in fact proctoscopic examination is far easier without it. The position, however, is a constrained one, so that, if the examination is prolonged, it is well to give the patient a rest during the performance by allowing him to raise his head and chest for a minute or two.

In the normal rectum by this means the mucous membrane appears of a pale pink colour, and one or more crescentic folds of mucous membrane stand out prominently. These are Houston's folds, and are said to give the faecal mass, in its downward course a spiral twist, as well as to prevent its too rapid descent to the anus. They are attached from one-third to half way round the bowel, and, measured at their centre, they project into the gut from $\frac{1}{2}$ to 1 inch. Their free border is crescentic and thin. They vary somewhat in position as well as in number, but the most prominent is usually about 4 in. up on the right side. An inch below this on the opposite side is the second, often also, well developed, while the third, if present, is on the same side (the left), and 2 or 3 inches above it. The ballooning of the rectum brings these folds prominently into view, but this ballooning is limited to the rectum, and does not seem to affect the sigmoid.

On withdrawing the tube the anal portion of the canal comes into view, when the anal valves are seen separated by the columns of Morgagni more marked in some cases than in others, and varying in number from 6 to 8. These columnae recti project above the surface of the mucous membrane, and are of a paler colour. They become pointed in an upward direction, but increase in breadth towards the anal margin. The sides of adjacent columns meet and join below, forming a series of semilunar pouches, the concavities of which are directed upwards.

Ball, of Dublin, believes that a fissure is usually caused by the tearing down of one of these pouches or valves; be that as it may, a minute foreign body may lodge behind such a valve, and give rise to a small and very painful ulcer. The upper extremities of the columns of Morgagni may become hypertrophied, forming a variety of rectal polypus—the so-called polypoid growth which is generally multiple.

The pathological lesions to be seen through this instrument include all diseases involving the mucous membrane of the lower portion of the large intestine, that is, of the sigmoid flexure and rectum.

During the past four years I have been able to diagnose and to treat successfully afterwards cases of tuberculous, dysenteric, and follicular ulceration where the lesion in some of these cases has been quite beyond the reach of the finger. I have also seen 3 cases of stricture of the sigmoid, and in one case I was able to assure my patient that there was no stricture of the upper rectum or sigmoid, a condition for which bougies had been passed at stated intervals for about twenty five years.

Dr. Tuttle³ in a most interesting paper on the subject says:

The only conditions which prevent the use of the instrument are constriction of the calibre of the gut through organic disease or by pressure from without, and extreme tortuosity of the sigmoid flexure with adhesions. Volvulus, faecal impaction, or intussusception might also limit its application, but it would still be useful in diagnosing these conditions, and thus serve the very purpose for which it was designed.

In speaking of non-surgical diseases Tuttle says:

There are three types of catarrh of the rectum, sigmoid, and colon—namely, simple acute catarrh, hypertrophic catarrh, and atrophic catarrh.

If by simple acute catarrh an acute proctitis is meant, I have seen a few of these cases, though I have not had an opportunity of examining them with the proctoscope, for the simple reason that no case has presented itself since I have been working with this instrument. The distinction which the above-named author makes between atrophic and hypertrophic catarrh appears to be that whereas in the former the mucous membrane is red and dry, with fissure-like cracks in it, and with little masses of faecal matter adhering to the rectal wall, in the latter the mucous membrane appears pale, oedematous, and boggy, and is covered with a muco-purulent secretion. There is persistent moisture about the anus, marked flatulence and indigestion, with loose stools, whilst constipation is a marked feature in the chronic atrophic variety.

A description of the examination of the rectum and sigmoid would not be complete did I omit to mention bimanual manipulation. For this to be of real use, the patient should be well under the influence of an anaesthetic in order that the abdominal parietes may be fully relaxed. The lithotomy

position is the best when this method is employed. With the index finger, sometimes supplemented by the second finger of the right hand, passed into the rectum, pressure is made upwards at the same time that downward pressure is made with the other hand applied to the hypogastric and right and left iliac regions. In this way the finger in the rectum can feel the sacral promontory, often with ease, whilst the pelvic contents can be mapped out and examined pretty thoroughly. This was the method relied upon before the introduction of Kelly's tubes, and is now a useful adjunct in cases of high-lying stricture, neoplasms, and tumours pressing upon the bowel from without.

I will conclude these remarks with a brief notice of a few cases in which I have found the use of the proctoscope of the greatest service.

CASE I.—Miss A., aged 50, seen with Dr. Clemow, of Earl's Court. Tendency to constipation, small and grooved motions; no blood or pus, but discomfort in left iliac region. Digital examination discovered nothing. Kelly's 8-in. tube passed into sigmoid shows a contraction, possibly muscular as the mucous membrane was healthy. I advised dilatation with bougies made in vulcanite of especial shape. This was carried out by Dr. Clemow with marked benefit. I was able also to allay the patient's fears as to the question of cancer, thereby possibly to some extent alleviating symptoms.

CASE II.—Mr. H., aged 50, had suffered with diarrhoea and a discharge of blood and mucus for some months. He was getting thinner. I passed the 8-in. tube well above the pelvic brim, and found the upper rectum and lower sigmoid the seat of several small ulcers, the majority being equal in size to a large pin's head. After the use of chinolol injections, at first twice a day, for two months, combined with a bismuth mixture and careful dieting, he reported himself well.

CASE III.—Mr. G., aged 50, just returned from India, where he had contracted dysentery. He was still suffering with diarrhoea, and the passage of blood and slime; urgent call to stool every two hours; has not passed a solid motion for weeks; is wasting rapidly. Digital examination shows nothing abnormal. Proctoscopic examination: A number of separate and irregular-shaped ulcers in upper rectum. Treatment as in previous case, with a like result, excepting that after two months he had a slight relapse, owing to neglect of himself.

CASE IV.—P. S., a male, aged 34, was brought to me by a former nurse at the West London Hospital. He had suffered with diarrhoea, and the passage of blood, pus, and mucus for seven years. He had on an average twelve actions of the bowels in twenty-four hours. Had got so thin and weak that he was obliged to give up all work. Digital examination discovered nothing, but with an 8 in. Kelly tube a tight stricture was seen at 7 in.; ulceration was present. I strongly advised colotomy.

CASE V.—Lady X. seen in consultation with Dr. Playfair. The patient, a stout lady of middle age, had been passing blood at intervals for some time. At times the bleeding was severe. There was no particular pain nor marked protrusion. Examination with the proctoscope revealed a small cleanly-cut ulcer about 4 in. up. This was cauterized, and chinolol injections 1 in 600 prescribed. I heard subsequently that the patient did well and had no more bleeding. The note of this case is from memory.

CASE VI.—J. D., male, aged 48, sent to me by Mr. Wallace of Stamford Hill. The patient complained of constant uneasiness, amounting at times to pain, in the left iliac and suprapubic regions. Bowels irregular, but no discharge of blood or pus. Mr. Wallace suspected disease of the sigmoid. Digital examination detected nothing, but there was an ill-defined sense of resistance in the iliac region. A few days later I examined with the proctoscope and found carcinomatous ulceration on a level with the pelvic brim. The disease was well seen by Mr. Wallace and his brother, Mr. Frederick Wallace, also by others who were present. Bimanual examination under ether revealed a deep-seated tumour in the sigmoid region, which at a subsequent operation proved to be malignant disease of the sigmoid colon. I had hoped to be able to perform excision, but finding the growth firmly fixed to the pelvic brim with involvement of the neighbouring glands I rested content with the formation of an artificial anus. The patient has recently left St. Mark's Hospital much relieved.

I think these few cases will go far towards proving my contention that the proctoscope is not only of practical value, but that it is indeed a most important adjunct to the means at our disposal in the diagnosis of rectal diseases.

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CLINICAL OBSERVATIONS ON THE ACTION OF SOME SUPRARENAL PREPARATIONS.*

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[After some introductory observations Dr. Longworth said:]

The chemistry of the suprarenal bodies is very complex, but they contain an active principle secreted entirely by the medullary portion of the gland which up to the present has not been satisfactorily identified. Several workers claim to have isolated various substances under the name of suprarenalin, epinephrin, etc., possessing in a greater or less degree

* Read before the East Anglian Branch of the British Medical Association.

the active properties of fresh preparations of the entire gland. One of these, adrenalin, isolated by J. Takamine, can now be obtained commercially, and is one of the preparations used in connexion with the subject of this paper. It is a crystalline substance, and like all other so-called active principles that have been isolated, is highly oxidizable, consequently requiring some care when in use to preserve its active properties; this has been assisted, however, by bringing it into solution with normal sodium chloride solution and a small percentage of chloretone, in which state it may now be obtained. It is doubtful whether adrenalin is the sole active principle of the suprarenal bodies. Schäfer, I believe, is inclined to think it is only one of the active principles.

In experiments on animals by G. Oliver and Schäfer, and others, with preparations of the suprarenal glands, constant and very marked physiological effects have been produced.¹ When a solution is injected intravenously the most powerful effect is produced on the muscular system generally, but especially on the muscular walls of the heart and blood vessels, with, in addition, a stimulating effect on the cardio-inhibitory, and also some action on the voluntary muscles. As a result of this action, and in spite of the slowing of the heart, there is produced a marked rise in blood pressure which can be still further augmented if the vagus action be removed either by paralyzing with atropine or by section. Schäfer considers that suprarenal extract probably produces a greater rise in blood pressure than any other known substance. The effects, however, pass off in the course of a few minutes, the same authority considering it likely that the active principle is removed from the circulation by the muscles, and there stored up.

It has been estimated that, of the dry extract, 0.5 mg. per kilogram of body-weight is sufficient to produce a maximum effect, and that about $\frac{1}{100}$ gr. of the active principle is sufficient to produce a distinct effect on the heart and arteries of an adult man; but in one of the cases in which adrenalin was administered, and which will be referred to presently, $\frac{1}{2000}$ gr. produced a very marked effect. The foregoing applies only where the substance is brought directly into the circulation by intravenous injection, but when given subcutaneously the effects are much the same, although not nearly so marked.

It will thus be seen that we have a very active substance to deal with, in fact a substance derived from the animal kingdom closely resembling digitalis in its action, but more powerful. It possesses a similar power to digitalis of increasing the efficacy of the systole of the heart, of slowing its action, and of powerfully contracting the arterioles. It is also not unlikely that the analogy may be still further traced into the chemistry of the two; just as digitalis contains several distinct active principles of somewhat similar action, so the suprarenals may be found to yield several, of which adrenalin is one. A point, however, in which suprarenal extract differs is that it has not been found to possess the cumulative action of digitalis.

Now as suprarenal extract was found to exhibit such active physiological properties, it naturally suggested itself as being worthy of trial in practical therapeutics. Schäfer, judging from the results of his experiments, strongly recommended its trial as an intravenous injection in cases of sudden cardiac failure, or even into the heart itself where there is great emergency.² In the two following cases in which this treatment was tried the results certainly were striking and of much promise in the meeting of certain kinds of sudden heart failure, but temporary improvement was the most that could have been expected in either case owing to their hopeless nature from the outset.

CASE I.—A female, aged 30, who had been in the Suffolk County Asylum about three weeks, suffering from acute mania. She was admitted in a very much reduced physical state; she was very anaemic with small rapid pulse, frequently refused her food, and much difficulty was experienced in giving her sufficient sleep. She was confined to bed from the time of her admission. Sudden cardiac failure occurred on the twentieth day following her admission, and when seen within five minutes of the onset she was unconscious, with marked lividity of the face, feeble shallow respirations, and a pulse of 120 to 140, which was barely perceptible; in fact, it was considered that she could not live many minutes. Hypodermics of brandy were followed by some slight temporary improvement; then adrenalin chloride $\frac{1}{100}$ gr. was given subcutaneously, but without any appreciable effect; this was followed by hypodermics of ammonia and caffeine, which caused some further temporary improvement, and were repeated in half an hour. Patient's condition continued somewhat better for another hour, the pulse was stronger though rapid, and she was able

to take teaspoonfuls of stimulant by the mouth. The heart, however, again gave out, and the pulse falling entirely at the wrist, death appeared imminent. It was decided to try adrenalin intravenously; $\frac{1}{100}$ gr. was injected into the basilic vein, and in the course of forty-five seconds a most marked effect was produced, consciousness returned, patient commenced to struggle and resist, respirations became full and deep, and the pulse returned and fell in frequency from 124 to 84 per minute, but in the course of five minutes the effect had completely passed off, and patient was in practically the same condition as immediately before the injection. In a quarter of an hour the injection was repeated with the same pronounced effects, the pulse now falling in frequency to 72 per minute, but only continuing so for about one minute, rapidly rising to 120 again; it, however, did not fall entirely again, and her condition was distinctly better. The stimulation was continued by the mouth, and with but slight variation patient's condition remained about the same for the next three days. The prognosis was, however, altogether bad, the heart again failed suddenly, and patient was found in a similar condition as on the first occasion; adrenalin intravenously was again resorted to; $\frac{1}{100}$ gr. first produced only slight effect, and when repeated was without any effect whatever, the patient succumbing in the course of half an hour.

CASE II.—A female, aged 19, admitted into the asylum suffering from acute mania occurring during the puerperal state; she was also an epileptic. For a fortnight preceding admission while at home she had been refusing her food, and was in an extremely reduced and feeble state when admitted. She was confined to bed and in the course of a day or two her temperature became elevated and general condition assumed that of acute delirious mania. The pulse, which on admission was rapid, small, and soft, became more so, rising from 120 to 150 per minute, and then disappearing entirely at the wrist. She continued in this state for two days, being quite pulseless, was semi-conscious, had dry, parched skin, tongue brown and dry, and taking little or no nourishment, urine also very scanty; a very distinct type of case which seems to be of toxic causation and in which there seems to be a reduction of the total quantity of the blood to a minimum. After thus being pulseless for two days it was decided to try the effect of intravenous saline injection. After the infusion of one pint a very decided improvement appeared, the radial pulse returned as also did consciousness, and continued to improve as the operation proceeded; some five pints were injected in all, the pulse pressure then equalled 100 mm. Hg. as measured by Hill and Barnard's sphygmometer, and the frequency about 100 to 110. Adrenalin chloride ($\frac{1}{1000}$ gr.) was then added to the last portion of the saline solution, and in the course of half to one minute was followed by characteristic effects, that is, increase in depth of respirations, increase in the force of the pulse and reduction in frequency, the blood pressure rose to 120 mm. Hg. These effects passed off in five minutes, the blood pressure returned to 100 mm. Hg. and pulse-rate to former frequency. The general improvement was maintained throughout the day, but towards night the pulse rose to 120, and the blood pressure fell to 75 mm. Hg., and next morning, although the pulse was still perceptible, she was evidently sinking again. The pulse failed entirely some hours later, and saline solution was again resorted to, but no return of the pulse occurred, nor was any appreciable improvement evident after some three pints had been given. Adrenalin chloride ($\frac{1}{1000}$ gr.) was then added, producing quite a distinct effect, the pulse returned, and reached a pressure equal to 90 mm. Hg. the respirations, which had been very shallow, became deeper, and there was a generally stimulating effect produced. Although the main effect passed off as rapidly as usual the pulse continued quite perceptible, and condition was better, but not nearly so good as that following the infusion the day previous; about another two pints were introduced before the operation was completed. Patient's improved condition was, however, only maintained for some few hours, when the pulse disappeared again, and death followed next morning.

These cases have been described with perhaps more than necessary detail in order to show that much benefit could not have been expected from any treatment; they were really cases of gradually failing heart on which sudden failure supervened, whereas the class of case in which adrenalin is most likely to be of use is that in which the heart may be expected to have some reserve force left—such as heart failure from an overdose of chloroform, as suggested by Cushny, and perhaps in cases of asphyxia from drowning or other causes. It will, however, be noticed that after the immediately marked effects following the injection had passed off some improvement in the condition persisted, and in the first case mentioned was probably the means of prolonging life for three days, and in the second for possibly a few hours.

Subcutaneous injection of adrenalin failed to produce any appreciable effect in Case 1, although it produces in persons under normal conditions very distinct effects similar to those resulting from intravenous injection; this would suggest that it should be always given in such cases intravenously, for where there is much collapse and the circulation is at its lowest ebb absorption for substances administered subcutaneously frequently appears to be much delayed or even entirely cease.

Subcutaneous injections of $\frac{1}{1000}$ gr. to $\frac{1}{500}$ gr. of adrenalin chloride have recently been recommended in ophthalmic practice to be used immediately before some operations about the eye in order to control haemorrhage, and attention was drawn by the writer to the fact that toxic effects can be produced by suprarenal preparations, but he himself had not noticed any, and thought it unlikely when working

with such small doses; this one can endorse, as from observations on several cases in which doses up to 1.5 gr. were given, and sometimes repeated within short periods, no effects beyond those characteristic of the action of the drug, and which could not be regarded as toxic, were observed.

The administration of suprarenal preparations by the mouth has not been found to be followed by such constant results as when given intravenously or subcutaneously, and some difference of opinion exists as to whether it can produce any effect when so given. Schäfer states that the active principle is not destroyed by gastric digestion, while Cushny and others state that little or no effect is observable when administered in this way. Grünbaum, in observation on himself and others, failed to obtain any rise in blood pressure, even after very large doses of suprarenal extract, except in one case of abnormally low blood pressure, in which the rise was not maintained after leaving off the drug. He concludes that normal blood pressures are uninfluenced by the administration of suprarenal extract.³ With a view of obtaining more definite information in this direction I administered suprarenal preparations by the mouth to 6 cases, in which I made daily observations of the blood pressure and pulse-rate; in two of the cases daily measurements of the calibre of the radial artery were made with Oliver's arteriometer, and in two cases daily records kept of the total quantity of urine passed, and estimations made of its specific gravity, total solids, and the amount of phosphates and urea excreted. Four of the cases were in good health, and free from any organic disease, while, of the other two, one was suffering from phthisis and one from epilepsy, but otherwise in good health. Three of the cases were in bed throughout the observations, which extended over periods of from three to five weeks. The preparations used were: A solution of adrenalin chloride 1 in 1,000 (Parke, Davis, and Co.), tablets of suprarenal gland, each equivalent to 5 gr. of the fresh substance (Burroughs and Wellcome), and a dry powdered extract of suprarenal medulla (Willows, Francis, Butler, and Thompson).

CASE I.—A healthy female, aged 44, in bed during whole period of observations. The morning blood pressure for ten days before commencing suprarenal averaged 118 mm. Hg. with an average fall of 8 mm. towards evening, on several occasions the evening fall equalled 15 mm.; 5 gr. of powdered suprarenal medulla were given three times daily after meals. At first some nausea was produced, which passed off in a day or two. No effect was noticeable for first five days of administration, but from then on to the fourteenth day the morning blood pressure averaged 120 mm. and the evening 116 mm. On the evening of the fifteenth day the blood pressure rose to 130 mm. and the averages for the next four days were—morning 130 mm., evening 143 mm.; on two evenings the pressure reached 150 mm. The extract was discontinued on the nineteenth day with a fall of the blood pressure to 120 mm. on the following morning. The evening and morning pressures continued at this height for two days, when the variations between the morning and evening pressures again appeared. The pulse-rate throughout the whole period averaged 76 per minute. The calibre of the radial artery averaged 2 mm., with an increase to 2.7 mm. during the extreme rise in the blood pressure. There was a slight increase in the average daily quantity of urine, no variation in the total solids, but a slight increase in urea and phosphates excreted. The body weight showed a loss of a few pounds. The temperature was unaffected.

CASE II.—A female, aged 42, in good health, and continued at her employment during observations. The average morning blood pressure for ten days before commencement of suprarenal equalled 112 mm., and evening 106 mm.; the pulse-rate averaged 60 for the morning and 64 for the evening. Three tablets of suprarenal gland were given three times a day to begin with, and were increased to four on the fifth day; from this time on to the tenth day the morning and evening blood pressures averaged respectively 113 and 114 mm. On the morning of the eleventh day the pressure rose to 140 mm. and the pulse-rate fell to 54; this was accompanied by some *malaise* and loss of appetite. The tablets were discontinued. The morning blood pressure for the next four days averaged 130 mm. and the pulse-rates 50 and 52 morning and evening respectively; the evening blood pressure was not affected. The *malaise* passed off in the course of a few days, but the pulse-rate continued slowed for two days after the return of the blood pressure to normal. There was a loss in body weight of a few pounds.

CASE III.—A girl, aged 12, an epileptic imbecile, health otherwise good. Up and about during the observations. Average morning blood pressure before the administration of suprarenal equalled 100 mm., with an occasional fall of from 2 to 10 mm. towards evening. The pulse-rate averaged .95 per minute. Two tablets of suprarenal gland given three times daily, which were increased to three in a week; no effect produced on morning blood pressure, but evening fall did not exceed an average of 2 mm. The pulse-rate continued the same. Tablets were discontinued on the fourteenth day on account of an increase in the severity and daily number of fits which it was thought the suprarenal might have been influencing adversely. From the fifteenth day on there was an average variation of 5 mm. between the morning and evening blood pressures. The urine showed a slight increase in daily quantity with practically no variation in the excretion of urea and phosphates but a slight increase in the total solids. There was a gain in weight of a few pounds.

CASE IV.—A female, aged 39, suffering from phthisis, which had run a somewhat chronic course for some time. On passing into an acute stage with rapid extensions in the lungs there was an associated fall in blood pressure from between 120 and 130 mm. to 100 mm., with a rise in pulse-rate to an average of 100 per minute. After the blood pressure had continued at an average of 100 mm. for a week, adrenalin chloride $\frac{1}{2}$ gr. was given three times a day. The blood pressure fell another 10 mm. the day after the adrenalin was commenced, and continued about 85 mm.; the adrenalin was discontinued after one week. Daily measurements of the radial calibre averaged 0.9 mm., with but very little variation at any time.

Cases V and VI were both young girls in good health. Their blood pressures before commencing adrenalin averaged respectively 100 mm. and 120 mm., with an evening fall in the latter case of about 15 mm. Adrenalin chloride was administered in one for ten days and in the other for fourteen days without any appreciable effect on blood pressure or pulse-rate.

It will thus be seen that in the first two cases a very decided rise in blood pressure followed the administration of the drug, and rapidly subsided after its withdrawal. The rise did not commence at once, no effect being observed until after the fifth day, when a levelling up of the evening pressure to that of the morning took place, and was maintained. In Case III the effect on the blood pressure was very slight, but there appears to have been some, as the variations between the morning and evening pressures were slightly lessened, and increased again on the cessation of the drug. Case II was the only one that exhibited the cardio-inhibitory action of the drug, causing a decided slowing of the pulse, which was already slower than normal, and this action was maintained some days longer than the rise in blood pressure. The analyses of the urine in Cases I and III are not in accord with those of Easterbrook, who found some diminution of the total solids, urea, and phosphoric acid, and considered that suprarenal administration tends to diminish tissue oxidation.⁴

Cases IV, V, and VI would tend to show that adrenalin, when given by the mouth, is without effect on the blood pressure; but, thinking that this, being a pure active principle, might be much more rapidly absorbed than the impure preparations containing much proteid matter, etc., from which it is derived, I made observations in Cases IV and V on the blood pressure, pulse-rate, and calibre of the radial artery every ten minutes for an hour or so on several occasions after the administration of one of the daily doses. The results showed that adrenalin was absorbed immediately into the circulation, and its effects could be detected within five minutes. In Case IV a rise in blood pressure from 65 to 90 mm. took place within fifteen minutes, a fall in the frequency of the pulse from 108 to 92, and a diminution of the radial calibre from 1.1 mm. to 1 mm., but the effect had completely passed off in one hour. In the same case, when a larger dose was given, a reduction of twenty-four beats per minute took place in the pulse-rate, and a narrowing of the radial calibre by 0.3 mm. Case V, observed in the same manner, gave similar results; there was a rise in blood pressure from 110 to 120 mm., a diminution of the radial calibre from 2.1 to 1.8 mm. and a fall in pulse-rate from 64 to 52. These effects only lasted some ten minutes and were followed by a distinct reaction, the blood pressure fell to 100 mm. with an enlargement of the radial calibre to 2.4 mm., but in the course of an hour the blood pressure, pulse-rate, and radial calibre had become readjusted to the condition observed at the beginning. Adrenalin, therefore, is equally active when administered by the mouth, but its effects are more transitory and consequently failed to produce any sustained rise in blood pressure in Cases IV, V, and VI. The tablets and powdered extract, on the other hand, appear to produce a more sustained effect owing to slower and more gradual absorption, for both must be equally rapidly eliminated.

The powerful effects produced on the vascular system by suprarenal extract led G. Oliver to give it a trial in various conditions of anaemia and asthenia where there was general lowering of vasomotor tone and abnormally low blood pressure; he observed much benefit from it in such conditions. It has also been suggested as a treatment in similar conditions of a more acute production, such as cases of acute febrile disease (enteric fever and pneumonia) where there is a considerable fall of blood pressure due to toxic paresis of the myocardium and which fails to respond to such drugs as digitalis, strychnine, alcohol, etc.; much benefit has been

claimed to have been derived from suprarenal in this type of case.⁵ It is here, I think, where adrenalin in frequently repeated doses might be of value. Certain forms of mental disease, mostly of the maniacal type, have been found to be associated with an abnormally low blood pressure, and in some cases that have been reported by W. R. Dawson, Easterbrook, and others, in which suprarenal extract was tried, distinct improvement has taken place coincident with a rise in the blood pressure. W. R. Dawson also observed in some of his cases that the effect on the blood pressure is of the nature of a levelling up of the evening pressure to that of the morning, as in Cases I, II, and III above mentioned.⁶ All of the cases to which I administered suprarenal preparations were suffering from some form of mental disease. Case I was of a subacute maniacal type characterized by much noisy excitement and extreme variations in the emotional state. During the period when her blood pressure was raised she was certainly less excitable and more stable in every way. In Case II, which was of a more chronic type, the rise in blood pressure was accompanied by a decided attack of depression; this, however, may have been due to the *malaise* and gastric disturbance caused by the drug, for it disappeared with it. The remaining cases were quite uninfluenced mentally.

Among conditions not directly connected with the vascular system in which suprarenal preparations have been recommended is epilepsy, but some consider it distinctly harmful.⁷ In Case III of those mentioned, that of an epileptic imbecile, the fits increased in frequency and severity during the administration of the drug, culminating in status five days after its withdrawal; it is, of course, impossible to say what influence the suprarenal exerted in this case.

The results obtained in the treatment of Addison's disease are naturally of most interest. Although many cases have been reported in which recovery and improvement has followed on suprarenal treatment, the results, on the whole, have not been anything like so satisfactory as those obtained in the treatment of myxoedema by thyroid extract. It must, however, be remembered that in many cases the treatment is not commenced until so late in the disease that it is almost hopeless to expect any benefit; this was so in the only case I have had the opportunity of so treating, a case in which *post mortem* the medulla of both suprarenals was found entirely replaced by dense fibrous tissue.

Before concluding, I would refer to one other condition, namely, Graves's disease, in which the internal administration of suprarenal extract has been recommended, and at least one case has been reported in which recovery has followed. This is a disease in which some benefit might be expected from this drug, for the most prominent feature present is a general want of tone of the circulatory system, a relaxation of the arteries, rapidity of the pulse and a tendency to cardiac dilatation, all conditions which suprarenal tends to correct and in which digitalis has been found of value. A somewhat interesting relationship exists between a constant condition found *post mortem* in Graves's disease and in animals in which experimental extirpation of the suprarenal capsules has been performed, namely, hypertrophy of the thymus.⁸ The exact significance of this is unknown, but the thymus is considered by some authorities to provide an internal secretion which is antagonistic in action to that of the suprarenal bodies; Schäfer and Oliver, however, doubt this, having been unable to obtain any definite results from experiments with thymus extract that would point to this body having any specific function. Whether this relation between the suprarenals and thymus can be regarded as a basis for treatment, or not, I think it worth while to give suprarenal preparations an extended trial in exophthalmic goitre.

In this paper I have not touched on the local applications of suprarenal preparations, so much has appeared of late in the various medical papers on the subject and it suffices to say that in ophthalmic, nasal, and obstetric work, they form a useful addition to our means for the control of hæmorrhage and of other conditions dependent on vascular turgescence.

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THE FUNCTIONS OF THE EPIGLOTTIS.

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SOME ten years ago Professor Kanthack said, "The exact function of the epiglottis is not even yet fully understood," and these words might be repeated with probably equal truth to-day. The uncertain nature of our knowledge of the subject is well shown by the diverse opinions expressed in the leading textbooks of physiology. Roughly speaking, these opinions may be divided into two classes, of which the first support the old theory that the main function of the epiglottis is to close down upon the glottis during deglutition, and so prevent food, etc., from entering the larynx; the other class deny this, but do not give any explanation of the movements of the epiglottis, or assign any function to it.

The old theory of the epiglottis acting as a lid to the glottis is well described by Sir Michael Foster in his *Textbook of Physiology*.¹ When speaking of the second stage of deglutition, after explaining the movements of the soft palate and its dependents, he says:

The epiglottis is depressed over the larynx, the cushion at the base of the epiglottis, covering the rima glottidis..... Thus, both the entrance into the posterior nares and that into the larynx being closed, the impulse given to the bolus by the tongue can have no other effect than to propel it beneath the sloping soft palate over the incline formed by the root of the tongue and the epiglottis.

The idea is, apparently, that the epiglottis closes down tightly on the glottis, so that the anterior surface looks more or less upwards and backwards; the posterior part of the tongue is at the same time elevated, and thus the surface, ordinarily almost in contact with the anterior surface of the epiglottis, comes to form a continuous sloping plane with it, which descends from the dorsum of the tongue to the oesophagus.

Against this theory, various points have been urged by many authors, amongst which we may notice the following:

1. The muscles attached to the epiglottis, consisting of a few fibres of the aryteno-epiglottideus and part of the thyro-arytenoideus externus, are very weak, and do not seem capable of bending the cartilage transversely, as it would be necessary for them to do in order to depress it over the larynx. Their function seems to be to draw back the two lateral margins of the epiglottis, and to make the ary-epiglottidean folds tense.

2. Persons in whom the epiglottis has been removed or has disappeared owing to destructive ulceration have little or no difficulty in swallowing solids, and only slight trouble with liquids, thus proving that the ingesta may be prevented from entering the larynx in the absence of the epiglottis.

3. The epiglottis is frequently irregular in shape and so folded upon itself that it could only with great difficulty be bent far backwards, and would then form a most inefficient lid to the larynx.

4. A case of corrosive acid poisoning has been described² in which the only part of the epiglottis found to be eroded was the "laryngeal surface of the petiolus," a position which should have been completely protected by a depressed epiglottis.

This theory was, however, universally accepted as the true account of the method by which the larynx was closed, until in 1892, Professor Anderson Stuart³ gave a much more satisfactory explanation. He maintained that the epiglottis did not fold down in a lid-like way, but that the occlusion of the lower air passages during deglutition depended entirely on the movement of the arytenoids, which were approximated and moved forwards, thus coming into contact with each other and with the base of the epiglottis. The closing of the laryngeal entrance was at the same time assisted by the upward and forward movement of the entire larynx.

This theory certainly fits in with many known facts of anatomy and physiology, the exact significance of which had been somewhat of a mystery before. The epiglottis not being depressed over the larynx, its occasional absence or irregu-