NON-TRAUMATIC CLOSTRIDIAL MYONECROSIS

By J. G. CAMBLIN
Senior House Officer, Royal Victoria Hospital, Belfast

and J. G. KINLEY
Now Consultant Surgeon, Moyle Hospital, Larne

GAS GANGRENE is defined as an invasive anaerobic infection of muscle, which is characterised by massive tissue death and by variable degrees of gas production. It is caused by the following organisms of the Clostridial group: C. perfringens (welchii), C. novyi (oedematiens), C. septicum (jeseri), C. fallax, C. bifermentans and C. histolyticum. There are numerous other strains within this group but the above mentioned are the only strains capable of producing gas gangrene without any other organism being present (MacLennan 1962). Gas gangrene can also be caused by anaerobic streptococci. In almost all cases these organisms gain entry via a wound that has been contaminated by soil, faeces or foreign body.

Non-traumatic gas gangrene is a much rarer phenomenon and of nine reported cases there has been only one survival of three weeks, the others dying within the first forty-eight hours (Marty and Filler 1969). In these cases there has been no visible external portal of entry and almost all the patients were more susceptible to disease by being either diabetic or on cytotoxic agents. In this case the patient was an elderly man who was neither diabetic nor receiving cancer chemotherapy. He had an adenocarcinoma of the caecum and presented as gas gangrene.

CASE REPORT

The patient was a thin elderly male of seventy-four years of age who was brought to Lagan Valley Hospital because of severe pain in his left thigh. He was so ill that he was unable to give a history but his wife was able to give a clear account of his illness. He had had no previous hospital admissions but one year earlier he had attended as an out-patient for investigation of abdominal pain, and had a barium meal carried out which was normal. Six months later he began to complain of upper left abdominal pain, loss of appetite, weight loss and constipation. He had had diarrhoea for four days prior to admission and the day before admission his abdominal pain had increased and he had vomited. The pain radiated into the left thigh which was discoloured, being dusky-blue in colour.

On examination he was pale and had a normal temperature, the pulse rate was 84 per minute in sinus rhythm and the blood pressure was 130/80 mm. Hg. There was no evidence of heart failure. There was generalised tenderness over the abdomen and this was maximal in the right iliac fossa. Guarding and rebound tenderness were also present. A rectal examination revealed only faeces. Femoral pulses were good, no leg oedema was present and joint movements were normal. The left thigh was swollen, bruised and tender. He lay with the leg semi-flexed and abducted and on palpation the thigh was crepitant throughout its medial aspect. A diagnosis of gas gangrene was made and the patient prepared for laparotomy. The only laboratory data of significance was an Astrup of pH of 7.10 and a base excess of −17.5.
OPERATION

A lower right paramedian incision was made and foul smelling, faeculent pus was found in the peritoneal cavity. A large fungating carcinoma of the caecum was present but without evidence of perforation or lymph node involvement. There was no visible lesion of the pelvic peritoneum. A right hemicolectomy was carried out with end to end anastomosis in two layers. The wound was then closed in layers with drainage, and attention now focused on the left thigh.

The skin of the left thigh was now more extensively bruised and had developed several large fluid filled blisters which had not been present at the start of the operation. An incision from the medial end of the inguinal ligament to the knee joint was made and the necrotic skin and muscle excised. The muscle excision comprised the entire adductor group which was black and crepitant. The raw area was dressed with saline soaked swabs.

TREATMENT

The patient was started on penicillin 1 mega q.i.d, and gastric aspiration and intravenous infusion commenced, the solution containing tetracycline 500 mg. per litre. Four units of blood i.e. two litres and 10 ml. calcium solution were given at operation. Sodium bicarbonate 100 meq. was also given to correct acidosis. In spite of this the patient’s condition rapidly deteriorated and he died six hours after admission.

LABORATORY DATA

C. septicum was isolated from a culture swab taken from the thigh at operation. The organism was sensitive to penicillin and tetracycline. The segment of bowel comprising the right colon and terminal ileum showed a fungating tumour eight centimetres across situated on the antero-medial aspect of the caecum. This was surrounded by an area of oedema and fibrinous exudate that extended to the ascending colon. A few adjacent lymph nodes were slightly enlarged. Histological examination showed frank carcinoma in some areas but the rest of the tissue was difficult to recognise due to extensive necrosis. The germinal centres of the lymph nodes were enlarged. A sample of the excised thigh muscle which was black and crepitant at operation, showed inflammatory cell infiltration and marked oedema which separated the muscle fibres apart, and in addition spaces which must have contained gas were seen. A minor degree of atheroma was detected in the great vessels at post mortem only.

DISCUSSION

The source of any clostridial infection is direct from the gastro-intestinal tract or indirectly via soil and water that have been contaminated by faeces. This infection is a hazard in any surgical procedure involving areas liable to contamination by faecal material. In other reported cases of non-traumatic gas gangrene the sources were perforated colonic lesions, cholecystitis and in one case from a perforated duodenal ulcer (Cabrera 1965, Marty 1969, Eraklis 1969, and Rose 1966). In the present case a colonic lesion was present in the form of a non-perforated but fungating carcinoma of the caecum. Usually clostridia are only of serious importance if they enter the circulation and cause a clostridial septicaemia (MacLennan 1962). When one thinks of the number of wounds and incisions that are exposed to clostridia or from which the organism may be cultured, surprisingly few ever develop gas gangrene.
As to why the lesion should develop in the opposite thigh to the presumed source of infection is not known. There was no direct communication between the caecum and the left thigh and the peritoneal wall of the pelvic cavity was macroscopically intact. It is possible that the organisms entered the circulation and seeded to the muscle of the left thigh. Such clostridial infections are common in lower animals and here no macroscopic source is found. The dog is very susceptible to *C. septicum* but this is a slightly different strain from that which affects man. The organisms are carried in the tissue as parasites but this is not known to happen in man (MacLennan 1962). It has been known for a contaminated wound to harbour spores in the scar for up to fourteen years and for them then to germinate to cause gangrene, but this patient did not have any such scar.

It has been found that clostridial myonecrosis is most often located in areas of large muscle mass such as the buttocks, thigh and shoulder. The affected muscles have not been normal as the organism is anaerobic and cannot grow in aerobic conditions. It is found associated with vascular damage due to arterial disease or to blunt trauma and similar conditions may also be produced by cold or shock. All these factors produce local tissue anoxia with associated regional acidosis from the lactic acid produced by the muscle itself (Rose 1966, Whyland 1960). The lowering of the pH does not markedly affect the organism but does promote the proteolytic enzymes produced by them. The major factor in this is the alpha toxin which promotes muscle cell death and thus allows the organisms to grow (MacLennan 1962). It is the circulating toxins that produce the widespread toxaemia, shock and death.

This patient was treated in the recognised manner by intravenous infusion to restore circulating blood volume, bicarbonate to correct acidosis, antibiotics, and by excision of the necrotic tissue to remove the focus of infection. In spite of this he died as a result of continuing shock. Hyperbaric oxygen therapy is strongly advocated by many authors (Rose 1966, Eraklis 1969) but was not readily available to us. From this and other reported cases a patient presenting as localised gas gangrene of an extremity without local trauma has most likely a perforating lesion or a carcinoma of the gastro-intestinal tract as the source of organisms. This being so, rapid treatment of the gangrene with removal of all dead tissue and laparotomy is essential, but even with the most energetic measures no patient has survived longer than three weeks. Possibly the only method by which the present uniform mortality may be circumvented is by prompt diagnosis, resuscitation and early radical surgery together with hyperbaric oxygen therapy when available.

**Summary**

A case of a fungating adenocarcinoma of the caecum in a non-diabetic male which presented as non-traumatic clostridial myonecrosis of the contralateral thigh is reported. The standard resuscitation, operative and antibiotic measures are described and the uniformly fatal outcome to date is noted.

We are grateful to Mr. G. I. Young, Consultant Surgeon of the Lagan Valley Hospital, Dr. J. E. Morison of the Pathology Department of the Belfast City Hospital, and to Dr. W. Shepherd of the Bacteriological Department of the Belfast City Hospital, for permission to report this case.

152
REFERENCES
Cabrera, A., Tuskada, Y., Prickren, J. W. (1965). Cancer, 18, 800.
Eraklis, A. J., Filler, R. M., Pappas, A. M., Bernhard, W. F. (1969). Amer. J. Surg., 117, 485.
MacLennon, J. D. (1962). Bact. Rev., 26, 177.
Marty, A. T., Filler, R. M. (1969). Lancet ii, 79.
Rose, H. D., Bukosly, R. J. (1966). J. Amer. med. Ass., 198, 1368.
Whyland, W. A., Levin, M. N. (1960). Amer. J. Surg., 99, 77.

BOOK REVIEW
PREVENTIVE MEDICINE IN MEDICAL CARE. By Kurt Schwarz. (Pp 216. £2.50). London: H. K. Lewis, 1970.
The author of this book combines his appointment as Senior Lecturer in Preventive Medicine and Public Health at the University of Leeds with those of Assistant Medical Officer to the City of Leeds and Consultant Physician to the United Leeds Hospitals. By virtue of these appointments he is in the unique position of being able to take a broad view of the epidemiology of infectious and non-infectious disease from both the hospital and clinical and the community and social standpoints. The first edition comes at an opportune time when much emphasis is being placed on the social and preventive aspects of disease and on the inter-relationship between the environment and the health of its citizens. There is justification for bringing a greater content of medical care to the patient in his normal home environment.
On reading this volume one is continually reminded of the importance of health education and preventive medicine generally, and as disciplines which will undoubtedly assume greater importance in the “unified” health services of the future. The author lays stress on this approach by subdividing chapters under such headings as “pre-symptomatic diagnosis”, “primary and secondary prevention”, “early diagnosis” and “public health aspects”. He further emphasises the theme in his reference to the importance of “screening” in medical care, in the surveillance of “at risk” groups in the community and in the emphasis on “specific projects” with public co-operation, e.g. in the fields of cancer diagnosis and accident prevention.
A criticism of this book could be that in the short space of just over 200 pages the author attempts too much. He has not set out to write a textbook of clinical medicine (there is often insufficient clinical data to make an accurate diagnosis), neither is this a treatise on social medicine but it is a valiant attempt to wed the two and almost succeeds in doing so. The book certainly fulfils the author’s claim to be “a practical guide to the practice of preventive medicine and the application of preventive medical procedures to individuals and the community”. In addition to being a valuable guide for senior undergraduate and post graduate students it offers to doctors in public health, occupational health and general practice perspectives in priorities for the promotion of community health and for the prevention and control of specific disorders. For more advanced students who wish to expand their knowledge by additional reading a list of relevant literature is given at the end of chapters; in all there are forty eight recommended references for further study.
In this interesting and very readable book the author by combining the clinical and the social has introduced a new trend which will no doubt be further developed by authors in the future, a future which promises not only many changes in health service structure but in the whole field of undergraduate and post graduate medical education.

J. McA. T.