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TREATMENT OF CHRONIC OSTEOMYELITIS WITH THE CONTINUOUS IRRIGATION-SUCTION METHOD

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Large quantities of antibiotics are used every year for the treatment of chronic osteomyelitis, but a number of patients return periodically with flare-ups and recurrent discharging sinuses. One of the difficulties in the treatment of chronic osteomyelitis by chemotherapy is the relative isolation of the infected tissues. The bacteria may be widespread in the necrotic tissues, Haversian canals or within the medullary cavity. The subperiosteal vessels and often the main nutrient artery are thrombosed, and consequently the antibiotics fail to reach the organisms.

In our series of twelve cases of chronic osteomyeltis, the method of treatment employed was continuous irrigation-suction using a detergent and two antibiotics. Chronic osteomyelitis, in this series, was defined as being where the infection was still present clinically and radiologically for four weeks or longer, in spite of previous conservative or surgical treatment. The technique of irrigation is not new. In 1934 the first 'irrigation and drainage' cannulae were made in the Massachusetts General Hospital—these were straight glass cannulae. Smith Petersen, Larson & Cochran (1945) used T-shaped cannulae from glass or vitallium. Dakin's solution had been used extensively for irrigating in the preantibiotic period, later being replaced by Penicillin in solution with the detergent sodium tetradecyl sulphate (Grace & Bryson 1947). Mitra & Grace in 1956 reported good results in 61 cases out of a total of 95. Compere (1962) used Alevaire with chloramphenicol or novobiocin. Alevaire is a detergent wetting agent with mucolytic properties (Compere et al. 1967), which breaks up the mucus and pus to reach the bacteria, cleaning the wound in addition.

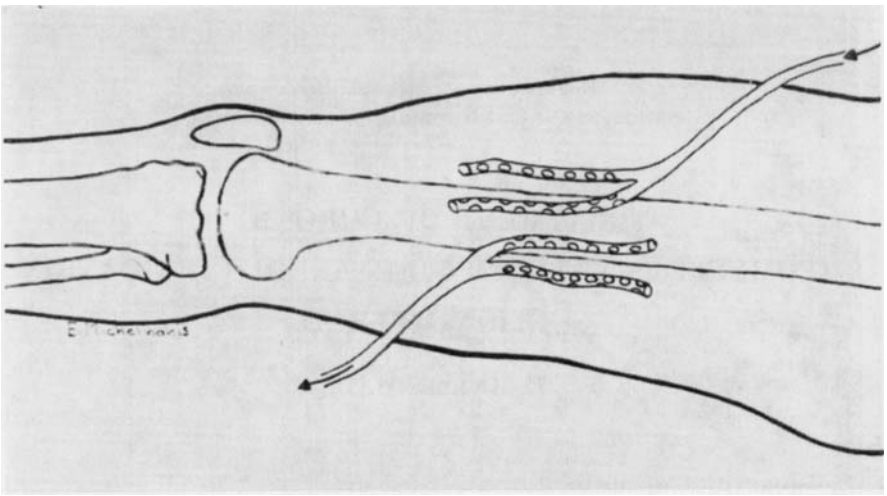

Figure 1. This figure illustrates the irrigation tubes in position.

For our series the irrigation solution is composed of 800 cc normal saline, 200 cc Alevaire, and any two of the following antibiotics according to the sensitivity, and in the following doses: Cloxacillin 1g/l, Erthromycin 2g/l, Lincomycin 1·2g/l, Chloramphenicol 1g/l, Penicillin 3,000,000 units/l, Streptomycin 2g/l. During the period of irrigation Clindamycin 150 g six hourly is given orally and continued for the three weeks following the removal of the irrigation tubes.

CLINICAL MATERIAL

The closed irrigation-suction technique has been used in twelve patients with chronic osteomyelitis during the past four years. The ages ranged from 15 to 73 years, and the disease had been established at the time of treatment from four weeks to twelve years.

The infection was localised in the femur in five patients, in the tibia in four patients, in the hip in two patients and in the knee in one patient.

Nine of the twelve patients had from one to three sinuses, and seven patients had undergone from two to seven operations previously for the infection (sequestrectomy, decompression and excavation of abscess, etc.).

METHOD

The sinuses are excised down to the bone, sequestra and all necrotic tissues are removed. The medullary canal is opened and curetted and any internal fixation (e.g. Kuntscher nail, prosthesis, plate) is left in position. The multiperforated

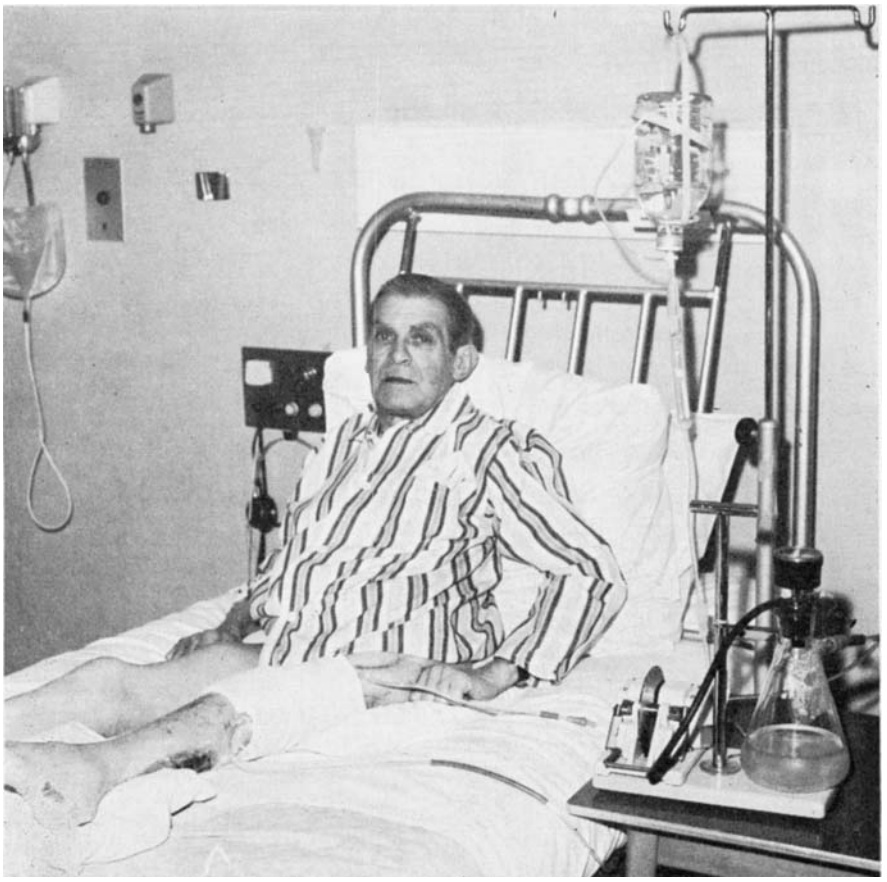

Figure 2. This figure illustrates the irrigation-suction apparatus in use on a patient with chronic osteomyelitis of the left femur.

V-portions of the two Y-shaped Redivac tubes are laid, so that one of the tubes of each V lies within the medullary cavity, and the other lies in the surrounding soft tissues (see Figure 1). The stem of the Redivac tube is led out through healthy tissues two inches from the incision and secured to the skin by a single suture. The skin is closed carefully to avoid leakage, using a continuous stainless steel suture.

The inlet tube is connected to a 1 litre infusion bottle containing 800 cc normal saline, 200 cc Alevaire, and two antibiotics according to the sensitivity. The outlet tube is connected to a suction pump at a pressure of 5 to 10 cm Hg.

It is essential to note that excess suction causes plugging of the outlet tube by inclusion of normal tissue. Very low suction allows the accumulation of debris to block the outlet tube. If blocking should occur, the flow can be reversed. Heparin solution may be syringed into the tube, or the blockage can be forcibly removed

Table 1. Summary of results in twelve patients with chronic

Age years	Short history of infection
28	Compound, comminuted fracture left femur shot-gun injury. Osteomyelitis not controlled by antibiotics. Recurrent sinuses.
32	Chronic osteomyelitis lower end left femur of acute onset 12 yrs previously. Recurrent flare-ups.
24	Compound, comminuted fracture right tibia after R. T. A. Discharging sinus.
50	Compound fracture left femur 10 yrs. previously with persistent sinus.
59	Infection of lateral condyle following aspiration of knee joint in patient with rheumatoid arthritis.
61	Compound fracture right tibia following R. T. A. with skin loss. Infection not controlled by antibiotics.
15	Chronic osteomyelitis right femur of acute onset 1 yr previously. Recurrent sinus and abscesses.
16	Chronic osteomyelitis of acute onset following a fall 1 yr previously. Infection not controlled in spite of large doses of antibiotics. Two sinuses present.
17	Chronic hypertrophic osteomyelitis left tibia with discharging sinus.
67	Subcapital fracture neck femur. Treated by nail plate. Infection following operation.
76	Subcapital fracture neck femur. Treated by Austin Moore prosthesis. Wound breakdown occurred. Infection not controlled by antibiotics.
38	Fracture shaft right femur. Treated by Kuntscher nail. Infection following operation.

by injecting normal saline under pressure into the afferent tube. The drip rate should be set to deliver two litres in 24 hours, i.e. 83 cc/hr.

Cultures are taken of the material drawn through the outlet tube twice a week.

The irrigation tubes remain in position between two and four weeks, depending upon the severity of the infection. Systemic antibiotics according to sensitivity are given orally during the irrigation period and for up to three weeks afterwards, depending upon, again, the severity of the infection.

osteomyelitis treated with the closed irrigation-suction method.

Organisms	Duration of infection before irrigation	Operations for the infection before irrigation	Period of follow-up	Results
Staphylococcus Aureus. Escherichiacoli	5 yrs	6	4 yrs	No Recurrence
Staphylococcus Aureus.	12 yrs	7	3 yrs	No Recurrence
Staphylococcus Aureus.	3 yrs	3	2 yrs	No Recurrence
Staphylococcus Aureus.	10 yrs	7	3 yrs	No Recurrence
Staphylococcus Aureus.	4 wks	None	2½ yrs	No Recurrence
Staphylococcus Aureus. Proteusvulgaris.	2 yrs	None	2 yrs	Failed
Staphylococcus Aureus.	6 yrs	2	2 yrs	No Recurrence
Staphylococcus Aureus.	1½ yrs	3	2 yrs	No Recurrence
Staphylococcus Aureus.	2 yrs	4	4 yrs	No Recurrence
Staphylococcus Aureus.	6 wks	Abandoned as technical failure. Nail plate removed.		
Staphylococcus Aureus.	2 mos	None	3½ yrs	No Recurrence Prosthesis remained.
Staphylococcus Aureus.	4 wks	None	4 yrs	No Recurrence Nail remained.

RESULTS

In ten patients the results were good. The cultures taken from the outlet tube were sterile within the first 10 days of the irrigation. They remain clinically symptom-free and there was no radiological evidence of infection for a period now extending from two to four years. In two

cases the method had allowed us to leave in position a Kuntscher nail and an Austin Moore prosthesis. We had two failures. In one case, a technical fault forced us to abandon the method, the tube being accidentally removed on the second post-operative day. In the second case a further large sequestrum was overlooked during the operation. A sequestrectomy was performed but the infection recurred.

SUMMARY

Twelve patients with chronic osteomyelitis, ranging in duration from four weeks to twelve years, have been treated following operation with the closed irrigation-suction method, where all the necrotic material was removed. The irrigation solution consisted of a detergent, Alevaire —a mucolytic wetting agent—two antibiotics according to the sensitivity, and normal saline. All the patients had previously failed to respond to conservative treatment with antibiotics, immobilization, etc., and eight of them had had from one to seven operations for the infection prior to irrigation (i.e. sequestrectomy, excavation of abscess, etc.). In ten patients one or more discharging sinuses were present before the commencement of the treatment.

Good results were obtained in ten, the disease showing no evidence of further activity during the follow-up period of two to four years.

In one patient the technique was abandoned due to technical failure, and in another a sequestrum was overlooked at operation and the infection recurred.

We are encouraged by the results and believe that this method of treating chronic osteomyelitis may lessen or prevent recurrence.

ACKNOWLEDGEMENT

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