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The silent coronary

Cardiac failure occurring "out of the blue," either acutely or—particularly in the elderly—with more gradual onset, is known sometimes to be due to a silent myocardial infarct. But this is only one facet of an interesting and puzzling condition.

Most myocardial infarcts are readily diagnosed by the characteristic, usually pathognomonic, symptoms. In a substantial minority of cases, however, the infarction goes unrecognised either because the symptoms are so atypical that the correct diagnosis is not made or because the infarct is unassociated with any pain or discomfort and is therefore defined as "silent."

How, then, do these unrecognised infarcts come to light? Usually the clue comes from characteristic changes developing in the electrocardiogram of someone who has previously had a normal tracing. Such a finding may occur in proposers for life assurance who have a previously "clean" history and a previously normal electrocardiogram; in those who because of their occupation are required to have routine medical examinations; and in those who undergo regular multiphasic screening. In a rather different category are those patients who first present with angina pectoris and have an electrocardiogram that shows evidence of an old myocardial infarct of which they have been quite unaware.

The prevalence of unrecognised or silent myocardial infarction is far higher than is generally appreciated. A recent reminder has come from a report from the Framingham study in the United States,¹ but as long ago as 1937² and again in 1967³ American doctors suggested that as many as a third of myocardial infarcts may go unrecognised initially. The Framingham study is of particular interest because of its long term prospective design. In 1948 a total of 5127 participants (2282 men and 2845 women aged 30-62 and free of apparent coronary disease) entered the study. During the succeeding years, among many other observations relating to cardiovascular disease, an electrocardiogram was performed every other year. By 1978, 30 years into the study, 708 myocardial infarcts had occurred. Of these no fewer than 28% of the 469 in men and 35% of the 239 in women were shown only by routine electrocardiogram examinations. The diagnosis was based on the development of a pathological Q wave or loss of the R wave in leads in which this would not be expected.

Overall the data showed that 138 myocardial infarcts occurred per 1000 of the Framingham participants at risk, and of these some 42 per 1000 were unrecognised, including some 22 per 1000 that were silent.

Thus almost half of these clinically unrecognised infarcts were silent, and in the remaining half the patients had had some symptoms, but these had been so atypical that neither the doctor nor the patient had entertained the diagnostic possibility of myocardial infarction despite the community having a high level of medical knowledge. Unrecognised infarction in men was most common in those aged 75 or more, but in women the distribution was much the same at all ages from 45 to 94.

What happens to people who have silent or unrecognised infarcts? Regrettably any concept that they might fare better than those with a more conventional presentation is not supported by the outcome in either the short⁴ or the long term.¹ Men with unrecognised infarcts are at least as likely as those with a recognised one to have another infarct or to develop cardiac failure. Fewer women in the unrecognised group had second infarcts, however, and there was a lesser tendency for them to have subsequent cardiac failure. Unrecognised myocardial infarcts seldom gave rise to initial incapacitating symptoms, but 14% of these patients went on to develop angina, and the average mortality rate was 4-5% a year. After 10 years 45% of those with unrecognised infarcts had died as compared with 39% of those who had had symptomatic heart attacks.

Several questions may be asked—but the answers are not obvious. Should patients who have had unrecognised myocardial infarcts be given β blockers now that the benefits of such treatment are apparent in those who have had recognised infarcts?⁵ In view of the poor prognosis, should we attempt to identify those who after an unrecognised infarct are at special

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risk and might benefit from surgery? Such a high risk group would probably include those with triple vessel disease and preserved left ventricular function who develop ST segment depression and a decrease in the ejection fraction on exercise.⁶

Why is pain absent in silent infarcts? The location of the infarct as determined by the electrocardiogram is no different whether there is pain or not. Nor does the size of the infarct appear to influence the severity of the pain. Furthermore, extensive myocardial ischaemia commonly occurs during exercise electrocardiogram testing without the patient experiencing any pain. No satisfactory hypothesis has been advanced to explain the absence of pain in either myocardial infarction or transient myocardial ischaemia. Any hypothesis would also have to take into account that in a given patient the initial infarct may be silent and a subsequent one may be painful¹; ambulatory electrocardiogram monitoring in patients with angina may show equally definite intermittent ischaemic changes, which are sometimes associated with and sometimes are not associated with pain²; after bypass surgery angina may be relieved, and yet, despite patency of the grafts, ambulatory or exercise electrocardiogram testing and radionuclide studies may show evidence of intermittent ischaemia which is totally asymptomatic.⁷ Clearly it would be naive to assess the outcome of bypass surgery only by the relief of symptoms.

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Aviation medicine in the '80s

A recent symposium organised by the Aviation Medical Group of the Royal Aeronautical Society brought together civilian and military experts in an ambitious programme which covered topics from backache to the Boeing 757 instrument panel.

Change was immediately apparent when P J Taylor, dean of the Faculty of Occupational Medicine until last year, outlined the new requirements for entry to the faculty. Broader conditions are needed—there are now more full time occupational physicians than radiologists—but Dr Taylor's keynote address struck a chord of discontent among some of the audience. The Diploma in Aviation Medicine will still not be recognised for admission as an associate. Candidates will be required to pass the examination for Associate of the Faculty of Occupational Medicine after six months full time or one year part time in the practice of occupational medicine. Yet in his lecture on training doctors in occupational medicine, Dr Roy McLaren considered that the Diploma in Aviation Medicine was at least, if not more, appropriate than the Associate of the Faculty of Occu-

pational Medicine for the practice of occupational medicine in an airline. Dr McLaren is well qualified to judge, being not only a senior medical officer (air) with British Airways but also an examiner and lecturer for the Diploma in Aviation Medicine course. Should not the faculty reverse its decision and take up McLaren's suggestion that aviation medicine should be recognised as a subspecialty of occupational medicine? The specialty has concentrated on alleviating, or protecting against, the adverse physiological effects caused by the hostile environment of flight and has therefore identified itself with the central aim of occupational medicine—namely, to improve the working environment.

Despite all the advances in aviation medicine problems still occur such as disabling disorientation and airsickness in student pilots and navigators. Squadron Leader Mike Bagshaw, a medically qualified fast jet pilot, described how he desensitises such sufferers by exposing them to a series of flights in which aircraft manoeuvres are progressively increased in severity. His patients have all been recognised to have good potential as aircrew and about 85% are cured—with resultant financial benefit to the Royal Air Force by reducing wastage of aircrew, who are expensive to train. How often do other occupational physicians prove their effectiveness so obviously when cost is measured against benefit?

The measure that concerned Dr Chris Rawll, senior medical officer (ground) at British Airways, was the greater number of occupational physicians available to care for air rather than ground personnel in his airline. Aircrew failure might crash the aeroplane but executive failure might crash the airline, and this group therefore deserved an equivalent degree of medical scrutiny. Among the many ground level problems described by Dr Rawll was a high incidence of backache in the drivers of crew buses. Apparently these drivers pick up crewbags expecting them to be light but find to their disadvantage that they are full of ceramic tiles from Spain or other heavy objects imported by aircrew for their favourable price. This exemplified the need for an occupational physician to investigate the causes of a problem if he is to find an effective solution—on this occasion, the education of aircrew.

Dr Alex Williams, of British Caledonian, described how an active programme of education in 1983-4 had halved the number of eye injuries in the engineering department and had reduced back problems by 35%. In aviation the physician can almost always reduce morbidity if he is prepared to do more than scrape the surface of a problem. Occasionally even this may be sufficient: when coated with cadmium, depleted uranium is now used in preference to lead to make balance weights for the control surfaces of aircraft. If the surface layer of cadmium corrodes radioactivity becomes a potential hazard to engineers working on the aircraft, but Williams has found that the actual amounts of radiation have remained within acceptable limits. Of more concern was his review of uncontrolled studies which raised the possibility that pregnant operators of visual display units might have an increased incidence of miscarriage. It is, however, reassuring to read a recent case-control study which did not support rumours of teratogenesis.¹

Today the ubiquitous visual display unit has even found its way on to the flight deck. The instrument panel of the Boeing 757, which has just completed two years of service with British Airways, has two screens which have replaced many conventional instruments. Among the features of the panel described by Captain Gray, of British Airways, is the alerting system which informs the crew immediately of problems in any of the aircraft systems, which are monitored auto-