ACUTE STREPTOCOCCAL GANGRENE

Report of a Case

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Acute streptococcal gangrene has never been common, and in this antibiotic age it is distinctly rare. References to it in the medical literature over the past ten years are sparse. Most surgeons might never see a case in a clinical lifetime. The combination of these factors makes for disaster when the disease does occur.

The classical papers on this subject are those of Meleney (1924, 1933). White (1953) reported seven cases and gave a full review of the clinical presentation. Cooper and Joske (1954) reviewed the literature and three cases that occurred in Australasia. No report since then has been traced in English medical literature.

Diagnosis is difficult, but if the reported high mortality is to be avoided proper management is urgent. This case report is instructive because it illustrates only too well the pitfalls that await the ignorant, and it further emphasises that the full resources of modern supportive therapy, including antibiotics, blood, intravenous fluids and steroids are not sufficient alone, and that correct and urgent surgery is essential.

In Christchurch Hospital all abscesses and all staphylococcal infections are treated in a special ward set aside for this problem under the care of the same team of surgeons. This was a good background against which to observe an infection that was behaving differently from a score of others, and an emphasis on those bizarre features that immediately called for comment, even though at the time unexplainable, may be of benefit to others confronted with a similar problem.

CASE REPORT

A man aged twenty-three was struck on the left thigh while playing rugby football eleven days before his admission to hospital in June 1959. Marked swelling occurred, but it began to subside after a few days. Three days before his admission, however, the swelling again increased. The hip became stiff, the knee swollen, and the thigh hot and very tender. He was admitted with a provisional diagnosis of infected haematoma.

On examination there was pyrexia of 100.4 degrees Fahrenheit. The left thigh was diffusely swollen, slightly red and hot. During the next two days the temperature rose to 103 degrees Fahrenheit and the pulse rate to 100 per minute. The thigh began to show red patches about the middle. Blood examination showed a white cell count of 30,000 per cubic millimetre, with 92 per cent polymorphs. The sedimentation rate was 87 millimetres in the first hour.

Treatment and progress—Treatment by penicillin was begun with an initial dose of a million units, then half a million units twice daily. On the third day the thigh was incised and pus was found deep in the quadriceps. A swab yielded no organisms on culture, and pus cells were reported as scanty. This called for no special comment at the time.

On the sixth day after admission the patient complained of more pain in the thigh. Temperature and pulse rate had remained high. There was copious discharge from the wound, the extreme tenderness of which was a striking feature. In places there was sloughing tissue extending beneath the skin edges (Fig. 1). Probing revealed a cavity two and a half inches deep down the outside of the thigh, from which pus could be extruded. It was considered that this was a wound not draining adequately and so delaying healing. In addition the whole leg was now oedematous, hot and tender, and it was apparent that there had been a deep vein thrombosis.
A second operation was carried out on the tenth day. Slough and necrotic tissue were cut away. Two large cavities were found, one medial, the other lateral to the ilio-tibial tract. The lateral cavity was drained by a counter incision; the medial one was obliterated by pressure. The haemorrhage in what was undertaken as a minor procedure was severe, and it must be rare for a surgeon opening an abscess to consider the necessity for transfusion. The antibiotic was changed to erythromycin (500 milligrams six hourly). Bacteriological examination still showed no organisms on culture: from one smear gramme positive cocci were reported as scanty. During the next few days the wound looked cleaner. Because of a severely depleted haemoglobin content (8 grammes per cent) he was transfused with seven pints of blood, and in the succeeding six weeks further transfusions totalling forty-one pints were required.

By the fifteenth day the problem was becoming increasingly more puzzling. No organism had been grown on three occasions and the slough was spreading. The condition was now recognised as something rare, but one consultant recalled reading during the 1930's that cases of this nature responded to dressings of zinc peroxide. These were begun and the immediate local response was encouraging. The following morning the patient collapsed, looking blue, apathetic and shocked. He was thought to have septicaemia but blood cultures were negative. He improved slowly over the next few days without additional treatment. But after four days of the zinc peroxide dressings it became obvious that the infection was not being contained and indeed was advancing. The only part of the wound that looked healthy was the original area where the fat and deep fascia had been removed, exposing muscle. In front of the advancing edge in the region of the knee joint were two bullae, apparently containing serum. More swabs had been taken for aerobic and anaerobic culture during this period in repeated attempts to elucidate the cause of the illness, but negative results were again obtained. It was three weeks before any organisms were grown. They were non-haemolytic streptococci, sensitive to all antibiotics; bacillus coli, sensitive to streptomycin and chloromycetin; and bacillus pyocyaneus, resistant to antibiotics. The erythromycin was changed to chloromycetin (500 milligrams six-hourly) and the local dressing from zinc peroxide to phenoxytol. The serum protein level was low; so plasma was given, together with a high protein, high calorie diet and an anabolic hormone.

Despite this treatment the infection and necrosis continued to spread (Fig. 2) and the patient's general condition deteriorated. A more radical operation was therefore decided upon.

![Figure 1](image.jpg)

**Fig. 1**

The wound on the tenth day after admission, immediately before the second operation. There was an outer zone of redness, then a greenish-yellow area of necrotic fat undermining the skin. In the central zone is a patch of gangrene and some healthy tissue where the original deep incision had been made.
Operation—The whole diseased area was excised widely with an inch of seemingly healthy skin. The operation entailed total excision of the vastus lateralis muscle, which was necrotic down to bone. The wound was covered with zinc peroxide dressings (Fig. 3). The patient was given hydrocortisone (100 milligrams) before operation and after operation and again next day. Histological examination of the resected tissues showed acute inflammatory changes in the subcutaneous tissues and muscle.

Further course—The patient’s general condition deteriorated further, with pyrexia up to 103 degrees Fahrenheit and leucocyte counts of over 30,000 per cubic millimetre and a sedimentation rate of over 80 millimetres in the first hour. As disarticulation could not now succeed, local treatment was continued, with cortisone to combat the effects of the toxaemia.

Cortisone was prescribed only because it was held that the patient would succumb to the toxaemia without it. The dose used was 300 milligrams daily, reduced to 100 milligrams by the end of the first week. The drug was maintained at this level throughout the period of further anaesthetics and surgery, together with ‘broad-spectrum’ antibiotics. On alternate days for the next nine days the wound was cleaned under general anaesthesia, with seemingly such marked improvement that it became feasible to graft the raw area with split-skin ‘postage-stamp’ grafts.

Although at first about a third of the skin grafts appeared to have ‘taken,’ ten days after the grafting operation the patient’s condition again deteriorated and all the grafts sloughed. The limb was amputated to reduce the area of toxic absorption, but the patient died within a few days, seven weeks after his admission. Necropsy showed the cause of death to be bilateral lobar pneumonia.
DISCUSSION

The disease in this case followed the usual pattern by involving the lower limb of a fit young man after a relatively trivial injury. The clinical picture possibly depends on the host rather than the parasite, because there is no evidence that a special strain of streptococcus is involved in this rare clinical manifestation. Meleney (1924, 1933) suggested that it might be a hypersensitivity reaction. The essential pathology is ischaemic death of the subcutaneous tissues and skin after thrombosis of the subcutaneous vessels which become involved in the infective process occurring at the level of the deep fascia. This was observed here. The only place where muscle, bone or other tissue was affected was at the site of the original wound, where the vastus lateralis muscle was incised to reach the pus.

The disease is usually described as having a characteristic fulminating course, the patient showing early profound prostration and often circulatory collapse. The local and pathognomonic features of the disease usually appear within seventy-two hours. In this case it was three days after the original incision of the abscess, and six days after the streptococcal infection is presumed to have begun in the thigh haematoma that the characteristic local signs were noted. This could mean that the incision allowed a deep infection to become superficial and to assume its characteristic appearance, which would be against the disease's being a hypersensitivity reaction, at least in this case. There was no prostration or indifference to surroundings at an early stage, but the patient did show evidence of circulatory collapse on the sixteenth day. The systemic reaction, as judged by pulse and temperature, sedimentation rates and white cell counts, was considerable, and was unaffected by the incision and drainage of pus.

The characteristic appearance of the wound can be seen from the illustrations. The peripheral margin is dull red and oedematous, and bullae containing serum or haemorrhagic fluid may be found close to the advancing edge. Next is a greenish-yellow zone of necrotic, liquefying fat appearing to undermine the skin, which may also show the purple blackness of frank gangrene. This may make it possible to pass an instrument along the fascial plane for a considerable distance without encountering resistance. Although the pathology of the condition means that communicating blood vessels between the deeper structures and the skin will be thrombosed, large patent vessels are found, and these were responsible for the haemorrhage when the wound was incised. These features, and the exquisite tenderness of the wound to touch, are the characteristic and remarkable findings. This patient did not show any tendency to develop metastatic lesions, but by the seventh day he had a deep vein thrombosis, which is a well recognised complication.

The absence of bacteria from swabs and cultures, both aerobic and anaerobic, has been observed often enough to be regarded as a characteristic of the disease. This may be due to the early use of antibiotics in most cases, but the consequences are that the diagnosis is missed, when it must be made not from a bacterial swab but from observation of the characteristic clinical course. Again, as in this case, the bacteriology may be misinterpreted when positive, more attention being paid to the secondary invaders than to the wound, at a time when this was more important than any of its organisms.

The treatment of acute streptococcal gangrene has not changed from that advocated by Meleney, despite modern advances in supportive therapy. This case makes it clear that this alone is of no avail. The depressant effect on the bone marrow of the toxaemia, and possibly local destruction of red cells, call for large transfusions of blood. Our patient was also given an anabolic hormone to preserve tissue protein, transfusions of plasma when required and a high protein diet. He had penicillin, erythromycin and chloromycetin in adequate doses. There was repeated check of electrolytic deficiencies and correction by intravenous drip. The use of cortisone has not been reported previously but is considered justifiable, under antibiotic cover, when the patient looks like dying from the effects of prolonged toxaemia. In this case its use coincided with the cleaning up of the wound, but nevertheless it seemed to contribute to the improved clinical appearance.
But these measures alone are not enough. In our case they merely "bought time" until the surgery was rightly directed. It is truly said that to delay operation while antibiotics are tried is to make a bigger wound in a sicker patient (Wilson 1952).

The treatment of choice, then, is to open widely the entire length of the fascial plane. It is of interest that the initial incision which drained the pus from the quadriceps muscle opened the fascial plane and, as can be seen in the illustrations, there was no further trouble from this area.

**SUMMARY**

1. A case of acute streptococcal gangrene is discussed against the known background of the disease.
2. In management, stress is laid upon the necessity for early adequate surgery, backed by adequate supportive therapy.

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**REFERENCES**


