Heart disease and Bright's disease are so intimately associated with arterial degeneration that it is often impossible to say in a given case how far the condition is cardiac or renal; the absence of response is to a great extent a measure of the renal element in the case and of value for prognosis, signifying, as a rule, that the condition is terminal.

REFERENCE.
[1] BRITISH MEDICAL JOURNAL, November 26th, 1910, p. 1670.

TWO CASES OF DEATH FROM POST-ANAESTHETIC ACID INTOXICATION.

BY
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IT has long been known that acetone is present in the urine of patients who have been anaesthetized.

Becker, for instance, states[1] that acetone follows anaesthesia in at least two-thirds of the cases, irrespective of the nature of the anaesthetic or the duration of the anaesthesia, "and that if it be already present it is increased thereby." This has been confirmed by Abram[2] in a series of cases at the Royal Infirmary, Liverpool.

The importance of this fact has been recognized by all, though some, like Wallace and Gillespie of the Prince of Wales's Hospital, London,[3] fully appreciate the dangers and take suitable prophylactic measures.

The two cases I have to record both occurred at the Children's Infirmary, Liverpool, within a few weeks of one another.

CASE I.

The patient was a boy aged 6 years, suffering from a chronic intussusception which had been present for six days. On August 10th, 1910, at 11.30 a.m. he was given ethyl chloride, followed by ether by the open method. A right rectus incision was then made, and a large chronic intussusception found and reduced easily; there were no adhesions and practically no congestion. The abdomen was sutured in three layers.

The anaesthesia lasted about twenty-five minutes, and 3½ oz. of ether were used.

After-progress.

At 8 p.m. the respirations were very rapid (40), though there were no râles in the chest. He was given atropine gr. $\frac{1}{200}$ four-hourly.

At 1.30 a.m. he was worse, expiration being prolonged at both bases.

At 2.30 a.m. he vomited, so was given sod. bicarb. ʒj in ℥iij of water; this was retained, and no more vomiting took place.

At 10.0 a.m. he was much worse; pulse 160, but hardly perceptible. Cyanosed; dilated pupils; he was given oxygen and brandy. Retained salines well.

At 1.30 the same day the child was just conscious, but obviously dying; the breath smelled of acetone. Respirations 72; air hunger; pulse hardly perceptible. Cyanosis not present as oxygen was given continuously.

Urine.

A catheter specimen of urine was obtained and presented the following characteristics:

Light colour, slight deposit of mucus, acetone smell just perceptible, acid, sp. gr. 1028. No albumen, bile, pus, or sugar. Phosphates precipitated on boiling. Acetone present in large amount, demonstrated by both nitro-prusside and iodoform tests. Diacetic acid was present. No microscopic examination was made.

The child died before treatment could be commenced, and no *post-mortem* examination was allowed.

Both the night sister and nurse noticed that the breath had a peculiar odour, but did not report it as they "thought it due to a new kind of chloroform."

CASE II.

This was a child, aged 1 year and 10 months, with inguinal hernia.

On September 17th, 1910, at 5.30 p.m., anaesthesia was commenced with equal parts of chloroform and ether given on a Schimmelbusch mask, but the child stopped breathing twice, although he was not deeply under. Artificial respiration was necessary on both occasions. A change was made to ether by the open method, and this was borne very well.

The anaesthesia lasted about forty minutes; of C.E. mixture ʒij were used, but much was wasted; of ether ℥jss.

After-progress.

Had a comfortable night, and was well till 7 p.m. on the following evening, when vomiting occurred and the pulse became 180, temperature 103.2°; ? smell of acetone on breath; respirations 44. Chest normal, child very quiet. Pupils normal.

Urine.

Specimen of urine obtained was clear and of light colour; a large amount of white urates appeared on cooling; the urine was acid and smelt o acetone. No albumen, bile, pus, blood of sugar.

Acetone was shown in very great quantity by Legal's nitro-prusside test and Lieben's iodoform test, and diacetic acid was present.

Treatment was at once commenced as follows: (1) Rectum washed out with sod. bicarb. solution; (2) ʒj sod. bicarb. in ℥ij water per rectum; (3) sod. bicarb. ʒss in water every hour by mouth.

This had no effect and the child became worse.

1.45 a.m. Much worse, respirations very rapid, pupils dilated, continuous rectal saline commenced.

4 55 a.m. Pulse much weaker, given pituitary extract ♏iij and sod. bicarb. ʒij in one pint of water, subcutaneously.

7 a.m. Moribund, given oxygen, and pituitary repeated.

8.5 a.m. Death.

An autopsy at 2.30 the same afternoon showed the liver slightly paler than usual, but otherwise everything was normal.

REMARKS.

In neither case was the urine tested for acetone before the operation.

Since the occurrence of these cases the urine of every child in the infirmary is tested for acetone on admission by Legal's test, and if present the operation is delayed, if possible, till the acetone has been eliminated, and treatment is continued after the operation.

Wallace and Gillespie pointed out[4] that an individual deprived of carbohydrates excretes acetone and diacetic acid, but the exhibition of carbohydrates rapidly causes the disappearance of these substances. They therefore employ glucose as a prophylactic. So, acting on their suggestions, the following scheme has been instituted at the Children's Infirmary, Liverpool:

All patients admitted to surgical wards for operation (usually admitted 2.30 p.m.) have

1. Glucose, ʒj, at 4, 6, and 8 o'clock on day of admission and 4, 6, and 8 o'clock on following morning. If the child is 8 years or older ʒij are given.
2. Sod. bicarb. in the strength of ʒj to ℥iv of water instead of plain "wash-out" before operation.

If acetone is present in urine on admission,

1. Continue glucose two-hourly in daytime.
2. Give sod. bicarb. ʒj in ℥j of water two-hourly in day and four-hourly in night.

Liquid glucose is more satisfactory than the solid, and children take it well as a sweet. Sod. bicarb. solution is frequently only taken by children after a struggle.

Since the initiation of this measure no serious symptoms have developed in any patient; but the treatment has not been in force long enough to give a reliable comparison, though the post-anaesthetic vomiting has been less.

I am indebted to Mr. Dun for permission to publish the first case, and to Dr. McClellan for the second.

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RADIUM IN CANCER.

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IT is now some years since the newer method of using radium, advocated by Wickham and Degrais,[1] of Paris, and others, was introduced, but as yet there are few recorded results of cases treated in this country. I have employed the method in suitable cases during the past two years, and a description of some of the more typical may be of interest.

The method differs from the older one of enclosing the radium in glass or metal tubes. Instead, pure radium in the form of sulphate is spread on a varnished surface of metal or linen, and screens of various densities are interposed between the applicator and the tissues. In this way it is claimed that a much smaller quantity of radium is required, and the amount of the radiation can be graduated and concentrated either on the surface or on the deeper parts. The best results appear to be obtained from applicators containing 2½ mg. of pure radium to each square centimetre. I have used two applicators of this strength, one measuring 4½ and the other 9 square centimetres.

In the majority of my cases the disease has been in a very advanced stage. In two only was the cancer still in an operable condition. These were very similar cases of

epithelioma of the floor of the mouth, and in one the treatment was successful; in the other it failed, and an operation was required.

CASE I.

Male, aged 54, under the care of Mr. L. A. Dunn and Dr. W. H. M. Smith of Croydon.

The history was that nine months previously an ulcer appeared below the tongue and gradually spread. Three months later the lymphatic glands behind and below the lower jaw became enlarged. Operation was advised, when it was found that the patient had glycosuria, and he was then referred to me for radium and x-ray treatment. When seen there was a hard nodular ulcerated surface, extending from opposite the third left molar tooth to the frenum, both sides of which were indurated. The edges of the ulcer were hard and serrated. The tongue was fixed, and, as the patient said, "He could not lick a postage stamp." There was much discharge, but little pain. A mass of involved glands was seen below and behind the jaw on the left, of the size of a small hen's egg, most prominent above the angle. In the right submental region there was a hard gland the size of a filbert, and a smaller one over the left sterno-mastoid muscle.

Radium was applied to the ulcer in two applications of one hour each on consecutive days without lead, and for eight hours with a lead screen of $\frac{1}{10}$ mm. in thickness. The glands on the left side were treated at the same time for seventy-six hours through lead screens varying from $\frac{1}{10}$ to 1 mm. In eleven days the superficial glands had shrunk sufficiently to expose a deeper layer, lying under and apparently attached to the ulcer. This was treated in a similar way. The gland on the right, which meantime had remained practically unaltered, and was certainly no smaller, was then attacked and subsided as rapidly. In six weeks all the glands had shrivelled to a size less than a pea, and, after a second course of treatment two months later, the small nodules remaining could only be found after careful search. The small sterno-mastoid gland subsided with two treatments of four hours each through $\frac{1}{10}$ mm. lead.

For the ulcer in the mouth another course of treatment was required, after which it was entirely healed and the tongue became freely movable. Now, six months later, the condition remains the same. There is no regrowth and, so far, no metastasis.

In the other case the tumour was rather larger and extended more under the tongue. The involved glands were about half the size of those in the first patient. It was treated at Guy's Hospital by Mr. Dunn and Dr. C. I. Iredell, to whom I am indebted for the opportunity of observing and recording the case.

CASE II.

J. H., a carter, aged 49, admitted October 21st, 1910. *History:* About three weeks before admission he noticed a "scab" below the tongue on the left side. There had previously been some pain in the tongue for four weeks.

On admission, there was an ulcerating ridge-like growth extending from the first right bicuspid to the first left bicuspid tooth. The tumour could be felt extending under the tongue almost to its root. The tongue was fairly movable, but its left side was considerably raised. The submaxillary glands were enlarged. Dr. Iredell applied radium, but after a few days the glands and growth became further enlarged from septic trouble. This subsided after a discharge of pus from under the tongue, and the glands became decidedly smaller. There was no appreciable improvement in the growth itself, the pain became intense and appeared to be aggravated by the treatment, and after four weeks Mr. Dunn operated.

It will be noticed that clinically the first case differed from the second only in its mode of onset. This in the one was comparatively slow and in the other rapid. I have frequently observed that it is in the slow growing cancers that radium acts best, and that the more rapid and malignant the type the less chance is there of improvement. There are, however, some exceptions to this. In the following case there was a very rapid recrudescence followed by an equally rapid regression.

CASE III.

A lady, aged 53, under the care of Mr. Dunn and Dr. Lipscomb of St. Albans. The right breast and glands were removed one year ago for a small nodule in the breast found microscopically to be carcinomatous. She was well until six weeks ago, when she complained of neuralgic pain. Dr. Lipscomb examined the chest wall and found nothing. Three weeks later a small hard lump appeared on the third right costal cartilage and grew rapidly. The pain was intense, at times preventing sleep. I saw her on October 24th, 1910. The swelling then was about the size and shape of the half of a Tangerine orange. It measured 6 cm. in diameter and was raised 4 cm. above the surrounding skin. Radium was applied for eighty hours through lead from $\frac{1}{2}$ to 1 mm. in thickness. A week from the commencement the tumour was appreciably smaller. In fourteen days it was level with the skin, and within a month no swelling or thickening could be felt. The pain disappeared on the fourth day, but returned a fortnight later. It was then referred lower down to a tender thickened spot over the sixth costal cartilage. There was now also a slight enlargement of the supraclavicular glands. In November these places were similarly treated. It was arranged to give another treatment at the end of January, 1911, but in December two fresh growths appeared round the previous one on the sixth cartilage. The growth on the second cartilage also showed signs of activity. These places were again treated and subsided. The case is still under treatment.

In the more chronic cases of cancer radium may be expected to have an ameliorative effect, even when there are numerous and extensive secondary deposits. The next case, an example of a slow-growing carcinoma with many relapses after operation, has been kept in check for over eighteen months.

CASE IV.

A lady, single, aged 61, a patient of Mr. L. A. Dunn and Dr. E. J. Moore of Blackheath, was first seen in August, 1908. The left breast and glands had been removed four years previously for a slow-growing carcinoma noticed by the patient some years before. The operation was followed by numerous recurrences in and about the scar and in all five operations were required. The last, for recurrence in the axilla one year ago, was followed one month later by a fresh growth in the same region. When I first saw her there were at least nine definite plaques in the scar and surrounding parts, besides some doubtful thickening of the scar tissues. The supraclavicular glands were enlarged and there was thickening over the subclavian artery.

X-ray treatment was given at intervals for a year with decided improvement. Some of the plaques diminished and a few disappeared. At the end of the year several places showed signs of active disease and some of the plaques in the skin increased in size and threatened to become "en cuirasse." Radium was therefore applied to the active nodules and the x rays continued to the rest of the chest. In all the places treated, including the supraclavicular region, there was a rapid decrease in the size. Within a month of the first application each growth shrivelled to a small, hard nodule, and now, eighteen months later, there is no regrowth.

In the places not treated by radium several fresh recurrences have appeared from time to time, the latest in December last. All of these have similarly diminished after radium treatment and remained quiescent.

The following case is in many respects an unusual type of carcinoma of the breast in which radium failed to have the slightest beneficial effect. The original growth was comparatively benign. Nine months after it was first noticed it was still small in size. For four years after excision there was no return of the disease. Then it reappeared in the supraclavicular glands and assumed a rapid and malignant form.

CASE V.

A lady, aged 54, sent to me by Dr. W. G. Thorpe of Balham. Four years ago the right breast and glands were excised by Mr. L. A. Dunn for a small nodule found microscopically to be carcinoma. The nodule in the breast had been noticed nine months before. She remained well until two months ago when the right supraclavicular glands became enlarged and were removed. These were found to be melanotic. When I saw her a definite thickening, but no individual glands, could be felt in the supraclavicular region. X rays three times a week and radium for 120 hours through lead 1 mm. in thickness were applied. The growth slowly and steadily increased, and therefore after two months the case was referred for further operation.

The supraclavicular tumour was excised and the patient was sent to me four months later for further treatment. There was then a large flattened mass in the axilla below the original scar and a small hard lump in the apex of the armpit. The arm was much swollen and the pain severe. Radium was used and the lower growth was at first retarded. The upper small growth, in spite of large doses, rapidly increased. To it radium, through screens of all thicknesses—from lint to lead of 2 mm.—was applied. The crossfire method from in front, behind, and below was also tried without any benefit. In all, this growth alone had over 500 hours' treatment. The disease latterly appeared to be aggravated by the radium; the pain became more intense and the treatment was therefore discontinued. Dr. Thorpe tells me that soon afterwards extensive ulceration occurred, with fresh growths in the scar and supraclavicular region and metastasis in the liver and stomach.

My remaining cases have all been extensive growths in an advanced stage, frequently with ulceration and much involvement of glands. In the majority of these, including inoperable carcinoma of the cervix uteri and rectum and extensive epithelioma of the jaw, there has been decided temporary improvement. As a rule, the discharge and haemorrhage ceases, the pain is relieved, and often there is some decrease in size.

The following is an example of an old-standing atrophic carcinoma:

CASE VI.

A lady, aged 66, sent to me by Mr. C. J. Symonds. *History:* The patient noticed a lump in her left breast about ten years ago. This gradually increased in size, and after six years an ulcer formed and spread. She kept her trouble to herself, although she thought it was cancer, because she had seen many cases and all had returned after operation. A year ago the discharge and bleeding forced her to consult a medical man, and ultimately, after much persuasion, Dr. Harrison of Braintree induced her to have a trial course of treatment.

When I saw her the breast was atrophied and the nipple had disappeared. There was a large sloughing nodular ulcer with irregular edges, measuring 8 by 5 cm., over the breast. Numerous hard lumps above and below were present, with enlarged glands in the axilla and supraclavicular region. Radium was applied without lead to the ulcer, and through 1 mm. lead all over for about forty-eight hours. This relieved the pain, and the discharge and haemorrhage, which had been profuse, nearly ceased. The improvement was so great that a month later the patient herself asked for a further course of treatment. By then the nodules on the ulcer had almost entirely disappeared, the surface was clean, and it was 1 cm. in diameter smaller. New skin had commenced to grow round the edges. The surrounding growths and glands had also diminished. Unfortunately, during the second course of treatment an acute attack of pleurisy, probably of a septic nature, set in, and she died after a three days' illness. The last two months of her life, however, were at least made tolerable.

In the treatment of these cases I have followed the originators of the method in using lead screens. Recently for growths in or immediately under the skin I have employed another method which I think acts as well and saves valuable time. It consists in placing the applicator either without lead or with a thin lead screen, at some distance, ½ in. or more, away from the skin. As the rays are divergent a much larger area, about four times the size of the applicator itself, can now be irradiated by the more penetrating and effective of the rays, the softer and skin-damaging rays being cut off by the air space and layers of lint or cotton-wool. In deeply-seated growths the radium must be placed on the skin, if it is intact, so as to be as near to the tumour as possible, and the skin must then be protected by lead, 2 or 3 mm. thick, to prevent damage from the prolonged exposures required. In these cases, however, there is no doubt that much better results are obtained by burying the radium in the substance of the tumour. I have found no benefit result in the few cases in which radium emanations have been employed, or in which radium bromide has been given internally. In all my cases *x* rays have been applied to the surrounding parts in addition to the radium treatments.

There is no doubt that some varieties of cancer are much more responsive to radium than others. With few exceptions it is in the slow-growing cases that it acts best, and in which a diminution in size may be expected. Unfortunately we have no statistics of the number of cases in which it fails. That failure occurs not infrequently even in those treated on the Continent with large quantities of radium is well known. We know also that it does not always cure the comparatively benign rodent ulcer or prevent its recurrence. I have seen a rodent reappear as late as three years after its apparent cure by radium. As my earliest successful case of cancer was treated only eighteen months ago, it is too soon to speak of the ultimate result. Recently Nahmmacher[2] reported a case of carcinoma with no recurrence as late as three years after radium treatment.

At present the position of radium-therapy seems to be that while it is of undoubted value in many cases, its chief function is in aiding and not in excluding the other recognized methods of treatment. Until it can be proved that relapse and metastasis are not more common after regression from radium than after excision, the method must be reserved for those cases in which operation is contraindicated and for recurrences.

Apart from the question of the curative effect of radium, there is one point of practical importance which deserves attention. It is that in the cases in which radium acts beneficially it acts at once. Within fourteen days of the beginning of the treatment an unquestionable diminution in size will be found in all cases in which radium is able to exert a regressive effect. Occasionally this decrease is seen as early as the third or fourth day. If no improvement is apparent in this time further treatment is useless, except, perhaps, for its palliative effect.

There appears to be no other certain means of foretelling in the individual case the result of radium treatment, and I have found this test application very useful in determining the advisability of a prolonged and necessarily expensive course of treatment. It will be of still greater value, if radium fulfils expectations and its results are found to be permanent, in deciding the question of operation.

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CURATIVE INFLUENCE OF ROENTGEN RAYS IN MALARIA.

BY

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AND

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THE influence of the Roentgen rays in changing the pathological conditions in certain diseases (such as leucocythaemia and lupus) gave one of us the idea that the application of *x* rays over the spleen should have some beneficial effect in cases of malarial fever, where one of the most distressing symptoms is the pain caused by engorgement of the spleen. It was thought that the rays might have some action upon the malaria parasite either directly on the parasite or indirectly by causing changes within the blood which should destroy the parasite.

It seemed not unlikely that the blood changes which are known to be induced within the body after exposure to *x* rays would stimulate the leucocytes to destroy the parasite, or that the altered serum would act in such a manner as to make the continued action of the parasite impossible.

The effect of heat applied over the splenic area in relieving the pain attendant upon an attack of malarial fever gave the idea that *x* rays also might have a therapeutic action as the immediate effect of their similar application.

That these conjectures were not without base is evidenced by the following cases:

A. *Cases of Malarial Fevers.*

CASE I.—Lance-Corporal S., 1st Royal Munster Fusiliers, admitted with a temperature of 104°; B. T.; spleen slightly enlarged and tender. For two days morning temperature rose to 104°. Had quinine by the mouth with no result; exposure five minutes. Temperature dropped to 97° with no subsequent rise, and the pain and tumour disappeared.

CASE II.—Private H., 91st Battery, R.F.A.; B. T.; temperature on admission 104°; some enlargement of spleen with tenderness in the region. No quinine. Exposure five minutes. Temperature became subnormal, pain and tumour disappeared, no subsequent rise.

CASE III.—Gunner W., 91st Battery R.F.A.; B.T. On admission temperature was 104°. He was put on quinine by the mouth. Temperature rose to 104° next day, and on the next to 104.4°. His spleen was slightly enlarged and tender on pressure, which persisted. Exposure five minutes on third morning. Temperature dropped to subnormal, and pain and enlargement disappeared.

CASE IV.—Lance-Corporal P., 2nd North Stafford Regiment; B. T. On admission temperature 103°; the spleen was enlarged 2 in. below costal margin, and painful. Exposure five minutes. The pain was relieved immediately, and the enlargement was lessened; temperature dropped to subnormal. The next morning there was a slight rise of temperature. Exposure three minutes. Enlargement of spleen disappeared totally, and temperature dropped to normal. No further rise. Convalescent. No quinine.

CASE V.—Sergeant H., 1st Royal Warwick Regiment; B. T.; admitted having had ague the day before. Temperature normal. Spleen enlarged 2 in. below costal margin; very painful. Exposure five minutes. The enlargement and pain disappeared and temperature remained normal without any further rise. No return of pain. Convalescent. No quinine.

B. *Cases of "Peshawar" Fever.*

CASE VI.—Gunner B., 86th Battery, Royal Garrison Artillery; B.T.; admitted collapsed. Haemorrhage from the bowels; temperature normal; spleen not enlarged. Exposure five minutes. No return of haemorrhage; temperature remains about 98°. No quinine.

CASE VII.—Private McS., 1st Royal Munster Fusiliers; B.T.; admitted in collapsed condition. Haemorrhage from bowel; temperature 99°. Exposure five minutes. No return of haemorrhage. On the second day the temperature rose to 101°. Given exposure of three minutes every day. On the fourth day temperature normal, with no haemorrhage during this time. No quinine.

C. *Malaria with Cerebral Symptoms.*

CASE VIII.—Private K., 1st Royal Munster Fusiliers, admitted with B.T.; temperature 104.8°; collapsed. No haemorrhage, no enlargement of spleen; mental type. Had one injection of quinine on second morning, and quinine by the mouth on the third and fourth. No satisfactory results; temperature still remained high, and the mental symptoms persisted. Exposure of five minutes on morning of fifth day. Temperature became normal, pulse improved, patient became brighter. No further rise of temperature.