quiet coma, but when convulsions and motor unrest are present they are often exaggerated, the plantar responses extensor, and clonus present. There may be neck rigidity (Machle, 1941; Plummer, 1913).

The urine sometimes contains traces of albumin and sugar. Unlike benzol, petrol and benzine are not excreted in the urine in conjugation with sulphates (Wichern, 1909). A blood count often shows a moderate reduction of haemoglobin and erythrocytes, and an increase of bilirubin in the serum, but there may be haemoconcentration. A polymorph leucocytosis is frequent and the percentage of eosinophils may be increased. Blood changes are, however, not prominent as in benzol poisoning. Sometimes there is a rise of blood urea, but not sufficient to cause confusion with uraemia. The cerebrospinal fluid is not altered.

Prophylaxis and Treatment

Prophylaxis.—Where petrol is handled in enclosed places adequate ventilation must be assured, so that, when exposure is likely to be prolonged, concentrations of 1 part per 1,000 are not exceeded. Too much faith should not be placed in an oxygen-breathing apparatus, especially when the concentration of petrol vapour is likely to be high, as the fumes have great penetrative power.

Treatment.—The victim should be removed at once to the fresh air. If breathing has ceased, artificial respiration will be required, and oxygen, if available, should be given, preferably with 5% of carbon dioxide. The clothes, as they are saturated with petrol vapour and may be contaminated by the liquid, must be removed and the skin cleansed. Sedatives are required if there is much restlessness, paraldehyde or chloral hydrate generally sufficing. In very violent patients intravenous pentothal may have to be used. A dose of 0.5 g. dissolved in 10 c.cm. of distilled water is injected slowly till a quiet sleep has been procured. The remainder of the dose is then injected intramuscularly to prolong the action of the intravenous dose. Careful supervision must be exercised during the first four days lest respiratory arrest, circulatory failure, or convulsions supervene. In circulatory failure adrenaline should be avoided, as it tends to cause pulmonary oedema (Machle, 1941).

Pathology

The macroscopic changes are found for the most part in the lungs, which are hyperaemic and oedematous and show petechial haemorrhages and extravasations of blood. The bronchi are inflamed. There may also be haemorrhage into the serous cavities and the subserous tissues, and into the mucosa of trachea, gastro-intestinal tract, and bladder. The meninges, brain, and spinal cord are hyperaemic and oedematous, and show petechial haemorrhages. The kidneys are oedematous. Histologically, cloudy swelling and fatty degeneration are found in the liver and in the proximal convoluted tubules of the kidneys. The cerebrum is congested, and there are perivascular extravasations of blood. The nerve cells of the brain and spinal cord show chromatolysis, loss of lipoid, and dendritic degeneration. There is swelling or disappearance of myelin (Jansen, 1937; Machle, 1941).

Sequelae

Mild neurasthenic symptoms, such as headache, sleeplessness, and anorexia, are common after petrol poisoning. Evidence of organic change in the nervous system is, however, not infrequent, particularly epilepsy (Floret, 1927), but also lesions of the pyramidal, cerebellar, or sensory tract simulating disseminated sclerosis or other organic nervous disease (Potts, 1915). The signs may be of scattered lesions or be hemiplegic or of more local distribution. Memory and intellect may be impaired. Sometimes the peripheral nerves are involved, often only a single nerve, such as the sciatic nerve (Jansen, 1937) or one of the cranial nerves, such as the hypoglossal. Retrobulbar neuritis has been recorded. These symptoms and signs may not become evident for several months after the accident, and recovery may take many years, or the disability be permanent. An early and fatal complication described by Floret (1927) is necrosis of the skin of the face and of the mucous membrane of the mouth and throat, following an erysipelas-like eruption. Pneumonia may occur, but is more common after the inhalation of liquid petrol—as when it is drunk—than of vapour.

Summary

Two cases of acute poisoning due to petrol vapour are described. The aetiology, clinical features, and pathology are reviewed.

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REFERENCES

Box, C. R. (1908). *British Medical Journal*, **1**, 807.
Coste, F., and Wolz, G. (1935). *Ann. Méd. lég.*, **15**, 909.
Fieldner, A. C., Katz, S. H., and Kenney, S. F. (1921). *Permeation of Oxygen Breathing Apparatus by Gases and Vapors*, technical paper 272, U.S. Dept. of Commerce, Bureau of Mines, Washington.
Floret (1927). *Zbl. Gewerbehyg.*, **14**, 257.
Foulerton, A. G. R. (1886). *Lancet*, **2**, 865.
Haggard, H. W. (1921). *J. Pharmacol.*, **16**, 401.
Hamilton, A. (1925). *Industrial Poisons in the United States*, New York.
Houghton, M. (1908). *British Medical Journal*, **2**, 1747.
Jansen, H. H. (1937). *Dtsch. Z. Nervenheilk.*, **144**, 68.
Johnson, J. G. W. (1913). *Canad. med. Ass. J.*, **3**, 118.
Johnstone, R. T. (1941). *Occupational Diseases*, W. B. Saunders, Philadelphia.
Kulkow, A. E. (1926). *Z. ges. Neurol. Psychiat.*, **103**, 435.
Lazarew, N. W. von (1929). *Arch. f. Hyg.*, **102**, 227.
Machle, W. (1941). *J. Amer. med. Ass.*, **117**, 1965.
Petrie, A. S. (1908). *British Medical Journal*, **1**, 987.
Plummer, S. W. (1913). Ibid., **1**, 661.
Potts, C. S. (1915). *J. nerv. ment. Dis.*, **42**, 24.
Rambousek, J. (1913). *Industrial Poisoning from Fumes, Gases and Poisons of Manufacturing Processes*, London.
Roth, O. (1933). *Arch. Gewerbepath.*, **4**, 727.
Rudd, T. N. (1944). *J. R.A.M.C.*, **82**, 271.
Siemon, O. (1896). *Mschr. Unfallheilk.*, **3**, 366.
Stiefler, G. (1928). *Wien. med. Wschr.*, **78**, 938.
Tschernikow, A. M., Gadaskin, I. D., and Gurewitsch, I. I. (1935). *Arch. f. Hyg.*, **113**, 313.
Wichern, H. (1909). *Münch. med. Wschr.*, **56**, 11.

MONO-ARTICULAR OSTEO-ARTHRITIS OF THE HIP

TREATMENT BY ACID INJECTION

BY

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During the past nine years I have treated over 1,200 cases of arthritis by intra-articular acid injection, comprising chiefly those of osteo-arthritis, of traumatic arthritis, of so-called "menopausal" arthritis, and of rheumatoid arthritis in the residual deformity stage. Owing to war conditions, effective statistical analysis of results has been impossible; it may, however, be legitimate to gauge the value of the treatment from the increase in the number of patients referred to my two hospital clinics annually—from 56 in 1940 to 186 in 1944. I estimate that over 70% of cases of all types have been rendered free from pain and with sufficient restoration of function to allow of a return to their normal occupation.

Mono-articular arthritis of the hip-joint, however, occupies an unenviable pedestal of intractability among joint affections. According to MacMurray (1943), "local treatment of the affected joint by hot packs, hot mud packs, radiant heat, etc., results in a more or less temporary relief of pain, but produces little interruption in the progress of the disease. Electrical treatment by ionization has proved to be of little or no value, and its use is followed in some instances by a considerable increase in the pain and tenderness." Manipulation has its advocates for early cases; fixation by plaster or other support will give relief from pain; deep *x*-ray therapy is said to effect improvement in about 10% of cases—the Freiburg authorities claimed that 33% of their cases were relieved by deep therapy. As none of these measures has in my experience arrested the disease process and has rarely returned the patient to economic circulation, it seemed that an analysis of the condition of the cases treated by joint acidification in one year might afford some indication of its usefulness or otherwise in this baffling disorder.

The rationale of acidification of arthritic joints is based on my observations on the *p*H of synovial fluid in various conditions (Waugh, 1936, 1938): in chronic osteo-arthritis of the hip this appeared to be consistently on the alkaline side—even as high as 8.8. It has been shown by Smith-Petersen that the use of the vitallium cap after excision of the head of the femur

is followed by the generation of a layer of fibrocartilage in the acetabulum and over the stump of the neck : I have not so far been able to obtain a similar specimen from the hip-joint after acidification ; but examination of the cartilage removed from the head of the tibia in a case of osteo-arthritis of the knee, which had received a long and successful course of this treatment, showed a covering of fibrocartilage 1/32 in. thick, covering the whole weight-bearing surface.

Warren Crowe (1944) has reported his results in 400 cases of all kinds, using acid potassium phosphate. I prefer lactic acid, as more closely approximating a natural acid found in the tissues : some difficulty was experienced in obtaining a stable preparation of constant *p*H, but this has been overcome.

Technique.—Briefly, the technique consists of (1) an injection each week of 15 to 20 c.cm. of a solution of lactic acid of a *p*H of 5.8, together with procaine, into and around the joint ; (2) followed by very gradual manipulation, and flexion-abduction-extension exercises, without weight-bearing, consistently and perseveringly carried out by the patient.

Analysis of Cases

The cases described are of the hospital out-patient class, referred to me either by the physiotherapy department or directly by their own doctor. In all, 142 cases have been examined and 108 treated in this way during the last five years. Owing to removals, bombing, and other causes, I have not been able to attempt a complete follow-up of these cases : I have, however, investigated the result obtained in 26 consecutive cases which were referred to me in the year 1942 ; and I find that between 50 and 60% of these patients obtain enough relief from pain and recovery of function to be able to carry on their normal occupations, including housework and shop assistant's work in women, and shipyard work—riveting—and even in two instances coal-hewing, in men.

In this condition it is extremely difficult to establish any scientific criterion of success or failure of treatment. Pain, the patient's chief disability, is a subjective matter ; with the possible exception of the demonstration of the narrowed joint space, radiography is an indifferent guide to the clinical condition ; nor does limitation of range of movement bear any constant mensurable relation to the clinical condition. For a number of years I have made my own percentage assessment of the degree of overall disability. For example, when a patient is for all practical purposes confined to bed he is assessed at from 90 to 100% disabled ; others able to get about, but with considerable difficulty, at 70 to 80%. These assessments are entered on the patient's case-sheet at the beginning of treatment, while on completion a final assessment of the degree of disability remaining is made. While this is a purely clinical method of estimation and dependent on the surgeon's personal observation, I find it the most useful means of ascertaining whether the patient has improved under treatment.

Discussion

The chief contraindication to suitability for this form of treatment is extreme loss of joint space, particularly in the outer and upper quadrants of the joint, as seen by radiographs. The amount of osteophytic outgrowth does not in itself, however, govern the suitability of the case for acidification. Extreme loss of joint space indicates extensive destruction of the articular cartilage, and, apart from the unlikelihood of obtaining effective regeneration of joint surface by fibrocartilage, the mechanical difficulty of reaching the space of the joint with the needle is almost insuperable. Five of the 26 cases come into this category, of which two were successfully dealt with by oblique osteotomy ; no treatment was given to the remaining three. Three cases failed to continue treatment after the first or second injection, and must be written off. Of the remaining 18 cases, all of which I have examined within the last few months, four were in-patients and carried out what I regard as the complete course. These are naturally the most successful. Three appear to be almost completely free from symptoms : one, a housewife who had been confined to bed or a chair for a year previous to treatment, is now fully active, does all her housework, and can stand in queues and do her shopping. By her own account she is practically free from pain or any disability. There is still some limitation of range of movement, particularly inward rotation. Her original classification was in the 90 to 100% class ; I estimate her total disability now as under 10%. The two remaining male cases were those of a coal-miner and a slinger at an ironworks ; both are free from pain, but have rather greater limitation of range of movement ; they have returned to full work at their heavy occupations. The fourth case is a failure ; for a year after finishing treatment this patient continued fairly well, but his condition has since deteriorated. The remaining 14 patients—nine men and five women—were treated purely as out-patients. The average disability figure at the first examination I put down as in the region of 60% ; only three (men) are relative failures, in that after completion of treatment the disability figure is still in the region of 40%. The other 11 are all sufficiently recovered to carry on a useful existence, and, in several cases, hard physical work, without complaint of pain ; their average remaining disability figure I put at well under 20%. Two of them have returned in recent months, as they felt they were getting more pain. They have been given a further course of six injections ; this appears to have cleared up any return of symptoms.

Results in 18 Cases of Mono-articular Osteo-arthritis of the Hip treated by Joint Acidification

	No.	Results		
		Very Good	Good	Poor
In-patients	4	3	0	1
Out-patients	14	4	7	3

It is not easy to obtain a solution which remains constant ; I use that made for me by Brady and Martin, Newcastle-upon-Tyne, which is reliable.

Summary

The method of treatment of osteo-arthritis by intra-articular acid injection is outlined.

Non-operative methods of treatment of mono-articular osteo-arthritis of the hip are itemized.

The results of acid injection in 18 cases are analysed.

REFERENCES

Crowe, H. Warren (1944). *Lancet*, **1**, 563.
MacMurray, T. P. (1943). *A Practice of Orthopaedic Surgery*, p. 155, London.
Waugh, W. G. (1936). *Lancet*, **2**, 976.
—— (1938). Ibid., **1**, 487.
—— (1939). *Rheumatism*, London.

TORSION OF A PEDUNCULATED GASTRIC CYST

BY

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AND

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Cysts of the stomach are rare and few cause symptoms. We describe in detail one case of clinical importance and mention three others in a short discussion upon gastric cysts.

Case Report

Clinical History and Examination.—A woman aged 62 had felt rather full in the abdomen for two years and had noticed a swelling in the right iliac fossa for about four months. She had been troubled with constipation and hiccups also. On palpation of the abdomen a freely movable globular tumour about the size of a grapefruit was found. It was not tender and could be pushed right up under the costal margin. A long-pedicled ovarian cyst was diagnosed and its removal advised.

On laparotomy the tumour proved to be a cyst in the peritoneal cavity with a long pedicle attached to the greater curvature of the stomach. The pedicle was twisted about five times, and the cyst, although not necrotic-looking, was discoloured in places. There were patches of fibrinous exudate and a portion of lightly adherent omentum upon its surface. Muscle fibres of the muscularis of the stomach were observed running from the greater curvature right down the pedicle to the cyst wall. The cyst was removed without difficulty and the patient made an uninterrupted recovery. Subsequent questioning yielded no information indicating when the torsion had occurred.

Pathological Examination.—The specimen consisted of a cyst, 11 by 10 by 7.5 cm., the outer surface of which was greyish blue,