CAUSES OF ETHER CONVULSIONS.

Various factors have been presented as giving rise to the alarming and only too frequently fatal convulsions arising during ether anaesthesia.

1. *Impurities in the Ether.*—This factor was strongly upheld by the late Dr. S. R. Wilson.³ He maintained that the convulsions were of toxic origin, and resulted from the action of acetaldehyde causing cell asphyxia by its inherent properties as a reducing agent, with the subsequent formation of acetic acid. That this was the cause in my own case I have no doubt. The convulsions gave every appearance of arising from severe and continuous irritation of the central nervous system. Evidently there was present some toxic product which was not eliminated from the system as rapidly as ether, hence the post-operative convulsions. Again in favour of a nerve cell disorder was the subsidence of convulsions after the exhibition of bromides and chloral.

2. *Deep Etherization.*—This has been suggested as a cause. In answer to this, it may be asked how many cases of ether convulsions have been observed in comparison with the number of cases that have been deeply etherized?

3. *Excess of CO₂ in the system* is suggested by Dr. Pinson⁴ as a cause of dyspnoea, with exaggerated muscular activity overflowing from the respiratory group to the rest of the body. In the case recorded, at no stage of the operation was there any marked excess of CO₂. An airway was used throughout, and except for one short period the patient kept a good colour.

4. *Lack of oxygen supply to the brain*, due to oedema and collapse of the lung bases, is suggested by Dr. Gwathmey⁵ as a result of various animal experiments. Against this theory is the failure to arrest the convulsions in my own case by free ventilation of the patient with oxygen.

5. *Atropine overdosage* has been put forward by Dr. Hornabrook.⁶ On the other hand, the dose administered in this case was the usual routine pre-operative measure adopted at this hospital, and no similar case had occurred before.

6. *Renal origin* has been suggested. In the present case the urine before operation was found to be free from pathological elements, but after operation ketone bodies were present in abundance. This latter finding is again in support of a toxic origin of the convulsions.

7. *Idiosyncrasy* has been offered as being the basic factor. Obviously this affords a very wide field for speculation, and only time will prove or disprove this theory.

8. *Various minor factors*, such as youth, pre-existing toxæmia, and heat, have been postulated. Cases are on record supporting and opposing these factors.

SUMMARY.

A case of epileptiform convulsions is described occurring during the course of ether anaesthesia.

The ether was shown, by readily utilized tests, to contain large proportions of two well-known impurities sometimes associated with ether.

Although nine other bottles of the same batch were subjected to the same tests no impurities were detected in these.

Acetaldehyde was probably the factor causing the convulsions by its action on a nervous system perhaps already rendered susceptible by a pneumococcal septicaemia, but certainly a nervous system to which epilepsy was previously quite foreign.

Acetaldehyde, being of higher specific gravity and therefore less volatile than ether, accumulated in the system and was eliminated less speedily, thus causing the delayed post-operative seizures.

No cases of ether convulsions were recorded when ether was used as an anaesthetic during the seventy years previous to 1919. At this time various contentions were published that pure ether was not an anaesthetic, and as a result impure ethers came into use.

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THE SYSTEMIC TREATMENT OF INFECTIVE ARTHRITIS.

BY

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MASQUERADE of the condition formerly designated rheumatoid arthritis and, more recently, infective arthritis under the title of focal arthritis, together with the importance attached to the discovery of a focus of infection, has resulted in too narrow an outlook and oversight of the fact that, at any rate from the therapeutic point of view, this condition should be regarded as a systemic infection and not as a disease of joints.

This view, which of necessity embraces a wider outlook, calls for more comprehensive methods of treatment, the essentials of which are a raising of the individual's immunity and the correction of biochemical abnormalities: the former implying the principles of treatment commonly applied to the active stage of, say, tuberculosis, and the latter, adjustment of departures from the normal in each system, the alimentary, the haemopoietic, etc., stage by stage. The success of such treatment depends in large measure upon individual experience in knowing just when to tackle each system. It will thus be seen that every case requires individual consideration in the matter of treatment, section by section. Actual joint treatment will not be discussed in this paper.

The removal of infective foci, when present and obvious, should automatically take place, not necessarily in the hope of immediate results, but as a routine to relieve the individual from any embarrassing load factor.

Bearing in mind the common incidence of tonsillar and oral sepsis in non-arthritis it does not seem unreasonable to suggest that the alimentary tract, even in virtue of size and occultness alone, is potentially the source of infection in a large percentage of cases of arthritis, and the not unusual methods of treatment by intestinal antiseptics, Plombières douches, and vaccines made from intestinal organisms are tacit witnesses to this view.

The relative value of any form of intestinal disinfection is difficult to assess correctly, in that some cases respond more readily to one treatment than others, and the chronicity of the disease bears a definite relationship to this response. I am rather in favour of the administration of small doses of calomel, such as one-sixth of a grain every hour for six doses on alternate days, followed by a saline the next morning. Another method found most efficacious in some instances is that of changing the pH value of the intestinal medium by administration of pure cultures of lactic acid bacilli in milk twice a day. On some occasions the rectal administration of this has been tried after colon evacuation by enemata. Plombières douches have been found extremely useful on the whole and are always worth consideration. It is difficult to estimate the disinfecting powers of potassium permanganate in capsules when taken by the mouth and followed by a draught of water on an empty stomach, but this method, with or without rectal irrigation with permanganate solution, has its advocates. Guaiacol carbonate with sublimed sulphur in cachets over a long period of time is a routine of long standing. The administration of streptococcal vaccines would seem to be most indicated where there is an associated nasopharyngeal involvement, especially when allergic in origin. In the atrophic form of arthritis achlorhydria is exceedingly common, and if the result of a fractional test meal proves this to be the case hydrochloric acid well diluted should be given at meal times.

Although in many cases of infective arthritis, personally investigated, the levulose tolerance test and Widal's haemoclastic test seem to be too gross to demonstrate a liver inefficiency, yet an hepatic inadequacy of a mild or moderate degree may be assumed on the summary of evidence obtained by a skilled biochemical opinion on the urine and stools, and the somewhat haphazard diet sometimes prescribed for these patients is capable of adjustment to meet the capabilities of any particular digestion until such time as the temporary rest afforded to the liver

by these means is no longer required. When the sugar storage mechanism is at fault and an emaciated patient is required to put on weight, insulin in suitable doses, together with the ingestion of glucose or sugar-candy, has been found very useful.

Moderately severe secondary anaemia is usual in infective arthritis. This has to be combated by the methods usually adopted in secondary anaemia, such as iron and arsenic by the mouth or injections of serum ferrugineux, but it is not unusual in chronic cases to find a fatigued bone marrow, and recently liver feeding has produced some hopeful results. The troublesome leucopenia which follows prolonged arthritis sometimes responds to injections of nucleic acid.

The value of skilfully given massage as a general measure in infective arthritis is too well known to need comment, but hydrotherapy (though its indiscriminate use in the acute and subacute stages has brought discredit on many spas) is useful, when properly applied, throughout the course of the disease, quite apart from the question of joint treatment, as a general sedative or stimulant to metabolism, to induce sweating and ensure sleep. Moreover, any well-equipped spa, being an arthritic unit in itself, implies the presence of specialized apparatus and personnel. In the systemic treatment of arthritis hydrotherapy is particularly useful in increasing the function of that highly specialized but much neglected organ the skin. The sweat in the grosser forms of arthritis has a characteristic and tenacious odour, and the skin is apt to be either greasy and opaque or else atrophic and shiny; the various methods of hydrotherapy, therefore, in overcoming the dysfunction of the skin cannot be over-estimated. In arthritic cases complicated by fibrositis and more particularly by panniculitis there is no treatment which adequately takes the place of hydrotherapy.

PERSISTENT PRIAPISM DUE TO SECONDARY CARCINOMA IN THE CORPORA CAVERNOSA.

BY

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SCHEUER,⁴ in an elaborate classification of the causes of priapism published in 1911, mentions as a subheading "neoplastic diseases of the penis." This appears to be, however, a rare phenomenon, as is, indeed, priapism itself.

It seems worth while to record the following case in which the etiology of the symptom was not ascertained during life.

A labourer, aged 62, was admitted to my service in the Wellington Hospital on March 18th, 1926, with the history that five weeks previously the penis had become erected and had remained so. There was mild aching pain about the organ, at times shooting into the perineum and thighs. He had had mild nocturia for some years. Since the onset of the priapism there had been some scalding on micturition, but no difficulty, and the stream was good. He stated that at times the urine was dark in colour. There was no definite haematuria. He had not lost weight or strength.

Examination showed him to be a well-nourished, somewhat adipose man. No oedema was present. The cardiac and respiratory systems were normal. Blood pressure 140/80. The abdomen was very large owing to fat, and was difficult to palpate. There was no apparent enlargement of the liver or spleen; no dullness in the flanks; no pain on pressure in the costo-vertebral angles. Neither kidney was palpable or tender. The testicles and scrotum appeared to be normal. The penis was erect, hard, and turgid, lying parallel to the abdominal wall. No irregularities were felt on careful palpation of the corpus spongiosum or corpora cavernosa.

On rectal examination a soft, uniformly enlarged prostate gland was felt projecting markedly into the rectum and extending upwards so that the examining finger could barely reach the uppermost limit. No nodules or indurations were felt in the region of the bulb or membranous urethra.

The urine was acid, with no deposit; specific gravity 1018. No white cells, organisms, or red cells were present.

A blood count showed red cells 4,500,000, white cells 7,000; lymphocytes 34 per cent. The central nervous system seemed normal.

The Wassermann test of blood and spinal fluid was negative. The Kahn test also was negative.

Kidney function: phthalein, 52 per cent. in first two hours. Blood, non-protein nitrogen, 40 mg. per 100 c.cm. There was no residual urine. It was impossible to pass a cystoscope for study. Plain x ray gave negative results.

Provisional Diagnosis.—Leukaemia and central nervous disease having been eliminated, the cause of the priapism remained obscure. The only notable pathological feature was the very large prostate.

All the usual non-surgical measures were tried without any effect.

Operation.—Suprapubic prostatectomy was performed. The mass removed, comprising two lateral lobes, had the dimensions of 6 cm. by 5 cm. Microscopically there was no sign of malignancy.

The patient seemed to recover well from the operation, but the priapism was little, if at all, improved. He was allowed up on the third day. On the eleventh day he was not so well, and there was very little urinary secretion. In spite of all treatment the urinary flow was not properly re-established, the non-protein blood nitrogen reached 67 mg., and he died in coma on April 25th, fourteen days following the operation.

Necropsy Findings.—There was a suprapubic wound partially healed and a healthy-looking prostatic cavity. The bladder showed no inflammation and but little trabeculation. The ureters were not dilated. The right kidney was normal in size, but on section showed early dilatation of the pelvis and some toxic pallor of the cortex. The left kidney presented a cystic swelling on its upper and outer aspect. The cyst was lined by necrotic membrane and filled with blood-stained turbid fluid. It did not communicate with the pelvis, which was somewhat dilated. The kidney was pale, and at one part of the cortex was a small whitish nodule of tumour. The liver was filled with discrete masses of new growth. The corpora cavernosa were infiltrated with white masses of tumour, which in parts showed red patches of degeneration. The fibrous capsule was not invaded; except on section there was no evidence of the growth. There was no glandular involvement and there were no other metastases.

Microscopical Appearance.—The nodule in the kidney and the walls of the cystic cavity, together with sections of the deposit in the liver, all gave a similar appearance—namely, masses of cubical cells having an elongated acinar arrangement strongly resembling the convoluted tubules of the kidney. This is a not uncommon appearance in sections of certain portions of so-called Grawitz tumours, and is fairly characteristic of carcinoma as seen in the renal substance. Primary carcinoma in the corpora themselves would presumably not take on this formation, but would be of the carcinoma simplex type with stroma more or less developed. For this reason it is assumed that the primary growth was renal. The late development of symptoms associated with a lesion of the corpora would confirm this view.

Comment.

The commonest causes of priapism of the persistent type appear to be leukaemia and lesions of the central nervous system. Cases in which it is due to blocking of the circulation in the corpora cavernosa by malignant growth are rare. Dr. Frank Hinman³ published in the *Annals of Surgery* in 1914 a comprehensive review of the subject of priapism in general, and in 173 references in the bibliography attached not a single one was due to malignancy.

The only reference found in a casual survey of more recent literature was in a case reported by Cowie,¹ in which the substance of the corpora cavernosa was replaced by myxosarcomatous tissue spreading from a primary growth in the prostate.

Dr. W. A. Frontz² of Baltimore recently reported a case at the annual meeting of the American Association of Genito-urinary Surgeons, Atlantic City, N.J. This case was not diagnosed until necropsy. An attempt was made to relieve the condition by incision into the corpora cavernosa. At necropsy extensive metastases were found, but Dr. Frontz was inclined to think that the tumour was primary in the corpora cavernosa. At the same meeting Dr. H. H. Young⁵ of Baltimore mentioned that he had encountered a similar case.

Diagnosis in these cases is apt to be erroneous as the growth is well confined in the sheath of the corpus and no nodulation can be felt from the outside. In cases where malignancy is widespread in other parts of the body no treatment appears to be of any use.

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