ON OBSTRUCTIVE MITRAL MURMURS.¹

By J. S. BRISTOWE, M.D., LL.D., F.R.S.

OBSTRUCTIVE mitral murmurs are generally regarded, I believe, as presenting two well-marked varieties, of which the one, named indifferently presystolic or auricular-systolic (Fig. c), occupies the latter part of the diastolic period running up to and culminating in the first sound of the heart, while the other is an ordinary diastolic murmur (Fig. A) commencing from the second cardiac sound, and dying away in the course of the diastolic period. These two murmurs may occur independently of one another or in association, and in the latter case the earlier murmur may either die out before the later murmur begins (Fig. D), or the two may meet and blend (Fig. E), so that the whole period of the diastolic silence becomes occupied by a continuous sound.

The so-called presystolic murmur is the more common, the more characteristic, and the more interesting of the two. It commences somewhere in the diastolic period, varies in its duration (being sometimes very short, often much prolonged), is singularly rough in character, and usually increases in power from its origin to its close in the first sound of the heart. Various fanciful, and I think mostly meaningless, combinations of letters have been devised to represent its peculiar quality. It closely resembles the trilled "R," or

the sound of a saw slowly worked, and its gathering force and explosive termination in the first sound remind one of the breaking of a wave in the hollow of a rock. It is characteristic of the presystolic murmur that (notwithstanding its roughness and loudness as conveyed by the stethoscope) it is usually audible over a very limited area, the centre of which is a little to the right of and above the apex beat; and is inaudible, or at most very slightly heard, in the axilla, or at the angle of the scapula. So far as I know, this murmur, strikingly characteristic as it is now universally acknowledged to be, was not differentiated from the systolic mitral murmur by the older writers. As a student and young physician, I certainly knew nothing about it, and am sure that I (and I believe all my colleagues) regarded it as systolic mitral. I may add that I have always suspected that one chief ground on which it was formerly taught—that in certain forms of heart disease the pulse at the wrist was sensibly delayed—was this prevailing tendency to confound the two chief mitral murmurs.

The early diastolic mitral murmur, like the murmur of aortic regurgitation, runs off from the second cardiac sound, and tends to die out in the diastolic silence. It may generally be well heard in the mitral area, or in the situation which the presystolic murmur mainly effects. As Dr. Balfour remarks, its seat of maximum intensity is not uncommonly the junction of the left fourth cartilage with the sternum; and it may sometimes be heard here dissociated from its presystolic companion. This murmur is not unlike the murmur of aortic regurgitation, but is generally, I am inclined to think, rather shorter, rather more rough, and more sustained. It is rarely, however, as rough as the presystolic murmur, and I should be inclined to liken its sound to that of the untrilled "R." That it may be confounded with the diastolic aortic murmur, even by presumably competent observers, is certain. Only recently in a patient whom I exhibit this evening, a murmur of this kind, which near the apex blended with a loud presystolic murmur, was heard alone over the cartilage of the left fourth rib, and was regarded as a diastolic aortic murmur by one of my colleagues. And a few years ago I had under my care a patient between thirty and forty years of age suffering from cardiac disease, of which he died, who presented congestion of the face, general anasarca, hæmoptysis, and other phenomena generally present in the later stages of mitral disease, and whose sole local sign of cardiac defect (in addition to the fact of some degree of hypertrophy and dilatation) was a diastolic murmur audible only at the apex of the heart. I came to the conclusion, not without some misgiving, that the symptoms were all due to mitral obstruction. But the post-mortem examination showed that I had been deceived; for the mitral orifice was absolutely healthy, and the aortic valves were contracted and allowed of regurgitation. Of course, it is only those aortic regurgitant murmurs which are inaudible over the base of the heart that can possibly be confounded with diastolic mitral murmurs.

Dr. Dickinson calls special attention to a third variety of diastolic mitral murmur, to which I have also given much consideration, and which, if I recollect right, he considers to be the diastolic mitral murmur formerly recognised by Hope and others. I am inclined to think with Hope that Laennec's diastolic mitral murmur was the murmur of aortic regurgitation, and that his own was either that or the diastolic mitral just described, and not the murmur I am about to discuss. The third murmur occurs isolated in the diastolic period (Fig. B), and for the most part nearer to the second sound than to the first. I believe it is often regarded as a simple reduplication of the second sound. But it differs from the lagging factor of the normal second sound, in the facts that it is of longer duration than the second sound, that it is only to be heard in the region which the presystolic murmur affects, and that it occurs independently of any reduplication of the second sound audible at the base of the heart. The murmur is generally feeble, but varies in duration, and when more than usually prolonged presents obvious traces of the presystolic trill. The rhythmical relations of this murmur and the two sounds of the heart may be represented by a dactyl, of which the first syllable corresponds to the first sound, the second syllable to the second sound, and the third syllable to the murmur. They are better represented if the final syllable of the dactyl be made long instead of short. They may also be aptly represented by the word γεγραφα, which a distinguished colleague of mine used some years ago in illustration of such a case. I do not

¹ Read before the Medical Society of London on Monday, Nov. 7th.

know what his present views of this special murmur may be, but at the time to which I refer I believe he regarded the case of which he used this illustrative word as one of simple reduplication of the second sound. The case, however, had been under my observation for several years, and several times in the hospital under my care. It was one which I regarded during the whole of this period as an example of obstructive mitral disease, but in which, while the presystolic murmur was never audible, the short murmur following the second sound near the apex and undistinguishable at the base was always present, and in which I was able to trace the gradual enlargement of the right side of the heart, and the consequent development of a regurgitant tricuspid murmur and its permanent establishment.

The three murmurs above described (which might, I think, be conveniently termed the early, the mid, and the late diastolic mitral murmurs respectively) may exist either separately or combined; and in the latter case may constitute a continuous but uneven murmur, beginning from the second sound, ending with the first, and filling up the whole of the diastolic period; so that the acoustic phenomena of the heart as presented at the apex shall consist only of a series of alternate prolonged roars and briefer periods of silence. (Figs. E and F.) There seems to me no reasonable doubt that these three murmurs, although they frequently occur independently of one another (so frequently, indeed, and so characteristically as to demand individual description and separate recognition), are only parts of a potential murmur filling up the whole of the diastolic period; or, in other words, that they are the fitful, and in a sense accidental, roarings of a continuous torrent. This view seems to me to be confirmed (if confirmation be necessary) by two easily observed facts. The one is, that each one of the murmurs is liable to come and go as no other organic cardiac murmur comes and goes, and that they are liable (especially the latter two) to alternate with or to replace one another. The other is that, although the earlier two sounds are often feeble and somewhat indeterminate in character, when they blend with one another and with the presystolic murmur and become louder, they present all that vibratile roughness of quality which is so characteristic a feature of the generally more noisy and obtrusive member of the firm. In the case of the patient already referred to in the adjoining room, and in whom the condition of the prolonged diastolic murmur has varied somewhat from time to time, I observed on one occasion (and those who were with me and examined her will confirm my statement) that the roughest and loudest portion of the whole-length diastolic murmur was its middle half (Fig. F). I have observed the same thing in other cases.

There are one or two matters in connexion with mitral obstructive disease and the murmur it occasions to which I should like to advert.

The condition of the second sound of the heart in these cases has always been a subject of interest and study. It need scarcely be said that in mitral obstructive disease, as well as in mitral regurgitant disease, and indeed in all affections which oppose an obstacle to the transit of the blood from the pulmonary artery to the left side of the heart, and in which consequently the right ventricle becomes enlarged and the pulmonary artery dilated, the second sound over the pulmonic area becomes accentuated, while that over the aortic area either remains unchanged or undergoes enfeeblement. Further, it is generally recognised that in cases of mitral obstruction there is a marked tendency to reduplication of the second sound. As regards the actual or relative enfeeblement of that portion of the second sound due to the aortic valves, it is obvious that if there be such enfeeblement over the aortic area (where this sound is always best heard), there must be proportionate enfeeblement at the extreme apex of the left ventricle, and that occasionally it will be heard with difficulty at that spot. It is said, indeed, that in some cases it becomes inaudible there. No doubt such cases are met with, for one occasionally observes the extinction of the second sound in this locality in other forms of heart disease. But I cannot call to mind any example of mitral obstruction in which I have been unable to detect the second sound at the apex. The only case, indeed, in which it has seemed to me possible to ignore its presence is that in which the enfeebled second sound is lost in the noisy commencement of a prolonged diastolic mitral roar. The reduplication of the second sound is certainly a common accompaniment of mitral

obstruction; but it is a very variable phenomenon, and is apt to come and go in the same case. The reduplication seems due to the lagging of the aortic valves. The second sound is of necessity loudest, and its reduplication necessarily most distinct at the base of the heart in the neighbourhood of the valves. Reduplication of the second sound, audible only at the apex, is therefore an impossibility. It is for this reason, amongst others, that the mid-diastolic mitral murmur, which may simulate reduplication and has been mistaken for it, cannot be of pulmonic or aortic origin. But reduplication of the second sound in cases of mitral obstruction is not infrequently audible at the apex as well as at the base; and an interesting example of this fact has been more than once furnished by the patient already once or twice referred to, in whom the second sound is sometimes single, sometimes double, and in whom, when such reduplication is present, the prolonged diastolic mitral roar starts from the repeated second sound, thus leaving the second sound at the apex apparently normal, and allowing of a momentary interval of silence between it and the murmur. (Fig. G.) I believe that this phenomenon is always observable when the second sound is reduplicated, and the mitral murmur is of the early diastolic kind.

The presence of a thrill over and about the spot on the surface of the chest at which the heart's apex impinges has always been recognised as a characteristic accompaniment, not only of the presystolic murmur, but also of the noiseless rush of blood through a contracted mitral orifice. There can be no doubt, I think, that an apex thrill is in a very large proportion of cases diagnostic of mitral obstruction, and that it is generally due to the rhythmic vibrations of the blood entering the ventricle from the auricle, on which also the characteristic rough murmur depends. By most observers it is said distinctly to occur while the presystolic murmur proper is, or should be, in progress and the contraction of the auricle presumably is taking place. Dr. Galabin's cardiographic tracings seem quite to confirm this relation. But when the rough murmur occupies the whole of the diastolic period, the thrill also (as nearly as may be) is equally lengthy; and when the murmur is roughest in the mid-diastolic period the thrill is most marked during the same interval. Yet I am bound to admit that, so far as I can make out the only, or at any rate the most marked, thrill seems occasionally to accompany the ventricular systole. In a case at present under my care in which a hæmic pulmonary murmur is associated with a double mitral murmur, the apex thrill was certainly at one time mainly systolic. But the heart was beating rapidly (over 100 in the minute), and the thrill (as I think the cardiographic tracing confirms) was due to the successive rises and falls which even in health are apt to appear on the broad summit of the excursion representing the cardiac systole.

The association of a true regurgitant or systolic mitral murmur with an obstructive murmur at the same orifice is by no means uncommon. In most cases the first sound of the heart terminates the one and starts the other (Figs. C and F); in other words, a presystolic murmur and a systolic murmur are made continuous by the intervention of the first cardiac sound. Under these circumstances the two murmurs are generally, I believe always, absolutely distinct from one another, both in relation to the apex beat and the pulse, in the quality of their sounds, and in respect of the areas over which they may be respectively best heard. The presystolic sound definitely precedes the apex beat, but runs up to it, and equally definitely precedes the carotid pulse; while the commencement of the other coincides accurately with the apex beat and the pulse. The presystolic murmur is always rough, and generally increases in roughness and loudness until it blends with the first sound; the other, with very rare exceptions, is either musical or blowing and dies away into silence. Indeed, the sudden transition from the one kind of sound to the other is a very striking phenomenon. I admit that occasionally at the apex of the heart a short rumbling murmur is heard about the beginning of the ventricular systole, the exact relations of which it is difficult to determine; and that I am disposed at times to regard such brief murmurs as systolic, at times as presystolic, at times as ill-defined combinations of the two. My belief, however, is that (as the peculiar roughness of such sounds and their comparatively abrupt termination seem to imply) they are really presystolic. Again, the presystolic murmur (as has before been

pointed out) is heard over a very small area, and is not only generally audible in the axilla, below the angle of the scapula and at the base of the heart, but often fails to reach even the true apex. On the other hand, the mitral systolic associated with it may not only be heard where the presystolic is also heard, but extends in a greater or less degree into all the districts above specified. It may be recognised in most of them, and often at the apex, without even a trace of its presystolic accompaniment. In a small but interesting proportion of cases the systolic mitral is associated with a true diastolic mitral, as in a patient whom I saw a day or two since in King's College Hospital (Fig. A). In this instance there is a double murmur, best heard in the neighbourhood of the apex, of which the systolic element is prolonged and blowing, not unlike a diastolic aortic murmur, while the diastolic mitral, which runs off from the second sound, is of rougher quality, resembling an untrilled "R," is uniform in power, and ends somewhat abruptly.

I now come to the consideration of that question which Dr. Dickinson has discussed with great felicity of language and undeniable dialectical skill—viz., "*How are the murmurs which accompany and indicate mitral obstruction produced?*" I must confess that to my mind the problem appears to be free from all real difficulty, and that I entirely accept the explanation formulated by Dr. Gairdner many years ago. I believe that all the different varieties of murmur of mitral origin occurring between the second and first sounds of the heart are due to rhythmical vibrations, or (if it be preferred so to express it) to fluid veins, determined by the passage of blood from the auricle through the contracted mitral orifice into the ventricle; and that the reason why the so-called presystolic murmur is more common than the murmurs arising in the earlier part of the diastolic period, and is for the most part coarser and rougher than they, is that, as physiologists teach us, the systole of the auricle immediately precedes the systole of the ventricle and the occurrence of the first sound of the heart, and causes, while it lasts, a specially forcible current from the one cavity to the other. That the earlier diastolic mitral murmurs—viz., those running off from the second sound, and those that are isolated in the mid-diastolic period—are direct, no one, so far as I know, denies, and Dr. Dickinson himself believes. But if such an explanation is regarded as sufficient for murmurs developed from or shortly after the second sound of the heart, why should it not equally apply to murmurs occurring just before, and running up to, the first sound? Surely the fact that the contraction of the auricle at that time renders the flow of blood more rapid than it was before furnishes no intelligible reason for discarding the auricular systole as the principal agent in the production of such murmurs.

The reasons in favour of the view that the presystolic murmur (which is alone in dispute) is determined by the onward flow of blood from the auricle to the ventricle are mainly as follows:—1. It accords with the physiological fact that the contraction of the auricle, to which it is attributed, immediately precedes, and runs on into, the ventricular systole, the very commencement of which is timed by the first sound of the heart, in which the presystolic murmur itself ends. 2. The murmur precedes the arterial pulse, ends with the apex beat, and occupies a time, therefore, in the cardiac cycle, which would otherwise be a time of silence, and a time which we have always been taught to regard as the close of the cardiac diastole. 3. The presystolic murmur does not differ in quality from the diastolic mitral murmurs of earlier period. It is true that the latter are for the most part feebler, but though feeble they are generally characteristically rough, and not very unfrequently they present a degree of roughness which equals or surpasses that of the presystolic murmur itself. 4. All the different kinds of mitral obstructive murmurs are equally characterised by consonantal noisiness, and consonantal want of penetrating power, and thus are always audible over a curiously restricted area. 5. They are not conveyed into the axilla or to the angle of the scapula as systolic mitral murmurs are conducted, and as they would certainly also be conducted were they due to regurgitation.

Among the arguments which are adduced on the opposite side of the question are the following:—1. The force with which the blood is driven into the ventricle by the contractions of the thin-walled auricle is insufficient to cause the roughness and loudness of sound distinctive of the murmur in question. In answer to this, it would seem sufficient to

to say that equally loud and rough murmurs may be developed during the earlier part of the diastolic period, when the force of the blood current is chiefly dependent on the suction exercised by the expanding ventricle. But it is a mistake to suppose that the loudness and roughness of the presystolic murmur need much velocity of current for their production. The murmur, as I have before stated, is like a trilled "R," and is made up of coarse vibrations, which follow one another far too slowly to cause a musical note. There is no such forcible escape of air in the production of the trilled "R," as there is in whistling or simply blowing. Rather, the breath escapes in volume, but slowly, past the vibrating barrier. I do not argue that the slower the current the louder should be the characteristic murmur; but I hold that moderate rapidity is best adapted for its production, and that greater rapidity would probably convert the trill either into a musical note or into a noiseless whiff. 2. The running of the presystolic murmur into the systolic mitral murmur (when the two sounds coexist), without any discernible interval between them excepting that due to the presence of the first sound (which, in fact, unites them), is held to prove that the two murmurs must be due to a single action, and consequently to the contraction of the ventricle alone. It is argued that if the former of the two sounds is produced by the contraction of the auricle and during the flow of blood from the auricle into the ventricle, and the second is (as everyone acknowledges it is) caused by the contraction of the ventricle and the reversal of the blood current through the insufficiently protected mitral orifice, there must of necessity be a momentary interval of silence between the end of the presystolic murmur and the first sound of the heart, from which the later murmur starts; just as there is an interval of silence between each pair of respiratory acts, and a momentary pause between the end of a swing of the pendulum and the beginning of the one following, or (to take an even more apposite example), as there certainly is, between the successive elements of a to-and-fro aortic murmur. Such illustrations are valuable as helping to make clear the point of view of those who quote them; but they are of little value in determining the question at issue, unless it can be shown that their conditions are identical with, or analogous to, the conditions of the problems to be solved. I do not think that such is the case here. As I understand the action of the heart, and I believe it is the view which is generally taught by physiologists, the contractions of the auricle and ventricle are not so much an alternate contraction of these two cavities, as they are a rapid peristaltic movement beginning in the auricle and continued without pause into the contraction of the ventricle. If that be the case, even though there be a real reversal of the current between the auricle and ventricle at the moment when, on the cessation of the auricular systole, the ventricle begins to contract, no pause between the two actions is necessitated, and none need be assumed. Even if there were a pause, it might be so short that the ear would be unable to detect it. There is no audible break, so far as I know, in a prolonged, presumably continuous, note on the violin made by a competent player with a to-and-fro sweep of his bow. Nor is it difficult, I think, to utter with the lips a continuous noise determined by alternate inspirations and expirations. No doubt the inspiratory and expiratory sounds must differ from one another in quality; but that does not imply discontinuity in time. 3. It is argued that the presystolic murmur is produced in a period corresponding to what in the healthily acting heart might be termed the early silent stage of the ventricular contraction, or a brief period of contraction immediately preceding the closure of the mitral valves; that, owing to the leisurely closure of the thick and clumsy curtains when mitral obstructive disease is present, this period becomes prolonged, and that while it lasts the blood in regurgitating is a continually diminishing stream until the actual closure is effected with the snap of the first sound. I must confess that this explanation, ingenious as I admit it to be, seems to me altogether gratuitous. I am not aware that there is any sufficient anatomical or physiological basis for any such hypothesis; and it seems to me, as I have already incidentally tried to show, contradicted by the other clinical facts which are associated with the presystolic murmur. If the length of this murmur at the apex be a measure of the time during which the ventricle is contracting upon its contents before the advent of the first sound, there ought (when obstructive aortic disease is associated with obstructive mitral disease)

to be also a presystolic aortic murmur. Is any such murmur ever heard? Again, if during all this period the blood is flowing backwards into the auricle, it must also be flowing simultaneously onwards into the arteries, and the radial and carotid pulses (or, at any rate, their commencements) should be coincident with the beginning of the presystolic murmur. But the pulse in these cases, as in all others, is simultaneous with the apex beat and the first sound of the heart. Again, how are those cases to be explained in which, as in that of my patient, the whole interval between the second and first sound is occupied by a continuous roar? Must we assume that the whole of this period, as well as the period of silence, is occupied with the ventricular systole, leaving no room whatever for the diastole? Or must we assume that the cardiac incidents become so much disarranged that the first sound, instead of ushering in the ventricular systole (as it should do), ends it, and that the deposed ventricular diastole has to fit itself to the interval between the first and second sound? I know how these questions might be answered by those who accept Dr. Barclay's views; but the obvious answer involves an admission which is practically destructive of them.

Before concluding my paper, I should like to say a word or two with regard to a murmur, or group of murmurs, which has in many respects a striking resemblance to the group of obstructive mitral murmurs. I mean the murmurs often termed hæmic, which are generally best heard about the sternal end of the cartilage of the left third rib, and which may extend into the contiguous portions of the second and third interspaces, and even be prolonged a little way down the left half of the sternum. The murmurs in question are harsh and rough, not like a trilled "R," but sharper and more scratchy (as I believe the late Dr. Sibson described them). They are so rough in quality, and their roughnesses are so distinct, that they are undoubtedly suggestive of pericardial friction, and are not unfrequently, I believe, assumed to be due to the presence of recent or old pericardial lymph beneath the area over which they are heard. It would be difficult for a tyro not to believe that they are due to organic diseases within or outside the pulmonary artery or conus arteriosus. Their main peculiarity, apart from roughness, is that they tend to occupy the whole of the systolic period. (Fig. H.) In some instances the murmur runs off from the first sound, and dies away, like a systolic aortic murmur does, during the systolic period; in some it occurs mainly, if not alone, during the latter part of the systolic period, and, gathering force in its progress, runs into the second sound, which is usually markedly accentuated; while in some, again (and one of the patients whom I have brought with me exemplifies the fact), the murmur occupies the whole of the systole, running off from the first sound, becoming comparatively feeble in the mid-systolic period, and increasing again in volume as it approaches the second sound. Whether such a murmur is ever due to disease of the pulmonic valve or pulmonary artery I cannot say. But I am quite sure, and have proved it to myself by post-mortem examination and by clinical observation, that in the great majority of cases it occurs in connexion with structurally healthy right ventricles, pulmonary arteries, and pulmonic valves, and that the murmur is therefore a so-called functional murmur. How it is caused I do not pretend to decide. That (although it largely occurs in anæmic persons) it is directly due to altered quality of the blood I do not in the least believe. I should think it is connected with some want of due relation between the quantity of blood expelled from the ventricle in a given time and the size or tension of the pulmonary artery, allowing of the development of coarse vibrations of the contents and walls of that part of the circulatory apparatus over which it is best heard. So far as I can see, the occurrence of prediastolic pulmonic murmurs in cases in which the parts concerned are structurally healthy favours the general belief that presystolic murmurs (which so much resemble them) are direct murmurs arising during the onward flow of blood. I see by THE LANCET of last Saturday that Dr. Charlewood Turner, on the assumption that such pulmonic murmurs are due to organic disease of the pulmonic valves, attributes them to regurgitation occurring at the pulmonic orifice prior to the complete closure of the pulmonic valves and the occurrence of the second sound; and quotes this supposed fact as an additional argument in favour of Dr. Barclay and his disciples' views as to the causation of the mitral presystolic murmur.

A REPORT OF CASES (SURGICAL AND MEDICAL).

By J. HARRIS JONES, L.R.C.P. EDIN., L.F.P.S. GLASG.

(Concluded from page 910.)

Pyo-nephrosis; nephrotomy; cure. — Mrs. W—, aged forty-four years, was seen by me on the 11th of December last. Her health had been very indifferent for years. She complained of severe pain in the right lumbar region, which was generally accompanied by considerable uneasiness in the neck of the bladder. Micturition was frequent and painful, and for the last eighteen months she had been constantly passing "matter" with her urine. About ten years ago, after an unusual exertion, she observed blood in the urine on one occasion. She dates her present illness from that period. A year ago last September she felt a "lump" in her side, which slowly increased in size, and gradually approached towards the middle line of the abdomen. Early last summer she voided a very large amount of pus per urethram, and she thinks that some also escaped from the bowels. This had the effect of considerably diminishing the size of the tumour. Soon after, however, it grew to its former dimensions, and had remained at about its present size for the last six months. She had been under the care of several physicians, and had taken a great deal of medicine. Her disease had been variously diagnosed and treated. When I saw her she had been confined to her bed for about three months. Her complexion was very sallow, and she was greatly emaciated. Upon examination, I discovered a tumour stretching diagonally across the abdomen, commencing on the right side from beneath the floating ribs, and extending to a point two inches below the umbilicus and a little beyond the linea alba. It was deep-seated. When pressed upon, it gave an indistinct sensation of elasticity, but no fluctuation could be detected in it. There was no fulness in the right loin. The ascending colon was recognised by its resonance lying in front of the growth, but instead of following its usual upward course it had been pushed forward by the tumour to within a few inches of the middle line of the abdomen. The urine contained a large amount of pus, and was consequently albuminous. Under the microscope the slide was seen studded with pus corpuscles. The patient and her friends, having been told by previous medical attendants that surgical interference would be of no avail in this case, were much opposed to an operation, but after much persuasion on my part they reluctantly consented to an aspiration, and if the sac refilled they would permit me to cut down upon the abscess. On Dec. 27th, with the assistance of Dr. G. W. Guthrie (who a few days previously had seen the case with me), I inserted a needle at a point a little in front of the anterior extremity of the last rib, and aspirated about six ounces of very thick and foul-smelling pus. The operation gave some relief, and for a few days afterwards the urine was freer of pus and had increased in quantity. It was but a short time, however, before the sac refilled and all the old symptoms returned. On Jan. 4th it was noted that she was rapidly sinking, and that life could exist but a few days longer. Consent was given to perform nephrotomy the following morning. On the 5th the patient appeared to be weaker, and it was feared she might die under the operation. Having secured the assistance of Drs. Guthrie and Long, we decided to operate in spite of all odds.

Operation.—The patient took the ether very badly, and it was with much difficulty that the heart was kept beating until the operation was completed. She was turned on her side and the incision was made a little further from the spine than is generally recommended. It was deemed perfectly safe to do so, as the colon and peritoneum had been lifted several inches forward by the tumour, and I felt that by making it here I should likely strike the edge of the kidney and enter the sac at once. The different layers of muscles were divided upon a director to the extent of two and a half inches. A layer of adipose tissue bulged into the spinal end of the wound, and, after clearing it away, the edge of the kidney and sac was reached. A probe was inserted into it, and pus escaped. The opening was enlarged to the extent of the superficial wound, and the finger intro-