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Air in the bones: multifocal anaerobic osteomyelitis associated with oat cell carcinoma

Under 2% of cases of osteomyelitis are due to anaerobes.¹ We report a case of multifocal anaerobic osteomyelitis complicating widespread bone metastases from an oat cell carcinoma of the lung.

Case report

A 60 year old white man was admitted with low back pain, 10 kg weight loss, and bilateral leg oedema. He was a heavy smoker and drinker. He was afebrile with signs of chronic alcoholism and bilateral leg oedema. Oral hygiene was poor. His liver was firm and enlarged. His lumbar vertebrae and pelvic bones were painful on percussion. White cell count was $22.3 \times 10^9/l$ (68% segmented). A chest x ray film showed a 2 cm nodule.

Computed tomography showed bilateral abscesses along the psoas and the iliac muscles and gas in the pelvic bones, T5, T6, L1, L4, L5, and the spinal canal (figure). Areas of osteolysis as well as gas were detected on x ray films

Computed tomogram of L1, showing gas bubbles within vertebral body, spinal canal, and psoas muscles (vertical arrows); psoas abscesses are seen along lateral aspect of vertebral body (horizontal arrow).

of the thoracic and lumbar spine and the pelvic bones. Metastases were seen in the liver. Bone marrow aspirate from the iliac crest was foul smelling, and Gram staining showed abundant Gram positive cocci. The bone marrow and eight blood cultures were positive for *Peptococcus indolicus*. Intravenous penicillin was started. He died on the 34th hospital day.

At necropsy a small cell carcinoma of the lung was found with metastases in the bones, liver, and lymph nodes. The sites of osteomyelitis corresponded with x ray findings; histological examination of bone showed large areas of necrosis surrounded by inflammatory cells within foci of metastatic small cells. Bilateral psoas abscesses were present.

Comment

Anaerobic osteomyelitis results from invasion of the bones by organisms responsible for infection in an adjacent area.² It is a rare complication of anaerobic bacteraemia: of 1280 patients reported on in review articles on anaerobic bacteraemia, only seven developed osteomyelitis.³ These clinical data are corroborated by experimental studies, which have shown it to be extremely difficult to establish infection with normally saprophytic organisms in uninjured bone.⁴

Given the low incidence of bone infection in anaerobic bacteraemia, predisposing factors may play a major part when it occurs. Of the underlying systemic diseases, haemoglobinopathies and malnutrition (which affect tissue oxidation potential) have been associated with haematogenous osteomyelitis.^{2,4} Any condition (anaemia, ischaemia, diabetes, or malignancy) that favours disruption of normal capillary flow, however, will result in a decrease in perfused tissue oxidation potential and predispose to replication of anaerobes.⁴ Although bone metastasis seems an ideal environment for anaerobic growth, its association with anaerobic osteomyelitis has not been reported previously. We have found only two reports of patients with anaerobic multifocal osteomyelitis⁵; interestingly, one of these was a child with acute lymphocytic leukaemia and bilateral femoral osteomyelitis due to bacteroides.

The diagnosis was suspected in our patient because of the presence of gas within bones on standard x ray films and a computed tomogram. Gas was even seen in the spinal canal and within bilateral paraspinal muscle abscesses. Detection of gas associated with osteomyelitis has recently been reported⁶; this phenomenon is probably not uncommon, as it is well known that anaerobes can produce gas.

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Peritonitis due to *Streptococcus viridans* in patients receiving continuous ambulatory peritoneal dialysis

Was suggested that peritonitis in patients receiving continuous ambulatory peritoneal dialysis may result from haematogenous spread of bacteria from lesions in the mouth.¹ We report on four patients receiving continuous ambulatory peritoneal dialysis who developed peritonitis due to *Streptococcus viridans* after having oral lesions or undergoing dental surgery.

Case reports

The table summarises the clinical and bacteriological data on the four patients. *S. viridans* was isolated in pure culture from the effluent fluid collected at dialysis from all four patients. The patients were treated with vancomycin 50 mg/l, which was added to one of the four dialysate bags (the overnight bag) used daily, for 10 days. All four patients recovered.

Clinical and bacteriological details

Age (years)	Sex	Precipitating factor	Time to peritonitis (days)	White cell count in dialysate ($\times 10^9/l$)
31	M	Bleeding lesion of gum	2	4.7
53	M	Dental filling	2	0.2
21	F	Traumatic abrasion to lip	2	1.0
50	M	Boil on gum	7	2.0

Comment

There is usually a latent period of between 24 and 72 hours from contamination of the peritoneal cavity to the onset of clinical peritonitis.² Our four patients developed peritonitis due to *S. viridans* two to seven days after the onset of a lesion in the mouth or dental surgery. Peritonitis in these patients probably resulted from haematogenous spread of the bacteria from the mouth. Although *S. viridans* is always present in the mouth, it is only rarely cultured from the hands and from the sites of catheters in patients receiving continuous ambulatory peritoneal dialysis.³

We suggest that patients receiving continuous ambulatory peritoneal dialysis should be given antibiotic prophylaxis if they are to undergo dental surgery, using the same regimen as is advised for patients with lesions of their heart valves.⁴ Patients who are not allergic to penicillin should be given 3 g amoxycillin orally one hour before dental surgery, whereas those who are allergic or have recently taken a course of penicillin should be given 1.5 g erythromycin stearate orally one to two hours before the procedure and 0.5 g six hours later. In addition, we advise patients receiving continuous ambulatory peritoneal dialysis to use toothbrushes with soft bristles to minimise trauma to the gums.

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Comparison of erythromycin and isoniazid in treatment of adverse reactions to BCG vaccination

BCG vaccination is still given routinely to schoolchildren in many parts of Britain, and adverse reactions occur. Anecdotal reports suggest that a month's course of erythromycin is useful for severe local reactions to vaccination.^{1,2} We have compared isoniazid, another commonly used agent, with erythromycin in the treatment of adverse reactions to BCG.

Patients, methods, and results

Eighteen children vaccinated with BCG continued to have adverse local reactions of pain, abscess formation and discharge, and ulceration 10 weeks later. The subjects were divided into two groups of nine, equally matched for

ulceration, fluctuance, and areas of erythema and induration by one investigator (JTM). One group received erythromycin 250 mg four times a day and the other isoniazid 6 mg/kg body weight daily for one month. The groups were reviewed at two weeks and one month after starting treatment and all lesions were photographed on each occasion. The progress of the lesions was assessed in two ways. Firstly, the lesions were examined at each visit by an observer (SH) unaware of the treatment given. Measurements were made of the diameter of the area of induration and erythema in two planes at right angles, and the presence of fluctuance (as an index of the presence or absence of abscess) and also ulceration was noted. The table shows the changes that occurred.

Results of treatment with the two agents

	Erythromycin		Isoniazid	
	Week 1	Week 4	Week 1	Week 4
Fluctuance	5	2	5	1
Ulceration	7	4	7	4
Diameter of induration	{ Increased No change Decreased	1	1*	1†
		5	5	6
		6	6	6
Diameter of erythema	{ Increased No change Decreased	0	0	1
		1*	1*	1†
		6	6	6

*Two subjects developed two lesions, making measurement invalid.
†One subject developed two lesions, making measurement invalid.

The response in each treatment group was the same. The maximum percentage decrease in diameter of either erythema or induration that occurred in either group was 55%.

Another observer (JG) compared blindly the photographs taken at the initial visit with those at week 4. The pairs of photographs were arranged in random order and the observer asked whether the photograph on the left was unchanged, better, or worse compared with the right hand photograph; after decoding it was possible to state the progress of each lesion. Four subjects in the erythromycin group and five in the isoniazid group were considered to have improved, two in each group to have remained unchanged, and two in the isoniazid group and three in the erythromycin group to have deteriorated. No treatment was clearly superior. No side effects of treatment were noted except a macular rash on one patient in the erythromycin group.

BCG was seen and cultured from the abscess aspirate from one subject (isoniazid group). No other pathogens were seen or isolated from the specimen or from the ulcer discharge of another subject (erythromycin group). Sensitivity testing showed the BCG to be sensitive to isoniazid but resistant to erythromycin using a 10 µg disc.

Comment

We found that erythromycin was no more effective than isoniazid in the treatment of severe BCG reactions. The findings in the erythromycin group do not support the suggestion from previous uncontrolled reports that complete resolution of lesions can be achieved with erythromycin given for one month.¹ Nevertheless, possibly secondary bacterial infection of the BCG site contributes to the adverse local reactions in some cases, so that erythromycin may sometimes be effective. Certainly reports of the minimal inhibitory concentration for BCG to erythromycin have been in excess of 64 mg/l. Some other atypical mycobacteria, however, have been shown to be sensitive in vitro to erythromycin concentrations of 5 mg/l,³ which may be achieved in vivo by oral erythromycin.⁴

Possibly neither antibiotic has any effect on the natural resolution of the lesions. A placebo controlled trial of each drug is now necessary before further treatment recommendations can be made.

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