

tests for *Chlamydia*; these tests were performed by the whole inclusion immunofluorescence technique.

The table gives details of the micro-organisms isolated from the women. Serological tests showed IgG antibodies to *Chlamydia* at a titre of $\geq 1/64$ in all of seven women who yielded *Chl trachomatis*, and 60 of 82 women whose cultures grew no pathogens; the difference is not significant. IgM antibodies to *Chlamydia* at a titre of $\geq 1/8$ was present in four of the seven women with chlamydial infection and in 43 of the 82 with no chlamydial infection; again the difference is not significant.

Comment

Pelvic inflammatory disease occurs after first trimester therapeutic abortion in from 0.1% to 5.2% of unselected cases.² Gonococcal infection was uncommon in our study, but cervical infection with *Chl trachomatis*, an important aetiological agent in pelvic inflammatory disease, was found in 8%, and infection by *M hominis*, which may also cause pelvic inflammatory disease,³ in 21% of 89 women.

Prospective studies have shown that nearly one quarter of women with chlamydial infection at the time of termination of pregnancy will subsequently develop pelvic inflammatory disease, and the management of this problem may be approached in two ways. An appropriate antibacterial agent could be given prophylactically to all women having abortions. A single dose of doxycycline 500 mg has been advocated,⁴ but such a dose would be unlikely to eradicate *Chl trachomatis* completely and treatment with a tetracycline for at least one week is necessary. This procedure would leave male sexual contacts unidentified, and therefore untreated, with the possibility of reinfection.

Alternatively, women attending for termination should be screened for *N gonorrhoeae*, *Chl trachomatis*, and possibly *M hominis* before operation, and treated if found to be infected. At present, cell culture for *Chl trachomatis* is not widely available; serological tests on a single serum sample are, as shown in this study, unreliable for the diagnosis of *Chl trachomatis*, and paired serum samples are hardly practicable in the context of termination of pregnancy. The need for wider diagnostic facilities for *Chl trachomatis* has been advocated.⁵ Our findings have shown that the identification of this and other sexually transmitted microbes in women before termination of pregnancy would be a useful piece of preventive medicine. Further studies on antenatal populations, and on women attending for inpatient abortion, are in progress.

¹ Schachter J. Chlamydial infections. *N Engl J Med* 1978;298:428-35, 490-5, 540-9.

² Burkman RT. Culture and treatment results in endometritis following elective abortion. *Am J Obstet Gynecol* 1977;128:556-9.

³ Mårdh P-A, Weström L. Tubal and cervical cultures in acute salpingitis with special reference to *Mycoplasma hominis* and T-strain mycoplasmas. *Br J Vener Dis* 1970;46:179-86.

⁴ Brewer C. Prevention of infection after abortion with a supervised single dose of oral doxycycline. *Br Med J* 1980;281:780-1.

⁵ Richmond SJ, Oriol JD. Recognition and management of genital chlamydial infection. *Br Med J* 1978;ii:480-3.

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Ultrasonic assessment of stress fractures

Stress fractures are common in athletes and young military personnel. The wide range of possible sites and the varying frequency depending on the type of activity have been well described.^{1,2} Although there is increasing awareness of such fractures and their relation to overuse, early lesions may not be visible in conventional radiographs. Bone scintigraphy is a sensitive means of detection but may not be readily available.³ A chance finding, confirmed by others,⁴ that such stress

lesions may be painful after therapeutic ultrasound prompted the following prospective study.

Patients, methods, and results

Thirty five consecutive patients (29 men; mean age 25 years, range 16-51) attending a sports injury clinic with a history and clinical findings suggestive of a stress fracture of the leg were included in the study. Three women with rheumatoid arthritis (ages 25, 68, and 70) and possible stress fractures related to osteoporosis and treatment with corticosteroids were also included. The operator using the ultrasound machine was unaware of the clinical and radiological findings. In addition we studied 17 patients (10 males; mean age 24 years, range 5-58) attending an accident department with radiologically confirmed recent fractures of a bone lying close to the skin surface. The operator was unaware that five young patients had greenstick fractures.

A control group of 17 fit, physically active subjects (11 men; mean age 26 years, range 16-45) agreed to describe sensations produced by the application of the standardised ultrasound over four typical sites of stress fracture in their right leg. These were over the lateral lower third of the fibula, the anteromedial aspect of the midshaft of the tibia, the anterior part of the medial tibial plateau, and the lateral aspect of the lower third of the femur.

After a trial of various frequencies continuous ultrasound at 0.75 MHz was applied from a Sonacel Multiphon Mark II machine using a 3 cm head and a water based coupling medium. In those with possible or definite fractures the comparable site on the opposite side was also used to allow different sensations to be described. The intensity was gradually increased to a maximum of 2.0 W/cm² and a positive response defined as a very unpleasant sensation of intense pressure or pain, this usually occurring between 1.0 and 2.0 W/cm².

Only one of the 17 normal controls had a single, unexplained positive ultrasound reaction at the midtibial test site. None of the patients had positive reactions at the comparable, non-fracture site. Thus there was only one false positive response in 123 tests (0.8%).

Ten of the 11 athletes with clear, plain radiographs but subsequently definite scintigraphic evidence of stress lesions had a positive ultrasound reaction, while all eight athletes with clear radiographs and negative findings on bone scintigraphy had negative ultrasound reactions (table). A further

Ultrasonic, radiological, and scintigraphic findings

Ultrasound reaction	Radiograph clear			Radiological evidence of fracture		
	Scintigraphy Positive	Scintigraphy Negative	Follow up negative	Stress	True	Greenstick
Positive	10				11	
Negative	1	8	10	7	3	5

group of nine athletes and a younger patient with rheumatoid arthritis who had clear, plain radiographs and negative ultrasound reactions did not have bone scintigraphy; they were carefully followed up, however, often receiving therapeutic ultrasound and only slight restriction of activity for a presumed soft tissue lesion, and in no case did signs or symptoms of a definite stress fracture develop. These findings represent an accuracy of 96%.

Seven athletes had radiologically confirmed stress fractures with negative ultrasound reactions. One sportsman and one patient with arthritis had true fractures with positive ultrasound reactions. Nine of the 12 patients with full fractures seen in the accident department had positive reactions while all five of those with greenstick fractures had negative reactions.

Comment

These results suggest that standardised application of 0.75 MHz ultrasound may be helpful in the early diagnosis of stress fractures in sportsmen.

A stress fracture in a sportsman demands prompt reduction or stopping of the activity responsible, often for several weeks, while such advice is inappropriate and unwelcome to those without such lesions. Mimicking soft tissue lesions may respond to more active forms of treatment. Healing stress fractures shown clearly in initial radiographs and greenstick fractures are not painful with ultrasound, while most recent true fractures are. This difference has not been noted before, although others have observed that the rate of positive responses in true fractures decreases with time.⁵ These differences in response suggest that damaged periosteum may absorb continuous ultrasound energy with its conversion to heat and the development of pain, but that intact periosteum or periosteum involved in significant callus formation does not absorb this energy.

¹ Devas M. *Stress fractures*. Edinburgh: Churchill Livingstone, 1975.

- ² Orava S, Puranen J, Ala Ketola L. Stress fractures caused by physical exercise. *Acta Orthop Scand* 1978;**49**:19-27.
- ³ Meurman KOA, Elfring S. Stress fractures in soldiers: a multifocal disorder. A comparative radiological and scintigraphic study. *Radiology* 1980;**134**:483-7.
- ⁴ Delacerda FG. A case study: application of ultrasound to determine a stress fracture of the fibula. *Journal of Orthopaedic and Sports Physical Therapy* 1981;**2**:134-6.
- ⁵ Bedford AF, Glasgow MM, Wilson JN. Ultrasonic assessment of fractures and its use in the diagnosis of the suspected scaphoid fracture. *Injury* 1982;**14**:180-2.

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Anaphylaxis after bites by rodents

We report two cases of anaphylaxis in laboratory workers after rodent bites.

Case reports

Case 1—A 23 year old man had no history of allergy until April 1981, when he complained of sneezing, itching, and irritation of his nasal passages five years after starting work with animals. In December 1981 he complained of severe rhinorrhoea within five minutes of exposure to animals. In September 1982, during weekend work, he was moving rats from one cage to another and was bitten. He later reported that within a few minutes he felt tightness of the chest; a colleague noticed that his skin became bright red and he complained of "tingling"; his eyes became bloodshot, his nasal passages congested, and he expectorated mucus. As the acute respiratory distress persisted he was admitted to a local hospital. Within four hours the effect had worn off but two and a half hours later he again felt tightness of the chest and inflammation of his skin returned. These symptoms subsided when a nurse removed his feather pillow. He no longer works in contact with animals.

Case 2—A 30 year old man had worked with rodents for eight years without experiencing any symptoms of allergy; he was not atopic. In September 1982, while working with mice, he was bitten on the hand. The bite drew blood. Within five minutes he felt a warm flush in his hand, which gradually spread to his arm and body over the next 10 minutes; 20 minutes

after the bite his eyes and nose began to run profusely and he developed tightness of the chest. He was given chlorpheniramine maleate 10 mg intravenously and salbutamol by inhaler. The chest symptoms subsided within 10 minutes and the others over the next few hours, during which he complained of a headache. Six hours after the bite he was perfectly well.

INVESTIGATIONS

Skin prick tests and estimation of specific IgE antibodies by standard radioallergosorbent test procedures were carried out; the table shows the results. The subject in case 1 had a pronounced increase in reactivity, principally to rat and mouse allergens but also to guinea pig serum, over eight months; the latter tests were carried out nine months before the anaphylactic reaction. Specific IgE antibodies to these allergens were also increased. The immunological tests in case 2 were less positive but more specific; the high concentration of IgE antibody to mouse urine is noteworthy.

Comment

Both subjects had worked for some years with rodents before becoming allergic to them. The subject in case 1 was atopic and allergic to feathers. He had raised antibody concentrations and positive skin test results to several allergens; both were therefore of less diagnostic value than in the non-atopic subject in case 2, whose strongest reactions were to mouse urine.

Published accounts of anaphylaxis after animal bites are rare; the only report we have found is that of an incident caused by a slow loris in Thailand.¹ It is likely, however, that the event is more common than the literature suggests, and there may be at least anecdotal evidence of other such episodes. Although bites from rodents are common this severe reaction is extremely rare. Those who manage institutions with large numbers of animals would be prudent to review their medical arrangements for dealing with such emergencies.

¹ Wilde H. Anaphylactic shock following bite by a slow loris *Nycticebus coucang*. *Am J Trop Med Hyg* 1972;**21**:592.

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Immunological findings

Allergen	IgE antibodies (% binding of I ¹²⁵ rabbit antihuman IgE)			Skin prick test (diameter of response in mm)			
	Case 1		Case 2	Case 1		Case 2	
	Apr 1981	Dec 1981	Sep 1982	Apr 1981	Dec 1981	Sep 1978	Sep 1982
Rat							
Urine	11	25	6	5	10	0	3
Dander		23	0	4	12		3
Serum		28	2	5	16		0
Mouse							
Urine		21	15	7	12		6
Dander		14	6	7	5	0	0
Serum		21	4	7	16		0
Rabbit							
Urine		1	0	4	3		0
Dander		1	0	4	5	0	0
Serum		5	0	0	5		0
Guinea pig							
Urine		2	3	3	4		3
Dander		4	1	3	3	0	4
Serum		17	0	3	10		0
Grass pollens				4	4		0
<i>Dermatophagoides pteronyssinus</i>				4	5		0
Cat dander				3	10		0
Dog dander				3	9		0