteen cases of stone in one kidney and disease in the other. This group does not include a large number of cases in which an occasional pus-cell was found in the catheterized specimen from the opposite kidney. A few pus-cells are easily picked up by the ureteral catheter from the bladder-fluid and should have no practical significance, provided other cystoscopic data are negative, and the function of the kidney is found to be normal. But with definite evidence of infection and disturbance in function in the other kidney, the question may arise whether or not operation would be advisable.

Among the various conditions found in the opposite kidney, pyelonephritis to a moderate degree was found in 6 cases, pyonephrosis to such an extent that the kidney was functionless in 5, hydronephrosis in 3 and tumor in 1.

PYELONEPHRITIS IN THE OPPOSITE KIDNEY.

In the presence of pyelonephritis in the other kidney, it is advisable to ascertain as nearly as possible, its functional activity. When the functional test is normal the infection may disappear spontaneously following nephrectomy. When the function is moderately low it is advisable to institute pelvic lavage and catheter drainage, preliminary to operation. Uncomplicated pyelonephritis is usually painless. There

was no pain referred to the kidney with pyelonephritis except in one instance, and the patient gave a subsequent history of having passed a small stone, with colic referred to the kidney where a pyelonephritis only had been previously diagnosed. When, therefore, a pyelonephritis on the opposite side is accompanied with pain even though the roentgenographic evidence is negative, we must suspect the possibility of stone lodged either in the ureter or kidney, and an exploration may be justifiable. Stone secondary to a chronic pyelonephritis is not a rare complication to renal infection, and was found in two of our patients. Removal of the stone, however, does not necessarily effect improvement in the pyelonephritis.

In two patients the nephritic element predominated and the infectious process seemed to be of secondary importance. The stone was removed from the cortex or end of the calyx, and it was hoped that its removal would improve the renal function. While both the patients made a good temporary recovery, on subsequent correspondence and examination no definite change was noted in the condition.

One patient had a peculiar anomaly in that he had a reduplication of both ureters and pelves. The stone was situated in the upper pelvis of the left kidney which was independent from the lower pelvis. The stone was removed by bisection of the kidney. Pyelonephritis remained in the lower pelvis and was also present in both pelves on the right side. The patient was recently examined (six years after operation) and was found in a fair degree of health in spite of the persisting pyelonephritis which seemed to be no further advanced since the previous examination.

Inflammatory destruction of the kidney containing stone was so advanced that nephrectomy was necessary in three cases; the pyelonephritic kidney was left to carry on the function. Subsequent data from two other patients lead us to believe that they are in a fair state of health. Whether or not the increased function in the remaining kidney had any therapeutic effect would be difficult to determine.

PYONEPHROSIS IN OPPOSITE KIDNEY.

With pyonephrosis in the second kidney the indications for operation may be confusing: (1) When the function of both kidneys is greatly destroyed and there are no acute complications, the condition is not operable. (2) When there is even a small amount of normal tissue remaining in the calcareous kidney and there are acute symptoms which require relief, nephrolithotomy and drainage of the infected areas are indicated; the pyonephrosis in the opposite kidney being left undisturbed. (3) When the renal stone is not causing any acute disturbance and there is either pain or evidence of systemic infection from the opposite kidney, immediate nephrectomy of the latter is indi-

cated. In this series there were a number in the first group, which have been previously referred to; there were 2 in the second group and 3 in the third group. The prognosis in the first two groups is necessarily very poor, all patients being reported dead within a few months after operation. In the third group there is usually a marked improvement in the condition of the patient. This is usually accompanied by improvement in the function of the remaining kidney even though stone is present. In one patient, the combined function rose from 19 per cent. before operation to 40 per cent. a month after operation. The predominating symptoms in 3 of the patients were on the side in which the stone was located and in 2 patients on the side of the pyonephrosis. The discovery of stone in the latter was accidental.

HYDRONEPHROSIS IN THE OPPOSITE KIDNEY.

There were 3 patients with hydronephrosis in the opposite kidney and in 2 of these the hydronephrosis was bilateral with secondary formation of stones. From the long duration of symptoms, extending back to childhood, it would seem as though the hydronephrosis were of congenital origin, although unilateral hydronephrosis of recent origin with secondary stones is not an uncommon condition. In one patient the stones had caused so much infection that the kidney was largely destroyed and a nephrectomy was necessary. The patient, however, died three months after leaving the Clinic. In another case a pelviolithotomy was done and the patient reports some improvement with persistence of pain in both kidneys. The third patient was not operated on and reports the passage of numerous small stones and the cessation of symptoms a short time after being dismissed. It is evident, therefore, that in the presence of complicating hydronephrosis a conservative operation is indicated when possible.

TUMOR IN OPPOSITE KIDNEY.

In one patient a tumor was found involving the opposite kidney, which proved to be sarcoma. A nephrectomy was done but was only partially successful since there was infiltration in the surrounding tissues. No further operation seemed advisable.

STONE IN A SINGLE KIDNEY.

In 7 patients, with only one kidney, a stone was removed. In 5 of these nephrectomy had been done elsewhere some time previously; in the other 2 there was no evidence of the existence of the opposite kidney, and there was no clinical evidence of previous renal disease, so it may be inferred that the condition was congenital solitary kidney. In 3 of the 5 cases in which a nephrectomy had been done, this was necessary because of pyonephrosis—in 1 because of hydronephrosis, and in 1 because of acute pyelonephritis.

The operations performed on the single kidney were nephrolithotomy 3, and pelviolithotomy 4. In one of the cases of nephrolithotomy the patient was operated on three times for recurring stone, extending over a period of six years. The patient died seven years after the first operation. One other patient was also operated on for repeated stone, but is now alive and well. This illustrates the great degree of tolerance which a single kidney may have for removal of recurring stone. One patient developed uremia one month after operation and died. One patient had a subsequent x-ray examination, which was negative; there were no subsequent data in the remaining three cases.

A peculiarity noted in several of the cases was the high phenolsulphonephthalein output of more than 50 per cent., in spite of the presence of a stone of considerable size in the kidney. Had the opposite kidney been functioning, the output would have been considerably lowered by the presence of the stone, and the other kidney would have been performing a correspondingly larger amount of work. In the absence of the opposite kidney, however, the entire function was forced upon the one, and the stone-irritation did not have the usual effect. There was no operative mortality in this group. Two of the patients have since been reported dead. The others are living, and to all appearances are in comparatively good health.

HORSESHOE OR FUSED KIDNEY.

Five patients were operated on when lithiasis was found in a fused or horseshoe kidney—in 4 the lithiasis was confined to one-half of the kidney, and in 1 there was a stone in both sides of the kidney. In 2 patients with unilateral involvement, secondary infection had advanced so far that bisection of the kidney was necessary. In 2 a pelviolithotomy was performed. In the case of bilateral nephrolithiasis, heminephrectomy was necessary on one side, and a stone was removed from the lower ureter by cystoscopic manipulation on the other. Three of these patients are alive from one to five years after operation.

SUMMARY.

1. In 17.2 per cent. of the patients in this series there was bilateral renal involvement. The percentage of bilateral lithiasis was 12.3.
2. Bilateral as well as unilateral lithiasis occurred twice as often in the male as in the female.
3. Pain in bilateral nephrolithiasis was unilateral in 64 per cent and absent in 8 per cent of the cases.
4. Bilateral stones were found most frequently in the pelves and calices.
5. Combined renal functional tests were of practical value only when normal or extremely low.
6. To ascertain the comparative degree of

function in the two kidneys, the functional test was of value only when it was zero or a trace, normal or excessive.

7. The functional test, x-ray examination and cystoscopic inspection may be insufficient in determining the degree of healthy renal tissue remaining, and exploration only can determine this.

8. Indications for operation: (a) The kidney with acute complications should be operated on first; (b) without acute complications the kidney with the better function should be operated on first; (c) occasionally simultaneous bilateral operation is advisable.

9. Patients may be inoperable because of renal insufficiency, secondary infection, kidney destruction or constitutional complications.

10. Patients with large bilateral stones causing no symptoms or complications are better off without operation.

11. The operative mortality in this series was zero; the total number of deaths after operation 10; these patients died less than a year following operation. The operative mortality with calcareous pyonephrosis is much greater than with other forms of bilateral lithiasis.

12. The recurrences in cases of bilateral nephrolithiasis was 20 per cent; in unilateral lithiasis, as previously reported, it was 10 per cent.

13. When there is stone in one kidney the most common forms of disease in the opposite kidney are: Pyelonephritis, pyonephrosis and hydronephrosis.

14. With unilateral lithiasis the opposite kidney may be so badly diseased that a preliminary operation may be advisable on that kidney.

15. Stone secondary to pyelonephritis, when removed, prevents further renal destruction but is not of curative value.

16. When the nephritic element predominates, removal of the stone is not of much therapeutic value.

17. A single kidney has a great degree of tolerance for repeated operation for stone.

18. In a single kidney the phenolsulphone-phthalein output usually remains high in spite of the presence of an uncomplicated stone which is probably due to compensatory hypertrophy.

19. Fused or horseshoe kidneys permit of repeated operation for lithiasis which may, if necessary, include hemi-nephrectomy.

fragments in all three, shown by x-ray, leads me to report them. All three were seen shortly after the accident, and showed the typical picture of fracture of the neck of the femur, with eversion. The method used for reduction is the method described by Whitman, as follows: Patient, having been anesthetized, is placed upon the back, the head and shoulders supported by a box of sufficient size, pelvis resting on a sacral support. The disabled member is first flexed to disengage folds of capsule that may have fallen between the fragments. It is then extended and rotated inward to the normal attitude, and under traction and counter-traction the shortening is completely overcome, as demonstrated by measurements. The sound limb is then abducted to the limit to demonstrate the normal individual range and to fix the pelvis. The limb on the injured side is then slowly abducted by the assistant, while the surgeon, supporting the joint, pushes the thigh upward from beneath, to force the two fragments against the anterior part of the capsule. When the limit of abduction has been reached the capsule will be tense, thus directing the fragments, now in a horizontal plane and end to end, toward one another, and finally forcing the contact. The fracture is as if it were locked by internal splinters, and it is only necessary to hold the limb in the attitude of complete abduction and complete hyperextension by a plaster spica.

CASE 1. Mr. A., aged 64 years. Occupation, stone-cutter. Oct. 25, 1916. In the evening, while coming home from work, the patient started to cross street and was struck by a news team and knocked down, striking on right hip. He was brought home and seen shortly afterwards.

Physical Examination.—Well developed and fairly nourished man, past middle age, very nervous, showing some evidence of shock. Heart action soft and slightly irregular. Right leg

FIG. 1.—Case 1. Before reduction.

Clinical Department.

FRACTURE OF THE NECK OF THE FEMUR: REPORT OF THREE CASES.

BY CHARLES E. AYERS, M.D., WORCESTER, MASS.

THESE three cases, occurring in people past middle age, and treated by the Whitman abduction and fixation method with such satisfactory end-result in one, and anatomical reposition of