and 2.3 per 15 minutes respectively). Swallowing was significantly more frequent in patients with hiatus hernia and in those with duodenal ulcer than in either control group (13.2 and 9.8 per 15 minutes) ($p < 0.0005$). There was no correlation between swallow count and age, sex, salivary output, or anxiety as measured by either skin conductance or the self-report questionnaires.

Comment

Why patients with hiatus hernia or duodenal ulcer swallow excessively is unclear. Possibly the gastrointestinal disease provokes the activity—for example, pain or oesophageal reflux may trigger the act of swallowing. Aerophagia might be an aetiological factor in upper gastrointestinal disease in some patients. Swallowed air must cause distension, which may contribute to the formation of hiatus hernia. Similarly, distension of the stomach will increase acid output, which may encourage duodenal ulcer formation.

Patients with duodenal ulcer usually have a competent gastro-oesophageal sphincter, and the swallowed air would result in excessive flatus per rectum. Flatus was the main discriminant factor for duodenal ulceration in the computer diagnosis of dyspepsia.⁴ Small doses of antacid may produce relief of dyspepsia not by neutralising acid but by their peppermint flavouring, which relaxes the gastro-oesophageal sphincter, facilitating easy eructation.⁵

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Pneumoarthropathy in septic arthritis caused by *Streptococcus milleri*

Pneumoarthropathy is rarely diagnosed clinically and is an unusual radiological sign, particularly in the absence of joint trauma. *Streptococcus milleri* is increasingly being recognised as an important pathogen, particularly in abscesses, notably liver abscesses.¹ We describe a case of septic monoarthritis in which a gas-forming organism was implicated by the clinical and radiological findings and later confirmed by bacteriological examination.

Case report

A 53-year-old woman presented to her general practitioner in December 1981 with acute monoarthritis of the right knee. Raised uric acid concentration was noted (0.56 mmol/l; 9.4 mg/100 ml), and treatment with non-steroidal anti-inflammatory drugs and allopurinol was started with success. A second acute episode was again treated with non-steroidal anti-inflammatory drugs, and when no response was obtained prednisone 5 mg thrice daily was begun. She became increasingly unwell, developed polydipsia and polyuria, and was referred to hospital with heavy glycosuria, still complaining of a painful, swollen knee.

On admission she was feverish (temperature 38.3°C). Examination of the knee showed soft-tissue crepitus and a large effusion in a tender, hot knee. She was mildly dehydrated clinically, but there were no other clinical signs. Investigations showed blood glucose concentration 17.6 mmol/l (317

mg/100 ml); white cell count $5.7 \times 10^9/l$ with normal distribution; erythrocyte sedimentation rate 134 mm in first hour; uric acid concentration 0.18 mmol/l (3 mg/100 ml); and urea, electrolyte, and haemoglobin concentrations normal. X-ray examination of the knee showed gas shadowing in the suprapatellar bursa and retropatellar space (figure (left)). Aspiration of the joint yielded gas and 30 ml purulent fluid, which on Gram staining showed large numbers of Gram-positive streptococci. Culture grew a pure growth of group F streptococci, identified as *S milleri*. After treatment with intra-articular and parenteral antibiotics—initially ampicillin, but then penicillin

X-ray film of right knee before (left) and after (right) two weeks' treatment with antibiotics. Film on left shows gas shadowing within knee joint.

when sensitivity was reported—the knee improved and repeat x-ray examination (figure (right)) showed disappearance of the gas shadow. Her diabetes mellitus required insulin and came under good control.

The joint suffered severe damage secondary to the infection and subsequently had a severely limited range of movement.

Comment

Pneumoarthropathy is rare in septic arthritis but has been reported in anaerobic infections² and Gram-negative septic arthritis.³ *S milleri* is a microaerophilic Gram-positive streptococcus associated particularly with abscess formation; it has been reported only once before as causing septic arthritis in a patient with pre-existing rheumatoid arthritis⁴ in whom no other septic focus was found; pneumoarthropathy was not a feature of this case. Undoubtedly the prior joint damage in our patient and the hyperglycaemia were predisposing factors.⁵

This report emphasises the need to consider septic arthritis in all cases of acute monoarthritis, particularly in the presence of pre-existing joint disease, and also illustrates a rare but important physical sign.

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