in uric acid, with a slight augmentation of the alloxur bases relative to the acid. Under guaiacum, on the other hand, while the urea fell somewhat, the uric acid was markedly increased; but neither the phosphorus pentoxide nor the bases showed a corresponding increase, thereby denoting that this drug probably acts not by increasing the production of uric acid, but by eliminating a part of that stored in the blood. The bearing of this fact on the treatment of chronic gout will be appreciated. It is also noticeable that the increased excretion of uric acid was maintained for some time after cessation of the drug, the patient's condition being at the same time ameliorated. It is satisfactory to note that the experimental evidence adduced confirms the opinion, based on empirical knowledge, expressed by Sir Alfred Garrod that guaiacum was a powerful prophylactic agent in gout, this opinion being subsequently corroborated by Dr. Luff.

The raised excretion of uric acid with potassium iodide is probably attributable to the maintained effect of guaiacum. The value of potassium iodide in chronic gout is founded rather on its apparent power of retarding cardio-vascular and renal changes, and reducing albumen in the urine. Under colchicum a slight advance in the uric acid occurred. That it has an invariable effect on the excretion of uric acid is extremely doubtful. The result with quinine on the excretion of uric acid is contrary to the diminution usually observed. This again may be accounted for by the continued improvement in the patient's condition.

The results obtained with the experimental diets are not in agreement with the generally accepted view upon which the dietetic treatment of gout is frequently based. There is matter for reflection in the fact that a diet consisting largely of leguminous principles should so markedly increase the uric acid, the phosphorus pentoxide, and alloxur bases.

On the second day after tea was added to the animal diet the patient developed a temperature due to a chill which terminated the observations, so that no reliable inferences can be drawn from the record with regard to the influence of tea upon the urinary constituents estimated.

THE GELATINOUS FORM OF SODIUM BIURATE AND ITS BEARING ON THE TREATMENT OF GOUT.*

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I do not propose in this paper to touch upon the debatable questions of the seat or seats of formation of uric acid, or of the compounds from which that body may be derived. I believe, however, that it is a practically indisputable fact that the deposition of a salt of uric acid—namely, sodium biurate—is intimately related to the gouty attack, and I propose to briefly bring forward to-night the results of some experiments which I think throw some light on the therapeutics of gout.

I strongly share the view of the late Sir William Roberts that uric acid, when first introduced into the blood, exists solely therein as the sodium quadriurate. This substance is, in the dissolved state, a very unstable body, and soon changes into the sodium biurate, which first assumes the gelatinous and soluble form. This gelatinous modification, if not eliminated in the urine, is converted either slowly or rapidly, according to various conditions, into the crystalline and almost insoluble variety, which is then precipitated, and, by its deposition in various structures, causes the gouty paroxysm. It is obvious that if by any means the conversion of the soluble gelatinous biurate into the insoluble crystalline form can be delayed, then the advent of the gouty paroxysm is also delayed, and if, during this period of delay, the elimination of the soluble gelatinous biurate is promoted, then the gouty paroxysm may either be considerably diminished in severity or may even be averted altogether.

I have for some time been studying the physical and chemical properties of this gelatinous form of the biurate, and especially the effects exerted by certain drugs on its conversion into the crystalline form. The drugs the influence

of which on the gelatinous biurate I have experimentally investigated are sodium bicarbonate, sodium phosphate, potassium bicarbonate, potassium citrate, lithium carbonate, lithium citrate, piperazine, and lysidine. In a paper which I communicated to the last meeting of the British Medical Association,¹ I showed that by increasing the alkalinity of blood serum with sodium bicarbonate the conversion of the gelatinous biurate into the crystalline form is accelerated in time and increased in quantity, whereas when the alkalinity of the serum is increased by the addition of potassium bicarbonate the conversion of the gelatinous biurate into the crystalline form is delayed as regards time, and is considerably diminished as regards quantity. I have now carried out a similar series of experiments with the other drugs previously mentioned.

Briefly stated, the results show: (1) That sodium salts considerably accelerate the conversion of the gelatinous biurate into the crystalline variety, and that their employment in the treatment of gout is apparently not desirable; (2) that potassium salts delay the conversion of the gelatinous biurate into the crystalline form, and also that when the conversion is once started it is slowed by the presence of these salts; (3) that lithium salts, although they do not delay the initial conversion of the gelatinous biurate, yet when the conversion is once started it is slowed by the presence of these salts, and especially by the lithium carbonate; (4) that piperazine does not delay the initial conversion of the gelatinous biurate, and but slightly slows the conversion when once started; and (5) that lysidine, although it delays the conversion of the gelatinous biurate into the crystalline form, yet when the conversion is once started it has practically no effect in slowing it. From the results of these experiments it appears that for the special purpose referred to in the treatment of gout the potassium salts are the most useful, that the lithium salts rank next, and that piperazine and lysidine are not nearly so useful. I may mention that these results are entirely in accord with my clinical experience.

I do not for one moment contend that the beneficial action of the salts of the alkali metals in the treatment of gout is to be solely gauged either by their solvent action on deposits of sodium biurate, or by their inhibitory action on the conversion of the gelatinous biurate into the crystalline form. Undoubtedly many of them are extremely useful in the gouty state by their stimulating effect upon metabolism, by their remedial action upon the gastric and hepatic functions, by their diuretic action, and by their diminishing the acidity of the urine. I should like to remark here that the purport of a paper published by me in the *Lancet* of June 11th, 1898, has been somewhat misunderstood. In that paper I showed by experimental evidence that potassium, sodium, and lithium salts, and piperazine and lysidine exercised no appreciable solvent action on gouty deposits. I did not, however, question—still less deny—the utility of many of these drugs in the therapeutics of gout, for I am constantly employing many of them in the treatment of various phases of that disease; but I wished to point out that the oft-repeated statement that most of these drugs are useful for their great solvent action on gouty deposits is a loose and erroneous statement which it would be wiser in future to avoid.

Another important point demonstrated by these experiments is that the higher the alkalinity of the blood from the presence of sodium bicarbonate, the more rapid and the more complete is the conversion of the soluble gelatinous biurate into the comparatively insoluble and crystalline form. This point is of great interest, since I believe that the alkalinity of the blood of gouty patients is always higher than the normal alkalinity of blood. I know that this view is opposed to the prevailing view that gout is associated with what is called an "acid dyscrasia"—whatever that may mean—and that consequently the alkalinity of the blood of gouty subjects is below the normal. This view, however, so far as I can ascertain, is a pure assumption, and has apparently never been based upon any actual determinations of the alkalinity of the blood of gouty individuals. It received its first shock five years ago, when Klemperer showed by actual determinations of the blood of gouty subjects that the alkalinity was not below that of healthy blood. I have since made a number of determinations of the alkalinity of the blood of healthy and gouty individuals, with the result that I have so far found in

* Read before the Medical Society of London.

every gouty patient whose blood I have examined that the alkalinity is higher than the average alkalinity of the blood of healthy persons. The results that I have up to the present obtained show that, whereas the alkalinity of the blood of healthy adults varies from 0.161 to 0.185 per cent. of sodium carbonate, with an average of 0.167 per cent., the alkalinity of the blood of gouty patients varies from 0.193 to 0.251 per cent., with an average of 0.217 per cent., which is nearly one-third higher than that of normal blood. Now since this increased alkalinity of the blood is due to a higher proportion of sodium carbonate or bicarbonate, and since these substances both accelerate the conversion of the gelatinous bitrate into the crystalline variety, and hasten the precipitation of the latter, it is intelligible why such blood is prone to hasten and to augment the formation of gouty deposits.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, vol. ii, 1899, p. 1163.

AN OPERATION PERFORMED FOR COMPLETE ATRESIA VAGINÆ.

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SOME time ago, in consultation with Dr. Venters, of this city, I saw a young married lady, aged 28, who was said to be suffering from malformation of the vagina. Her history is briefly as follows:

She had always enjoyed robust health, though she had never menstruated, nor had she ever suffered from any vicarious hæmorrhages, nor shown any indications of any periodic disturbance, such as abdominal pains, headache, or the like. No medical advice had ever been sought with regard to her amenorrhœa, and two years ago the patient married. Coitus had been found impossible, and the patient now sought relief from her distressing condition. In order to make a thorough examination of the pelvic organs chloroform was administered, when the following conditions were noted:

The patient was well developed, though rather thin; the mammae were somewhat above the average size, and the nipples were well formed. The mons veneris and labia majora were normal, the labia minora somewhat short and deficient in bulk. The clitoris and urethra were normal. Between the meatus and the anus there was a perfectly flat area of thin skin, which at its centre (that is, opposite the spot at which the vagina ought to have been) presented a somewhat pinkish and moist appearance and partook slightly of the nature of mucous membrane. There was no infundibuliform depression, however, at this situation. On rectal examination the urethra could be felt very distinctly under the finger, but there was no trace whatever of a vagina. By the bimanual method a small atrophic uterus, about the size of an almond, was easily felt, as were the ovaries, also much below the normal size, the left being slightly the bigger of the two and about the size of a haricot bean. The small uterus could be pushed freely about in the pelvis, and there was no distended upper vaginal segment or *cul-de-sac* present, as is often the case.

It was evident from this examination, as well as from a consideration of the menstrual history of the patient, that the uterus and ovaries were functionless, and, consequently, that any operation which could be performed would only be for purposes of cohabitation, and not of maternity.

This state of matters was explained to the patient and her husband, and they expressed a very strong desire to have the operation, done as the patient was suffering a great deal from the mental distress commonly met with in such circumstances, and had lately been losing flesh rapidly. The patient being chloroformed and put in the lithotomy position, the following operation was performed:

An H-shaped incision was first made, the uprights of which, some 3 inches in length, ran from the lower extremity of the labia minora to a little beyond the anus on each side; the horizontal limb of the H (½ inch in length) lay midway between the meatus and the anus. The flaps formed by these incisions were then reflected back to their respective bases; the loose cellular tissue in the recto-vesical space was then freely opened up with the fingers and a large vaginal opening made. In the course of this part of the operation the small uterus was distinctly felt and was pushed upwards with its peritoneal covering, the peritoneum not being opened.

A second pair of flask-shaped flaps, about 7 inches in length and 3 inches wide, were then raised by making an incision which began on each side

just below the tendon of origin of the adductor longus, passed obliquely downwards and outwards parallel to the buttock fold, and was brought back to meet the top of the upright of the H incision on each side respectively. These two large flaps were then slid to meet each other in the middle line, with in the first instance their raw surfaces laid flat against one another, and they and the two small flaps were then united along their free edges with a continuous suture of fine catgut until a body somewhat resembling a large penis, entirely covered on its outer surface with skin, projected from the middle line opposite the new vaginal opening which had been made. All that now remained to be done was to invaginate this into the opening whose walls it was designed to clothe, and by the introduction of a large plug of iodoform gauze to keep the raw surfaces of the new vaginal opening and its covering in close apposition with each other.

When the legs were brought down from the lithotomy position, it was found that the edges of the large buttock wounds fell together so accurately that a few horsehair stitches kept them in position without the least tension, and healing took place by first intention, a mere linear cicatrix being left along the line of the buttock fold.

The iodoform gauze plug was left *in situ* for ten days, and when it was removed it was found that the whole of the internal parts had entirely healed with the exception of one small spot about the size of a split pea, which soon cicatrised. In order to prevent cicatricial contraction in the new passage, a difficulty which has been found by many operators so hard to obviate, I had a dilatable indiarubber bag made, 6 inches long by 2½ inches wide, with a stem and stop-cock attached, so that being rolled up and introduced empty it could be dilated to any desired extent with air by means of a Higginson's syringe. This bag was worn for half an hour twice a day after the gauze plug was finally removed, and the patient still introduces it occasionally as a precaution against contraction. The vagina is about 5½ inches in depth, and the bag is pushed in almost its entire length.

The patient's bowels were kept confined for 10 days after the operation, and her water was drawn off thrice daily. The pain and constitutional disturbance were almost nil, and in three weeks she was allowed to get up on the sofa.

A few days ago I received a letter from her, in which she says "... I can walk quickly, and have no discomfort except after being overfatigued or sitting too long on hard seats. Marital relations are quite easy, and Mr. and I agree in pronouncing the operation an unqualified success. I am already a good deal fatter!"

Two points of interest suggested themselves with regard to the skin flaps which covered the walls of the new vagina: First, how far the skin of the buttock would take on the characters of mucous membrane similarly to what one finds in the skin of the cheek when used to fill up gaps in mucous surfaces in plastic operations about the face; and secondly, how far and how soon the nerves of the new vaginal walls would give the patient the sensation that they belonged to her vagina and not to her buttocks.

With regard to the first point, it was interesting to notice that, as usually happens under such circumstances, there was a complete desquamation of the epidermis covering the flaps in the shape of a cast, which separated about a fortnight after the operation. The skin lining after this appeared to remain somewhat redder and smoother, but sufficient time has hardly yet elapsed to judge what further change in this direction may happen.

In regard to the innervation, at first the patient had very little sensation when the vaginal skin-covering was touched with a probe, but was rather inclined to refer this slight sensation to the buttock. After four weeks she felt it as being "in front of the bowel." She now reports it as feeling as more decidedly in the position of the vagina, though sensation is still rather dull. Here, again, it will be interesting to notice any further change that may happen in the course of time.

In an interesting digest of the Recent Literature on Atresia of the Vagina, Dr. Ballantyne¹ mentions a case of atresia operated upon by Paul Walton.² Here there was evidence of a functioning uterus and ovary, and Walton accordingly opened Douglas's pouch, pulled down the cervix, opened it, and stitched it to skin flaps taken from the vulvar infundibulum. In such a case, however, as the present one such a step as opening the peritoneum was not called for; but where there are evidences of physiologically active uterus and ovaries, it would appear to be the most certain and satisfactory method.

Sneguireff's method of excising the coccyx, dividing the rectum, making a new anus in the coccygeal region, and utilising the lowest portion of the gut to make a new vagina, will probably for various reasons not commend itself to many operators.

REFERENCES.

¹ Scottish Med. and Surg. Journal, June, 1899. ² Belgique Méd. Ann. 5, 354. 1898.

THE Congress of the Italian Obstetrical and Gynæcological Society will be held in Pavia in October.