tudes and phthisis. In the populous towns on the Bolivian plateau, and elsewhere in the Andes, phthisis is practically unknown, although the ordinary exciting causes, such as industrial occupation, sedentary habits, and the like, are the same as at lower levels. It is significant that Professor Hirsch, in treating of this matter (*Geographical and Historical Pathology*, iii, p. 211, English translation), seems to say that the immunity is due to an almost universal or ubiquitous tendency being counteracted. Although Dr. Hirsch accepts Paul Bert's hæmoglobin theory for the *mal des montagnes*, and the acclimatisation thereto (vol. ii, 505), he does not go beyond a mechanical explanation for the mountain-cure in phthisis. Living in a rarefied atmosphere, he thinks, will lead to a sort of pulmonary gymnastics; one must inspire deeper or oftener to cover the requirements for oxygen; and that will lead to a more vigorous development of the breathing organs, and a greater power of resistance on their part to noxious influences from without (*op. cit.*, iii, 212). But it may be questioned whether any such vigorous development of the organs, or more active exercise of their mechanism, does, as a matter of fact, show itself very decidedly in the residents at great altitudes in South America or elsewhere. The only evidence that I know of is the rather vague statement of Archibald Smith for Peru: "In the Indian of the plateaux, the lungs are capacious, bearing a due relation to the tenuity of the air which he inspires" (*Edinburgh Medical and Surgical Journal*, 1842, p. 356).

It may be useful, therefore, to try how a physiological adaptation will work, rather than a mechanical.

The pathological view of the tuberculous diathesis, to which I referred at the beginning, is based upon a certain interpretation of the structural facts of the disease. Although the condition is not one of anæmia in the ordinary sense of the term, yet it may be said to have deficient power of tissue-vascularisation as its most conspicuous feature. According to my reading of the facts, suggested by analogous normal processes in the placenta, of which I gave an account some time ago (*Journal of Anatomy and Physiology*, January, 1879), the caseous decay, the giant cells, and the other pathognomonic characters of tubercle, are explained as being due to growth, renewal, or overgrowth of tissue in circumstances where the power of vascularity is inadequate. I should be going too far afield for my present purpose if I were to discuss the interesting question of how the human body has acquired, or continues to acquire, that peculiar morbid type of tissue-formation, namely a growth redundant or excessive, without being properly vascularised. But whatever view we take of the remote antecedents of the tubercular diathesis and infection, most persons will admit that overgrowth without vascularity—or, perhaps, overgrowth because of non-vascularity—is characteristic of tubercular tissue.

If we go beyond tubercular tissue actually formed, and speak of the tubercular diathesis, inherited or acquired, which favours the local formation of it, we should say that the diathesis meant feeble vascularisation, just as we might speak of a person's innervation being constitutionally feeble.

But the power of vessel-making is at bottom bound up with the power of blood-making. Whatever helps the one will help the other. It is thus conceivable that a general stimulus to the greater production of hæmoglobin in the blood, such as a rarefied atmosphere brings, would directly meet that ingrained or constitutional defect which we know as the tubercular diathesis, assuming, of course, that the individual has any power of adaptation left. That is a somewhat vague position in which to leave this curative effect of altitudes; but it would clearly be hazardous to trace a more particular relation between increased capacity for oxygen in the blood, and that increased power of vascularisation in a redundant tissue, which we have good reason for identifying as the means of cure, or the way to safe repair or obsolescence, in cases where the tuberculous diathesis has actually come to expression. In cases where there is merely the tendency or the constitutional taint, inherited or acquired, the same sort of explanation would serve for the preventive benefits of mountain air. The more complete the adaptation of the blood to the rarefied atmosphere, the more permanently would the tubercular diathesis be held in check. The more naturally or imperceptibly the increased capacity for oxygen (greater richness in hæmoglobin) is called forth by the general environment of the patient, the more fundamentally will the disease be counteracted.

SUCCESSFUL VACCINATION.—Mr. F. W. Lewis, Surgeon and Public Vaccinator for the No. 1 District of the Llandoverly Union, has received the government grant for successful vaccination. This is the second time in succession that Mr. Lewis has received the grant.

THE POSITION AND THE VALUE OF THE OPERATION OF INTERNAL URETHROTOMY.¹

By G. BUCKSTON BROWNE, M.R.C.S.

FROM the earliest times strictures in the anterior portion of the male urethra, when proving tough and undilatable, have been subjected to treatment by the knife or by trocar or cannula, but the real history of the operation of internal urethrotomy is comprised within the last sixty years. Modifications of the trocar and cannula were devised earlier, but it was not until 1827 that Mr. Stafford, of London, brought forward his urethrotomes, which, to me, appear to be the prototypes of all subsequent instruments. In France and in England, during the next few years, various instruments were invented, but all appear to have been used with fear and trembling; small incisions were made to aid the introduction of gradually larger bougies, and the operation of internal urethrotomy was more the handmaiden of interrupted dilatation than an independent operation, and, as a natural consequence, it languished. In 1851, Professor Syme, of Edinburgh, gave a great impetus to the surgery of stricture. He taught earnestly that to ensure a good result from an incision into a stricture, the stricture must be freely divided, and this be accomplished by external urethrotomy upon a grooved staff. Coming after Syme, Sir Henry Thompson fully accepted his teaching, but not his practice, which he thought unnecessarily severe. He soon satisfied himself that a stricture could be thoroughly divided from the inside with greater ease and less risk to the patient than from the outside, and he has unquestionably, during the last twenty years, established internal urethrotomy upon a scientific and surgical foundation.

During the last twelve years, I have had unusual facilities for ascertaining the opinion of surgeons from all parts of the world on the subject of internal urethrotomy; and I have found that there are still some who never practise the operation, and others who view it with suspicion and distrust. I think this opinion arises from two causes: (1) the possibility of very serious consequences after internal urethrotomy in unpractised hands; (2) the indiscriminate employment of the operation by many of its advocates, and their neglect of trial of simpler and safer methods of stricture-treatment.

Now, with your kind permission to-night, I wish to show that, while in the treatment of stricture internal urethrotomy should be the exception and not the rule, still there are certain cases where it is unquestionably the only remedy, that it affords us really brilliant results in otherwise miserable and, perhaps, hopeless cases of disease, and that, with certain precautions, it may be made as safe as almost any operation in surgery.

In the first place, I would briefly state what I mean by the treatment of urethral stricture by internal urethrotomy. I mean the free division—no scarifications, no nicks, no multiple incisions—but one bold free stroke of the knife through all the fibres of the stricture in the floor of the urethra, since almost invariably the induration is most marked there. I maintain that this can only be done by an instrument which becomes practically a long knife in the operator's hand, and which is entirely under the control of that hand, subject to no mechanical restrictions whatever, and cutting, much or little, when and where, just as the surgeon's tactile sense informs him is necessary. When making an accurate incision into any part immediately under the eye, or, for instance, in carving wood, we instinctively cut towards ourselves, or else from left to right, the hand thus being most appreciative; so in cutting a stricture I prefer to cut from behind forwards, or from left to right, and the instrument which permits of this, and at the same time is simply a knife and nothing more, is the urethrotome usually credited to Civiale, and always recommended and used by Sir Henry Thompson. The blade is protruded beyond the stricture, and then drawn forwards, the stricture divided, the blade then sheathed, and the instrument withdrawn. All kinds of mechanisms have been devised whereby a knife sliding in a groove is driven through the fibres of a stricture, but I can as readily conceive the tendo Achillis being properly divided by a similar mechanism, as I can a urethral stricture. Imagine something being put under the tendo Achillis, and distended until the tendon is tightly stretched, and then a knife running in a groove on this machine, passed under the tendon; would any practical surgeon expect the tendon to be properly divided? If all tendons were mathematic-

¹ Read before the Harveian Society.

ally of the same thickness and toughness, no doubt a blade could be devised that would divide them in this manner, but it is precisely because all tendons and all strictures are not of the same dimensions and densities that I would as strongly deprecate the use of a machine for a stricture as I would for a tendon. Some machine-made articles are excellent—watches for example—but where the article has to suit the individual, and him alone, a machine-made one will not do. Suppose sets of false teeth were made to pattern—never mind how many patterns—no one would ever wear them. I do not claim for internal urethrotomy that it is capable of effecting a radical cure of stricture, although I would not deny that very occasionally it may do so, but, with practically no exception, the periodical use of a bougie is necessary after the operation.

With reference to the special dangers of an incision into the urethra, in the first place, hæmorrhage is rarely severe if the incision is only made through the dense stricture tissue. It is practically always controlled by tying in a large catheter (10-13 English) for twenty-four to thirty-six hours. I have never known a case lost from this cause, although I have certainly two or three times known the bleeding very severe. Two years ago I was called to see a case where a surgical friend had performed internal urethrotomy, and where the bleeding was severe enough to threaten life. No catheter was tied in, but Otis's perineal tourniquet had been applied, and as long as its pressure was maintained all was well, but when the patient wished to micturate, the tourniquet had to be unscrewed and blood flowed freely. I removed the tourniquet, tied in a firm English gum catheter, put on a perineal pad and applied pressure by means of braces and bandages, and in a few days all was well. Urinary fever is largely controlled by opiates, and need excite no anxiety if the patient is only in fair renal health to begin with. Extravasation of urine and abscess are prevented by extreme accuracy in the adjustment of an inlying catheter after the operation and by careful nursing. When a desire to pass water is felt, the nurse simply removes the catheter plug, and the patient is desired to make no effort to micturate, but simply to allow the urine to flow out. There is no operation after which the surgeon's presence is more constantly necessary for the first four or five days. It is always well for the patient to lodge close to the operator, so that the latter's visits may be made frequently, and the catheter kept accurately in place.

All forms and results of blood-poisoning—pyæmia, septicæmia, phlebitis, embolism and thrombosis—may follow an incision into the erectile tissue of the penis; but they are, fortunately, excessively rare, and are only mentioned that my account of the difficulties which may occur after internal urethrotomy may be complete. The most common form of blood-poisoning is inflammation of the veins of the leg; but it is rarely followed by any serious results. Sometimes the calf of one of the legs is alone affected, and this is soon recovered from with proper treatment. Abscess of the buttock, and pyæmic abscesses in various parts of the body (knee, elbow and parotid regions), and even fatal embolism of the heart have all been reported as resulting from a wound of the urethra. But if great cleanliness and care are practised in the performance of the operation, and in the surroundings of the patient, these dangers are not at all likely to occur. In connection with this subject, it should be mentioned that it is highly dangerous to incise a urethra before every trace of gonorrhæal infection has disappeared.

I now proceed to consider the cases of urethral stricture where internal urethrotomy should be performed. They are arranged in ten groups. In some the operation is absolutely indispensable, and in all it is by far the most desirable of all methods of treatment.

1. When time is an object. The patient is perhaps ordered on foreign service, or perhaps, on the eve of marriage, finds that he is the subject of stricture. These instances might easily be multiplied, where it is justifiable to run a little more risk than ordinary dilatation entails in order to get the best and most permanent result possible in the shortest space of time.

2. When the stricture is at the urethral orifice, or in the penile urethra, it will not yield permanently to either continuous or interrupted dilatation, but must be divided.

3. In cases of stricture where the gentlest instrumental interference is followed by rigor and great prostration. If the fibres of the stricture are freely divided, the use of a bougie will cease to be followed by rigor. If, after internal urethrotomy, the use of a bougie is still followed by rigor, it will be because the operation has been incomplete, and it must be repeated more thoroughly. Men are often met with from malarious countries who continue to have aguish attacks when resident again at home. I have not infrequently found this fever to be associated with urethral stricture, and have found that the attacks disappear altogether when the stricture is divided.

4. Internal urethrotomy is required when a stricture rapidly re-contracts after dilatation. Such strictures are called resilient.

5. Also, when the deposit round a stricture is obviously large and dense, dilatation is useless, and the stricture must be cut, and sometimes requires more than one cutting operation before a satisfactory result is obtained.

6. When renal or other calculus is impacted behind a stricture, the stricture had better be divided internally, and, if possible, the calculus extracted *per vias naturales*; should this prove impossible, the calculus may be cut down upon, and the division of the stricture and subsequent treatment will prevent the opening made becoming fistulous.

7. No urethral fistula will ever heal as long as the urethra is contracted in front of the fistulous urethral orifice. Divide the stricture, and keep it open by periodical instrumentation, and usually the fistula will close.

8. As age advances, it is not unusual, although the contrary has been stated, for a stricture patient's troubles to be complicated by prostatic hypertrophy, making it necessary for him to pass a part, or the whole, of his urine by catheter. To do so he must have a patent and easy urethra; and as stricture tissue tends to tighten up in elderly people, many of these patients find increasing difficulty in passing a catheter of reasonable size. Here internal urethrotomy comes to our aid, for the stricture is too hard and inelastic to yield to dilatation. I saw lately a gentleman, aged 73, who was obliged to pass a No. 2 gum-catheter every hour night and day, the smallness of the catheter rendered the emptying of the bladder so slow a process, that the poor man simply lived to pass his catheter. I opened the urethra in front of the prostate from the perineum, and gave the bladder complete physiological rest for ten days by means of an indiarubber drainage-tube lying in the wound, and, at the same time, I divided the stricture internally. When the perineal opening was allowed to heal up, the patient returned to the use of the catheter, but he was able to use a No. 9 easily, and was only obliged to use it six times in the day instead of twenty-four times. I have frequently performed internal urethrotomy between 65 and 75 years of age, and always with good result.

9. I have stated elsewhere (*Lancet*, November 10th, 1883) that when about to perform lithotomy through a strictured urethra, I prefer to dilate with steel bougies rapidly, when the patient is under the influence of ether, since an internal urethrotomy wound is likely to become torn and bruised by the lithotrites and tubes, and to become filled with calculous debris. But there are cases of stone in the bladder where internal urethrotomy is an incalculable boon to the surgeon. Nearly three years ago a gentleman, aged 65, who for years had suffered from stricture, consulted me in a pitiable plight. Twelve months before he saw me, he had had extravasation of urine, and perineal section had been performed. The wound never healed; he had made no water by the penis for six months; all was by fistula; some over the pubes, some in the scrotum, and not only this, but he was obliged to micturate every one to two hours, and each act was accompanied by agonising pains. I suspected vesical calculus, but was puzzled how to make my diagnosis, as no instrument could be passed into the bladder. However, I put the patient under ether, and then managed to pass my finest silver catheter into the bladder; withdrawing it, I then succeeded in passing Nos. 1, 2, 3, 4 and 5, and then my urethrotome, with which I divided the stricture. The bladder could now easily be sounded, and it was found apparently filled with calculus. Owing to the internal urethrotomy, a lithotomy staff could easily be passed, and I then and there performed perineal lithotomy, removing a phosphatic calculus of more than one ounce in weight when dry. He made a good recovery, and all the fistulae healed. We can easily imagine the state of this man's bladder; no wonder that, in some fourteen months, a phosphatic concretion required removal; this was done by lithotomy, owing to the excellent condition of the urethra. The patient is now alive and well, and, thanks to internal urethrotomy, is a comfortable member of our society.

10. I now conclude my instances of the value of internal urethrotomy by drawing your attention to its application in the treatment of perineal abscess when urethral stricture co-exists. I am not aware that attention has before been drawn to this point, which is one of great practical importance. A patient afflicted with a tight stricture, sometimes without definite cause, but usually after excessive or rough instrumentation, finds himself very unwell. His perineum is hard, tender, and throbbing, and he may or may not have a rigor. We all know that a perineal abscess is in process of formation. All surgeons open such an abscess at once, giving vent usually to a large quantity of matter; in a few days urine is passed by the wound, and,

unless the stricture is attended to, a permanent urethral fistula remains; usually the stricture is leisurely attended to by dilatation, and even then the fistula is often obstinate, and a source of annoyance to the patient perhaps for years. Some surgeons are more heroic (for example, the late Dr. Van Buren, of New York); they open the abscess, and then divide the stricture from the outside upon a grooved staff, thus performing a Syme's operation, and remedying the abscess and the stricture at the same time. The result is generally satisfactory, but all will allow that such an operation is a very serious tax upon a patient's powers, and that he must remain a patient, and far from comfortable, for some four, five, or six weeks. Such an abscess as just described is not an extravasation abscess; at first it does not communicate with the urethra, although it does so in a few days; it forms in the perineum outside the urethra, as Sir Henry Thompson has pointed out, just as an abscess may form by the side of the rectum without opening into it. A real extravasation abscess is not so very common; it begins by minute extravasation behind the stricture, but the formation is tedious, and is preceded by a slow-growing cord-like process, which is unmistakable to the touch of the practical surgeon. Now my point is this—and I have lately verified it in three cases—if the surgeon is prompt in dividing the urethral stricture, a true perineal abscess never will communicate with the urethra, and the patient will be saved all the trouble of a urinary fistula. I freely divide the stricture from inside the urethra, pass a 15 or 16 (Eng.) steel sound, and tie into the bladder a No. 12 gum catheter *per penem*. I then put the patient into the lateral lithotomy position, and, with my left forefinger in the bowel, I introduce a sharp narrow knife into the perineum, half an inch above the anus. I go straight in until pus issues, and then withdraw, and in withdrawing divide the skin upwards a little, so that the finger can follow the knife; the finger dilates the opening, and finds a large cavity full of pus, with the urethra filled by the catheter lying above, almost, as it were, dissected away from the surrounding tissues. As a rule this one opening will suffice to drain the abscess, but I have had to make a more dependent opening in the buttock. The catheter should remain in about three days. I have operated in this way upon three cases—one in my own practice, a second seen with Dr. Bayfield, of Wandsworth, and a third with Dr. Herschell, of London; the patients were up and about in less than a fortnight, and no urine was ever seen by the perineal opening. In fact the ease and quickness of the recoveries from severe and distressing symptoms were remarkable.

Gentlemen, there may be none here to-night who have any feeling against the operation of internal urethrotomy, but, as I have said, I know that there are surgeons of great repute who have not accorded to this operation the position it is entitled to. I trust that they will accept this paper as a modest effort to show that there are conditions of urethral disorder where internal urethrotomy is absolutely indispensable, that there are other cases in no other way so remediable, and that with proper precautions the operation is not a dangerous one.

NOTE ON THE PATHOLOGY OF CHRONIC INFLAMMATORY DISEASE OF THE UTERINE APPENDAGES, AS ILLUSTRATED BY THE PREPARATIONS OF SIXTY-THREE CASES REMOVED DURING THE YEAR 1886.¹

By LAWSON TAIT, F.R.C.S., M.D., ETC.,
Surgeon to the Birmingham and Midland Hospital for Women.

PREVIOUS to the author's first publication to the Pathological Society on December 6th, 1881, the conditions resulting from chronic inflammatory disease of the uterine appendages had been recognised as far back as the time of Ruysch, but their frequency and their serious character did not attract much attention until within the last ten years. The question of the frequency of these diseases had attracted a good deal of attention of late, but no definite answer upon this point could be given, because no method was known of arriving at a correct statement of either their absolute or relative frequency; but that these diseases were far more common than could have been imagined was seen by the fact that during the year 1886 the author had operated upon sixty-three patients, with the result of only one death in the series. The preparations from these cases he submitted for the inspection of the Society with the exception of five, four of which had been taken possession of by

the gentlemen whose cases they were or who had been present at the operations, and desired to have the preparations for the purposes of clinical instruction, and one which had been lost, but which fortunately had been previously reported upon to the Gynaecological Society by Mr. Bland Sutton.

Many of the patients had come to the author from long distances, and all of them had been suffering for years. The etiology of the conditions of the cases now described completely confirmed what the author had said in previous communications. There were four lines on which the causation of these diseases rested: first, that which may be called simply catarrhal; second, that which can be traced clearly to the influence of exanthematic disease occurring at the period of puberty; third, gonorrhoeal infection; fourth, the occurrence of inflammatory mischief in the pelvis in the post-puerperal condition, that is, either after a miscarriage or a full-term labour.

To these the author was now disposed to add a fifth, the relations of which still remain to be worked out, but the indications of which were far too clear for him to remain longer silent upon the subject. He expressed himself as having a growing experience for the formation of a distinct group of cases, in which the only explanation available of the occurrence of chronic inflammatory trouble in the uterine appendages was in the existence of an infantile condition of the uterus due to arrested development. In such cases the uterus was generally retroverted, completely fixed, and the enlarged appendages could be found on either side of it; the characters of the uterus itself were always infantile, whilst the appendages were completely disorganised by inflammatory change.

The preponderating influence of the third and fourth causes was at once indicated by the fact that out of the sixty-three cases there were only ten unmarried women. Of these ten single women, there could be no doubt that in at least three of the instances the origin was gonorrhoeal. In two of the single women there had been pregnancies, and these were, in all probability, the source of the diseased appendages. In one case, prolonged efforts had been made to cure ante-flexion by means of intra-uterine pessaries, and this doubtless resulted in the double pyosalpinx from which the patient suffered. In the four remaining single women, no conclusions as to the causes of the disease could be arrived at, though the author was inclined to regard the condition in two as probably due to scarlet fever.

In the fifty-three women who were married the average age was a little over thirty-three years; of these, twenty-three had never been pregnant, and they had been married on the average ten years. Of the remaining thirty cases sixteen had been pregnant once, the pregnancy occurring immediately after marriage, and being associated in every instance with the history of subsequent pelvic trouble, and then there was no pregnancy afterwards. The average interval in these cases between the pregnancy and the time of the operation was eleven years. Only fourteen of the patients had more than one child, and between the last pregnancy and the time of the operation was an average period of six years.

These facts were enough of themselves to show how completely sterility was produced by chronic inflammatory disease of the uterine appendages. In every one of these women the condition of the appendages was such that the patients could not by any possibility have become pregnant. In a very few of the specimens this was not quite clear now, because the tubes, in being torn from their adventitious beds, had their fimbriated extremities relieved from the field of adhesion by which their occlusion was completed. But the great bulk of the specimens still proved the completely sterilised condition of the patients, and this feature had a great pathological interest. In by far the greater majority of the specimens the occlusion had taken place by the trumpet getting glued on to the ovary. The frequency of this occurrence substantiated, to some extent at least, the tradition that the infundibulum got fastened on to the ovary temporarily at some time or other in connection with the process of ovulation. Formerly the author thought he should be able to prove that this relation did actually occur, but he had never been able to make himself certain of it.

In some cases the trumpet was found to have closed its tentacles like a polyp, and to have had them coalesced in that position, leaving the ovary free. In the group of twenty-three women who had been married for an average period of ten years and had never been pregnant, there could be no doubt, from the clinical histories of nearly a third of them, that the disease arose from old latent gonorrhoeas or gleet in their husbands, excited into activity by the indulgence of early married life. In rather more than a third the author believed the disease originated in the exanthematic diseases of girlhood, more especially scarlet fever, and in the others no clue to causation could be obtained.

¹ Read at the Pathological Society, April 5th, 1887.