Remarks ON TREATMENT OF SUBACUTE NEPHRITIS BY KIDNEY DECAPSULATION.

WITH AN ACCOUNT OF FOUR CASES OF NEPHRITIS IN WHICH
DECAPSULATION WAS UNDERTAKEN.*

BY

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HISTORICAL.

DURING the decade 1896-1906 a good deal of experimental surgery was undertaken in connexion with certain inflammatory conditions of the kidney which had not formerly been considered amenable to such methods. Some of these experimental efforts were undertaken in regard to cases of disease which proved, either at the time of operation or afterwards, to be nephritis. Such experience led the surgeons concerned to more deliberate attempts in this direction in cases of undoubted nephritis, using that term in its strict medical sense. In this way there arose what came to be known as "the operative treatment of acute and chronic Bright's disease." The treatment was at first associated with the names of Harrison, Edebohls, Israel, and Pousson. To these pioneers were added later the names of Primrose, Guitras, and Hauchet, and the record of cases was further supplemented by Boyd, Tyson, Lyman, Harris and Clayton-Greene, and others.

The technique adopted was variable. The earliest method was a simple puncture; later a simple incision was made: both of these methods were used in cases of acute inflammation, either when the kidney was considered to be in a state of tension within its capsule—as, indeed, it was sometimes found to be—or when the patient was anuric. Still later, the capsule was not only incised, but more or less of it was stripped from the kidney. In the earlier procedures the kidney wound was allowed to ooze "blood and urine" through a drainage tube for several days; in the later operations the kidney was returned to its bed after the capsule had been stripped, and the wound was sutured forthwith. In the earlier cases, again, one kidney only was dealt with, or at first one, and then, if it seemed desirable, the other kidney was similarly treated some days afterwards; in the later instances both kidneys were subjected to decapsulation at one and the same operation.

The work of the surgeons just named was at its height about the years 1900-1902. In reviewing the whole position as it then stood I pointed out that no very clear light could be thrown upon this important question until authors were careful to state fully the exact nature of the cases dealt with so far as this could be done by full clinical and pathological examinations. For if all renal lesions, unilateral or bilateral, local or general, were termed "nephritis," or, still worse, "Bright's disease," we could never hope to say, from reading the reports, which cases were suitable for surgical treatment and which were not. Only confusion could result, for example, from the publication of such papers as that of Edebohls, with the title "The cure of chronic Bright's disease by operation," yet containing records of cases where the evidence of nephritis was of the scantiest.

The cases of kidney inflammation, kidney pain, and kidney haemorrhage up till this time dealt with by surgeons fell into three classes:

- (1) Purely local, and for the most part unilateral, affections, such as calculus, pyelitis, pyonephrosis, etc.
- (2) A mixed group, including the cases classed as nephralgia, "renal haemophilia," etc.
- (3) True nephritis or Bright's disease—that is to say, inflammation of the kidneys which was acute or chronic, but always bilateral and general.

Now the surgery of class (1) was already successful in the highest degree; and with regard to class (2), since Tiffany, in 1885, first incised the kidney capsule in a case of nephralgia, many surgeons had demonstrated the usefulness of the operation in similar cases, if only because it afforded a means of exploration for stone, etc. And Senator, who criticized Israel's work on the surgery of

"nephritis" so severely, was himself the first to cure a case of "renal haemophilia" by nephrectomy. It was the cases in class (3) for which the claims of surgery still lacked demonstration, and it was essential that they should be kept separate from other conditions which had come to carry well-recognized surgical indications.

From about this time (1902) onward more exact knowledge concerning operative treatment in cases of nephritis seems to have arrived very slowly. This tardiness was due to two things: the too rash advocacy of the procedure by certain of its friends, and the absence of collaboration between surgeon and physician, whereby some definite indications for the procedure might be arrived at. A certain amount of desultory work of the same kind went on, but, since there was no clear lead as to which clinical type or types were best suited to the methods of decapsulation, it is probable that many good opportunities for exploiting the operation have been overlooked and lives lost in consequence.

THE PRESENT CASES.

Of the four cases of decapsulation forming the basis of the present paper the first was undertaken in 1914, and the last in 1919. The first pair of cases were very similar in their clinical features, and were highly successful in their end-results. These two cases, together with a close study of certain individual cases similarly treated by Primrose, Edebohls, Boyd, and others, form the material upon which a type case will be presented, which, I believe, gives more or less exact indications for the operation. The second pair of cases here recorded also presented very similar clinical features; they serve largely for purposes of comparison, because, though partially successful, I do not regard them as belonging to the type which primarily indicates the procedure. In all four of the cases both kidneys were decapsulated at the same operation, the capsules were completely stripped from the entire organs, were cut away, and were removed. The operation is quite simple in the hands of an expert surgeon, and complete decapsulation of both kidneys can generally be completed in about half an hour.

CASE I.

Jessie A., aged 30, a dressmaker, was admitted to St. Bartholomew's Hospital on April 6th, 1914. She gave a history of swelling of the legs and thighs, first noticed four months previously, and increasing gradually. She had been short of breath with effort and had vomited on two or three occasions. There was nothing in her past history throwing light upon the origin of the present illness. On examination the patient presented the picture of so-called parenchymatous nephritis. She was anaemic, her face was somewhat puffy, both lower limbs were very oedematous and the oedema involved the loins and lower abdominal parietes. The urine was diminished in amount, averaging 30 ounces in the twenty-four hours, pale, specific gravity 1.015, and contained 0.25 per cent. of protein with granular and epithelial casts. The systolic blood pressure was 120 mm. Hg, the radial artery was not thickened, and the heart was natural. The fundus oculi was also natural.

As the result of the customary medical treatment—rest, diet, deprivation of salt, diaphoresis and aperients—the oedema diminished until there was slight pitting in the region of the lumbar spine only, the patient lost 17 lb. in weight, the albumin dropped to 0.1 per cent. and the anaemia improved. She was discharged "relieved" on May 29th, 1914.

This patient was readmitted on February 27th, 1915, stating that she had remained fairly well and at work until early in January, when she noticed swelling of the face, neck, and abdomen, and a return of the swelling in the lower limbs. Her urine had become very scanty. She had taken to her bed, but her condition had not improved. On examination she was found to be more anaemic and much more oedematous than at the time of her former admission. There was considerable ascites: the abdomen measured 39 in. in circumference. The heart showed no abnormality except a ringing aortic second sound; the systolic blood pressure was 116 mm. Hg. The urine was reduced to an average of 20 oz. in the twenty-four hours, specific gravity 1.020; protein excretion amounted to 0.4 per cent.; casts were abundant. Vomiting occurred on several occasions.

Despite energetic measures on the usual lines, there was no improvement in the general state, and no diuresis established, after a sojourn of six weeks in hospital. At the end of this period, therefore, I asked Sir D'Arcy Power's assistance in the case, and on May 13th, 1915, he decapsulated both kidneys. There were a good many perinephric adhesions, more on the left than on the right side. The capsules were more adherent to the kidney substance than is normal, entailing a certain amount of splitting of these structures during their removal. Both kidneys were probably a little enlarged, slightly mottled, but certainly not pale.

The patient made an uninterrupted recovery from the operation. Improvement in the urine excretion, in the oedema

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and in the albuminuria began at once. At the end of the second week after the operation there was no oedema, and the urine excretion was normal; the albumin was less than 0.1 per cent. At the end of six weeks, when the patient was discharged (July 3rd, 1915), her colour was natural, she was quite free from oedema at any time, and the urine showed no trace of protein and no casts. Two months after her discharge she reported herself at hospital saying she was at work and in good health. The urine still contained a trace of albumin. I lost sight of this patient for five years. She then came to see me (January 16th, 1920) to ask if I thought she could get married and go to live in India. This gave me an opportunity of examining her. I found no signs of disease, indeed she was in most excellent health, and had been so since she was last seen. Dr. Geoffrey Evans, to whom I sent a morning and an evening specimen of her urine, reported that both of these were quite free from protein and other abnormalities, and were of good specific gravity.

CASE II.

Joyce L., aged 10 years, was seen in consultation with Dr. Hartigan on October 18th, 1914. Six weeks previously there had been slight sore-throat and pyrexia, passing off in a few days, to be followed four weeks later by a similar attack. About a week after this second sore-throat the child was found to have a puffy face, oedema of both legs, albuminuria, and pyrexia. This was her condition when first seen. She was treated on the customary lines of an acute nephritis, but the symptoms got worse, so that by the end of the second month of the illness the urine was scanty and loaded with protein, casts were abundant, and the dropsy was universal and very marked. The temperature was slightly raised throughout, and showed exacerbations which were accompanied by vomiting, headache, drowsiness, increase in the oedema and anuria. In some of these "crises" the vomiting was very troublesome, making feeding difficult. In addition to the routine remedies, trial was given of an autogenous streptococcus vaccine from cultures derived from the secretion taken from the tonsils. The condition gradually got worse, so that by the end of six months the child's state was most unsatisfactory; the oedema was extreme and involved the peritoneum, both pleural sacs, and the lungs. The ascites was relieved on two occasions by paracentesis.

At the end of the seventh month I suggested decapsulation of the kidneys, and this was decided upon after further consultation with Sir William Osler and Sir D'Arcy Power. The procedure was undertaken by Sir D'Arcy Power on May 21st, 1915, gas and oxygen being administered, with a little ether, by Mr. E. Boyle. The bilateral operation was completed in thirty-five minutes. A great deal of oedema fluid escaped from the lumbar incisions during the operation. The capsules of the kidneys were stripped without difficulty, exposing pale mottled organs of a large size in proportion to the patient's age. The kidney substance was not under any apparent tension. The wounds healed well, and there were no untoward after-symptoms. Diuresis began almost at once, and the oedema rapidly diminished.

The after-history in this case is interesting because the condition was complicated by the presence of the infected tonsils. Six months after the operation the patient was found to have a slight degree of oedema of the face and feet at times, and there was slight albuminuria, although the general state was greatly improved. There was at least one "flare-up," with nausea, malaise, and slight increase of both oedema and albumin. This occurred fifteen months after the operation. But the decapsulation had clearly increased the renal adequacy, rendering this in large measure proof against the chronic infection. Dr. Hartigan, however, considered this attack and some subsequent lesser developments of the same sort to be in all probability associated with the septic tonsils, and he decided to have these enucleated. This was done in June, 1918, three years after the decapsulation. The procedure seems to have completed the girl's recovery, for within a month of it the last trace of oedema disappeared and the urine became free from albumin. Since this time she has remained quite well. A letter from her mother, dated October 26th, 1920, says: "Joyce is quite well; she has grown a fine girl; does everything, plays hockey, lacrosse, dances; is really wonderful."

The next pair of cases of nephritis subjected to decapsulation contrast markedly with the last pair in that (1) the clinical type was different, and (2) improvement only was effected, not a "clean" end-result achieved.

CASE III.

Captain R. C. L., aged 29, first seen on July 29th, 1919, in consultation with Dr. William Roche. His history was as follows: Ten months previously he had an attack which was labelled "influenza" by the medical officer. There was haematuria with the illness, frequent and painful micturition, headache, malaise, and nausea. After a week he was allowed up and granted sick leave. He went to Harrogate, but, taken ill again, he saw a doctor who diagnosed his case as nephritis. He was transferred to a military hospital and placed under special treatment in a ward given up to nephritis cases. At this time he suffered from headaches, nausea, pains in the back, and puffiness of the eyes and face in the morning. He was under continuous treatment from the beginning of December, 1918, until April, 1919, when he was sent home on two months' leave.

On examination the patient was found to be free from oedema except of the eyes in the early morning. The urine output

averages 30 to 40 ounces daily; it contains 0.2 per cent. of protein, a fair number of red blood cells, a few leucocytes; a few granular casts; specific gravity 1014. There was slight hypertrophy of the left ventricle as judged by some heaving of the impulse, and a booming first sound; the aortic second sound was accentuated; the radial artery was easily felt; the blood pressure was 175-85 mm. The patient complained of being easily fatigued, of headaches and backache with slight exertion, nausea at times, and suffered from sudden starts as he was getting off to sleep. The fundus oculi was normal.

In view of the prolonged expert treatment which this officer had received, and his unsatisfactory state, I advised him to submit to kidney decapsulation, and this was done by Sir D'Arcy Power on August 8th, 1919. The capsules of the kidneys were rather difficult to remove, splitting a good deal in the process. The surface of the organs was a little rough, and small fragments of the cortex came away during the process of decapsulation. A small piece of one of the kidneys was removed for microscopic examination. Dr. Geoffrey Evans kindly undertook this for me and reported on the sections as follows:

"The sections are of a small piece of the cortex of the right kidney fixed in formalin, embedded in gelatin and cut frozen. The capsule had been previously stripped, and does not therefore appear in the section. The interstitial tissue is markedly swollen with oedema, and in it are small scattered areas of small-cell infiltration. There is some increase of fibrous connective tissue. The vessels are relatively normal, but in several afferent arterioles there is a fatty obliterative endarteritis such as is typical of diffuse hyperplastic sclerosis (? 'arterio-capillary fibrosis'—T. H.), while the capillaries of the tufts show varying degrees of hyaline degeneration without fatty change. The most marked pathological change is a proliferation of the epithelial cells of Bowman's capsule, in which both parietal and visceral layers are involved, leading to adhesion of the two layers in part of many glomeruli. All glomeruli are more or less affected; in those more damaged there is a periglomerular fibrosis; a few have undergone atrophy and fibrosis. The tubular epithelium shows, in general, a certain degree of cloudy swelling and desquamation and local fatty degeneration. There is no vascular engorgement. The changes appear to be recent. The interstitial tissue shares in the inflammatory process."

Recovery was uninterrupted. The first week after the operation showed considerable increase in the urine secretion, rising to 60 oz. on the fifth to eighth days, and the puffiness of the face disappeared. A month after the operation, however, there was practically no change in the characters of the urine, which still contained red blood cells, leucocytes, 0.15 per cent. albumin, and a few hyaline and granular casts.

The patient wintered at Malaga, and a report of the urine from Dr. Gutierrez on January 17th, 1920, showed almost the same features as those just mentioned. When examined on June 7th, the blood pressure was 160-80 mm., the heart was less irritable, but still gave evidence of slight hypertrophy, the headache and night starts had gone, and the patient could walk five miles without being tired. The urine showed no change; nor did it on September 9th, at which date the protein ratio of albumin to globulin was found by Dr. Mackenzie Wallis to be 9 to 1; red and white blood cells were still present, and a few granular and hyaline casts.

CASE IV.

George S., aged 18 years, was first seen on February 15th, 1918, for Dr. Vickery. He was suffering from headaches, backache, inability to undergo any exertion, and anorexia. There had been slight oedema of the face in the early morning before the present examination, but this symptom had passed off. The patient had been discovered to be albuminuric some eighteen months previously. The urine now yielded the following characters: Amount in twenty-four hours, 32 ounces; pale yellow, clear, no naked-eye deposit, specific gravity 1020, acid, albumin 0.35 per cent.; centrifugized deposit shows red blood cells absent, leucocytes in large numbers; hyaline, epithelial, and granular casts in large numbers. The radial artery was palpable; the systolic blood pressure was 145 mm.; the left ventricle gave evidence of slight hypertrophy; the fundus oculi was normal. This patient had received very efficient treatment before I saw him, and it was thought advisable to try the effect upon his renal function of bilateral decapsulation. This was done on March 4th, 1918, by Sir D'Arcy Power.

The operation and convalescence were uneventful. As oedema was not present before operation in this case, there was no noticeable change to record in the patient's appearance. But the records of the urine in respect of its abnormal features immediately subsequent to the decapsulation are of interest (see table).

Subsequent urine examinations always showed the presence of albumin and an occasional hyaline cast; but the albumin never reached more than 0.12 per cent., and this was after a long railway journey. (The patient was over six feet in height, and "postural" effects were often to be observed in connexion with the albuminuria.) So far as the symptoms were concerned, there has been a very slow general improvement; the headaches have been less severe and less frequent, allowing of brain work, which was formerly impossible. The arterial hypertension fell to 120 mm.; the slight cardiac hypertrophy remained. Writing as recently as October 24th, 1920, this boy's father

Records of Urine, showing Abnormal Features immediately subsequent to Decapsulation.

Days after Operation.	Amount of Urine.	Amount of Albumin.	Red Blood Cells.	Leucocytes.	Casts.
1	Oz. 36	Per cent. 0.45	Numerous	Numerous	Fair number.
2	56	0.25	A few	Numerous	Fair number.
3	58	0.2	Very few	Fair number	Fair number.
9	60	0.25	None	A few	Fair number.
12	60	0.18	None	A few	A few.
17	48	0.12	None	Scanty	A few, hyaline only.
19	50	0.075	None	Scanty	A few, hyaline only.

says, "Generally speaking, I should describe him as still very slowly improving; his sick headaches are not so numerous as a year ago, and are generally milder when they come."

GENERAL REMARKS.

I do not propose to go fully into the theoretical aspects of this subject. I think it better that actual experience of the procedure should be regarded as the main part of this communication. It would, of course, be absurdly unwise to dogmatize upon so little material. But consideration of these four cases, together with careful analysis of all the available records, lead me to the conclusion that there is a clinical type of nephritis in which—when thorough general measures have proved unavailing, and a reasonable time element, during which it is known that resolution not infrequently occurs, has passed—decapsulation becomes a definite indication and promises satisfactory results. This type is, I think, not inappropriately termed *subacute nephritis*, and is characterized by extensive and considerable oedema, massive albuminuria with casts in the urine, toxic symptoms of the chronic uraemic kind, and an absence, or the presence in only slight degree, of cardio-vascular changes. (By cardio-vascular changes I mean arterio-capillary fibrosis, hypertrophy of the left ventricle, arterial hypertension and retinal degeneration.) This was the state of things in both of my cases that resolved completely after the operation. In the two cases in which some improvement followed the procedure, but no cure, definite evidence of cardio-vascular changes was present, and the type of disease suggested a general involvement of the arterial system rather than a local inflammatory process in the kidney.

This consideration confirms the general idea that subacute nephritis is a different disease altogether from generalized arterio-capillary fibrosis, as a part of which process the kidney vessels suffer early, and the kidney substance suffers secondarily to the disease in the vessels. In subacute nephritis the causative agent may be regarded as either past and over, or, if still present, it may be regarded as producing its effects primarily upon the kidney parenchyma; in chronic interstitial nephritis, granular kidney, and (or) the arterio-sclerotic kidney the causative agent may be regarded as operating chiefly upon the whole arterio-capillary system, including the kidney glomeruli.

I have referred to the fact that analysis of the recorded cases of decapsulation confirms my own experience that it is these cases of subacute nephritis which are specially adapted to this form of treatment.

Dr. Francis Boyd has quite recently (Association of Physicians' Meeting, Manchester, 1920) reported such a case—a man aged 41, in whom dropsy was extreme, necessitating several tapplings of the abdomen and the legs; albumin was present to the extent of 32 grains to the ounce, with dyspnoea and severe headaches. After five months' treatment, with gradual decline, the kidneys were decapsulated. Diuresis began at once, and progress was rapid. Three years later the patient was reported to be at work and well, although the urine was still albuminous. In this case the systolic blood pressure was not higher than 130 mm. Hg. In a second case reported by the same author, similar clinical features were present: the blood pressures were even lower (systolic 79, diastolic 55); acute uraemic symptoms appeared in this case and the kidneys were stripped during this serious phase. Five months after the operation this patient was said to be in apparent good health, although a trace of albumin was present in the urine.

I am not here saying that decapsulation does no good in cases of arterio-sclerosis with kidney involvement—several

scattered cases in the literature, and my second pair of cases, prove that it does do good—I want to emphasize the opinion that the type of case most suited to the treatment, and most likely to justify its adoption, is not this type. For cases of advanced granular kidney, I feel confident that, from a study of the records, the operation is contraindicated.

One other clinical type of nephritis requires brief mention, and that is acute nephritis. I have had no experience of decapsulation in this disease. It is probable that the earliest of all recorded cases—namely, those of Harrison—were cases of this kind, though not recognized as such prior to the operation. It is certain that not a few of Edebohls's cases were suffering from acute nephritis. The occurrence of haematuria seems to have stimulated the surgical instinct. It is highly probable that the kidney puncture or incision undertaken by these pioneers did good. The doubtful point is whether the procedure was necessary in order to secure the result. This consideration does not make it illogical to say that puncture or incision of acutely inflamed kidneys is, in my opinion, quite justified whenever anuria and uraemia persist despite energetic general measures.

Concerning the mechanism by which the results of decapsulation are brought about I have little or nothing to say of actual fact. It is generally thought that depriving a kidney of its capsule, and thus bringing the cortex into close contact with the perinephric tissues, leads to the formation of new vessels which anastomose with those of the kidney itself, thus providing for the removal of inflammatory exudates and assisting in re-establishing renal function. And, although the results of experimental work by various investigators have been at variance on this point, this process of formation of new vessels may, I think, be regarded as actually taking place. In 1905 Boyd and Beattie² reported the results of a *post-mortem* examination on a case of decapsulation, and demonstrated these new and anastomosing vessels *in situ* four months after the operation had been undertaken. But we are faced with a difficulty: The good effects of decapsulation are immediate, whereas this new system of vessels must necessarily take time to form. Are these rapid effects due to the relief of tension? This can scarcely be so, seeing that—apart from the cases of acute nephritis, which are in a different class—little or no actual tension is seen to be present at the time of the operation. The question must remain for the time unanswered—unless it be an answer to say that the mechanism of production of the diuresis and disappearance of oedema and of symptoms generally is of the same kind as in the process of "wet cupping." For the process of decapsulation *does* amount to a very direct and very effective "wet cupping" of the kidney itself, and may therefore be not inappropriately compared with the indirect and too often ineffective "wet cupping" of the loin formerly in vogue in the treatment of nephritis.

We know very little about the exact relation which the perinephric tissue bears to the capsule of the kidney and to the kidney proper. We get glimpses at times of possible important bearings of this cellular tissue upon the organ embedded in it, and also of a converse relationship. But actual observations and experimental work are as yet very slight. Necropsies carefully undertaken in cases of chronic nephritis frequently reveal, even to the naked eye, varying degrees of perinephritis, and (though chiefly in arterio-sclerotic cases) new vessels of not inconsiderable size are seen entering the kidney capsule. Dr. Geoffrey Evans has drawn my attention to the work of Blandini,³ which points to possible renal infection *via* afferent lymphatics passing up the peri-ureteral tissue from the bladder. Kenneth Walker⁴ showed that an ascending infection was possible by this route, and he was at times able to demonstrate organisms in large numbers in the kidney capsule when he could not demonstrate them in the kidney substance. But remarks such as these are far too sketchy to pursue further. The whole subject calls for systematic study. Such a study may well be found to supply the answer to the question here asked as to the mechanism by which the good results of decapsulation are produced.

REFERENCES.

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