

# MEDICAL PRACTICE

## *Clinical Topics*

### Defibrillation at a football stadium: an experiment with Brighton and Hove Albion

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#### Abstract

Over a five-year period arrangements have been made to increase the prospects of resuscitation for victims of sudden death at a large football stadium. Seven cases of ventricular fibrillation occurred. Four were resuscitated successfully and were subsequently discharged from hospital.

#### Introduction

The belief that stress is a primary cause of heart attacks and sudden death is inaccurate. Nevertheless, excessive sympathetic stimulation may precipitate myocardial infarction in those who are vulnerable because of progressive coronary disease, and can trigger ventricular fibrillation in patients with electrical instability.<sup>1</sup> A football stadium may contain tens of thousands of excited spectators for three hours or more at a time, and a high proportion must be men with important underlying coronary artery disease. Though no figures are available, one or more deaths from heart disease are likely to occur each season in the grounds of most major league clubs. We became interested in this problem in 1976, and we recount our experience over five years with home games of Brighton and Hove Albion.

#### Organisation for cardiac first aid

Within the football ground the St John Ambulance Brigade has the primary responsibility for first aid, and about 35 uniformed members attend each game. Cardiac resuscitation is taught to the members independently of ourselves as part of the St John's routine training. There are in addition usually 50-60 uniformed members of the Sussex police force in attendance within the ground. The force has shown keen interest in cardiac resuscitation; special emphasis is placed on it during first-aid training, and the police film unit made their own excellent instructional film in 1974. Since then they have participated in many successful out-of-hospital cardiac resuscitations in Brighton Health District.

Within the area of Brighton and Hove there are four resuscitation ambulances manned by ambulance personnel trained to perform defibrillation, intravenous drug administration, and intubation without direct medical supervision.<sup>2</sup> One of the two ambulance stations is only half a mile (0.8 km) from the football ground. Nevertheless, access can be difficult because of traffic congestion and dense crowds. In 1977 the directors of Brighton and Hove Albion Football Club agreed to purchase a portable defibrillator and oscilloscope (Cardiac Recorders models 280 and 290) together with a resuscitation bag containing a laryngoscope, an Ambu-bag, endotracheal tubes, airways, and simple antiarrhythmic drugs. The equipment, which cost about £1000, is maintained by trained ambulance personnel. Two of the ambulance-men attend each home game at a cost to the club of £15 a match. They are in radio contact with the police and with East Sussex ambulance control.

In practice, first aid to victims of collapse is given initially by members of St John, but the police soon become aware of any disturbance and may help. Two or three minutes may elapse before the professional ambulance-men and the defibrillator arrive, and if a major emergency is confirmed a resuscitation ambulance is summoned. The aim is for defibrillation to have been achieved before the ambulance arrives, but extra skilled attention is often welcome even at this stage.

Brighton and Hove now have a scheme for community training in cardiopulmonary resuscitation, but this has not yet had a discernible impact on first aid at the football ground.

During the period under review, Brighton and Hove Albion played 26 or 27 home games each season. For the first four years of our

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review they were in the third and second divisions of the English Football League, and by the final year had been promoted to the first division. The average attendance was about 20 000 people.

In the five years under review resuscitation has been attempted on seven occasions. This was initially successful in that a heart beat was restored in five patients, but one of these did not regain consciousness and died in hospital. Four patients in the five years recovered from sudden death in the football ground and were discharged alive.

## Case reports

### CASE 1

A previously healthy 79-year-old man collapsed at a match in April 1976. External cardiac massage was started by a member of the St John Ambulance Brigade, and a resuscitation ambulance was summoned with a 999 call. Defibrillation resulted in asystole. After intubation he was transferred to an ambulance. Ventricular fibrillation recurred and after a second shock spontaneous idioventricular rhythm occurred. Spontaneous breathing returned shortly afterwards. In hospital ECG showed an extensive anterior infarction. The patient had a flail chest. He was ventilated electively for 24 hours but did not regain consciousness. He died four weeks later.

### CASE 2

A 72-year-old man collapsed at the gates of the football ground in November 1976. He was given external cardiac massage and mouth-to-mouth respiration by a police officer and later by a St John ambulanceman. A resuscitation ambulance took three minutes to travel a few hundred yards through crowds leaving the ground and the patient was found to be deeply cyanosed with dilated pupils. Because of the difficult conditions the patient was moved into the ambulance before a 200 J DC shock was administered for ventricular fibrillation. Idioventricular rhythm was then observed on the oscilloscope, and subsequently a pulse became palpable. Adequate respiration did not return at this stage and endotracheal intubation was necessary, after which the patient's colour rapidly improved. Ventricular tachycardia during transit responded to lignocaine. The ambulanceman also administered dexamethasone. On arrival at the accident unit the patient was a good colour, had small pupils, and a palpable pulse at a rate of 150/min with atrial fibrillation. ECG showed evidence of ischaemia but no infarction. Further arrhythmias that occurred in hospital included ventricular fibrillation, but the patient eventually made a good recovery. He later emigrated to Australia.

### CASE 3

A 72-year-old man who was at the back of a stand in April 1978 collapsed suddenly. A member of St John called the trained resuscitation ambulancemen on duty at the ground who were known to be relatively near. They found the patient unconscious, cyanosed, and pulseless; but the pupils were not dilated and there were occasional respiratory gasps. No cardiac massage had been given. The monitoring oscilloscope confirmed ventricular fibrillation. Sinus rhythm was restored with a 400 J shock. Very rapid ventricular tachycardia ensued almost at once and a further 200 J shock caused asystole. After cardiac massage sinus rhythm returned spontaneously, but five further bouts of ventricular fibrillation required shocks before the patient reached hospital. He had been intubated with difficulty, but was still slightly cyanosed in the accident department. ECG showed recent inferior infarction. Seven more defibrillations were required during the first 36 hours in hospital, but he was discharged well 10 days later.

### CASE 4

In March 1979 a 48-year-old man collapsed during a game: initial resuscitation was started by two police officers who were standing nearby. It took nearly 10 minutes for the trained resuscitation ambulancemen on duty at the ground to reach the scene, partly because they were stationed remote from the event and partly because of problems with the dense crowds. The cardiac massage was effective; though the patient was in ventricular fibrillation he had only peripheral cyanosis and was making some respiratory efforts. Cardioversion was achieved with one 200 J shock, but more cardiac massage was required

for two minutes before a pulse became palpable. Ventricular fibrillation recurred in the ambulance but reverted at once with a 200 J shock. Intubation was not needed, but lignocaine and dexamethasone were administered by the ambulancemen. The patient regained consciousness before reaching hospital and surprised his attendants by asking the score at the match! The ECG showed no evidence of infarction, though later investigations showed severe triple-vessel coronary artery disease. He was discharged feeling well and later received successful bypass grafting.

### CASE 5

A 75-year-old man lost consciousness just before the start of a game in November 1980. The radio communication was out of order, but the trained resuscitation ambulancemen were summoned by a "runner." Access was difficult because the crowd was dense. A woman member of St John was attempting resuscitation single-handed but had not been able to remove the patient from his seat to lie him flat, and no cardiac massage had been possible. He was cyanosed, pulseless, had dilated pupils, and was making no respiratory effort. Adequate cardiopulmonary resuscitation was then started with difficulty after several seats had been cleared. The oscilloscope showed coarse ventricular fibrillation that reverted with one 400 J shock; a pulse was felt almost at once, and a minute later spontaneous respiratory efforts began. In hospital the patient was restless but unconscious. An ECG showed no evidence of infarction. Progress was slow, and artificial ventilation was needed for three days because of pulmonary oedema. After two weeks in hospital the patient was discharged apparently fit and well.

### CASE 6

A man about 65 lost consciousness during a game in December 1980. He was sitting near two doctors who gave cardiac massage when they found him pulseless. Two trained resuscitation ambulancemen attended, but an equipment fault hindered adequate visualisation of the electrocardiogram. The patient was not breathing, ventilation was inadequate, and endotracheal intubation could not be achieved. Defibrillation did not restore a heart beat and resuscitation was unsuccessful.

### CASE 7

A 58-year-old man collapsed during a game in February 1981. Cardiac massage was started by members of St John after unknown delay. Several shocks were required to terminate ventricular fibrillation, which then gave place to asystole. No electrical activity returned subsequently; a pacing device was used but without effect. The attempt at resuscitation was eventually abandoned.

## Comment

The availability of resuscitation equipment at sports stadiums has been recommended, but few results of this policy have been published. In 1968 Carveth<sup>3</sup> described a successful outcome in three of four patients who collapsed at the Nebraska football stadium. Subsequent experience over an eight-year period at Nebraska included a total of eight successful long-term resuscitations from a group of nine spectators who had developed a cardiac arrest secondary to myocardial infarction.<sup>4</sup> The experience of Kassanoff *et al*<sup>5</sup> during a five-year period at the Atlanta Stadium was less rewarding; of 13 documented episodes of apparent sudden cardiac death, only three victims were successfully resuscitated. At the Mile High Stadium in Denver two patients who sustained a cardiac arrest during the 1978 football season were both resuscitated on site, ultimately to be discharged home well.<sup>6</sup>

The need for resuscitation services is apparent when so many vulnerable people are together under circumstances of intense emotion and excitement that increase risk. Yet the difficulties are formidable. Cardiopulmonary first aid with closed chest massage and artificial ventilation are relatively simple for trained

first-aid workers, but experience has shown that transporting patients with cardiac arrest is difficult, and a successful outcome is unusual if patients have to be taken to a defibrillator in a relatively remote hospital. The concept of bringing defibrillators to the victim of cardiac arrest that was pioneered in Belfast<sup>7</sup> has proved beneficial there and in Brighton but even more successful overseas, where funds and concerted effort can more readily be made available.<sup>8,9</sup>

In large sports stadiums victims who collapse will be seen at once, but the attention of first-aid workers cannot always be drawn immediately. Even when the alert is raised access can be extremely difficult. This is not made easier by poor co-operation from crowds whose attention is elsewhere and who may be unaware of the grave nature of an emergency. Our four surviving patients were resuscitated under conditions of great difficulty, which tested to the full the experienced ambulancemen who managed these emergencies. Nevertheless, we believe that the presence of a defibrillator and trained staff within the ground is helpful and almost certainly increases prospects of success. Co-operation with the St John Ambulance Brigade and with the police is of paramount importance, and a radio link limits delay.

We have shown that resuscitation in a sports stadium is feasible, but others with an interest in the system will wish to consider the financial aspects and the logistics of adopting the system elsewhere. The cost of the scheme in the Brighton and Hove football ground has been modest. Police and the St John Ambulance Brigade have to be in attendance, so their participation brings no extra charge. The £1000 capital cost of resuscitation equipment five years ago would be perhaps double today. Attendance at home games is by no means resented by the trained ambulancemen, who are paid only a small fee but enjoy an excellent view of the matches they cover.

We think the service would be difficult to provide, however,

in the absence of an organised resuscitation service, and we see it as a worth-while extension of the resuscitation ambulance project. We believe that better provision should be made for out-of-hospital cardiac arrest in all spheres, and exclusive attention to resuscitation in sports stadiums that can produce only a few successes each year might perhaps be inappropriate.

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### What are the health hazards for a family that includes two small children to live in West Africa for three years?

The health hazards for expatriates in West Africa largely arise from exposure to the infectious diseases prevalent there. These include malaria, faecal-oral infections such as gastroenteritis, viral hepatitis, dysentery, giardiasis, and poliomyelitis. In certain areas and circumstances helminthic infections, such as schistosomiasis, hookworm, round worm, and onchocerciasis, may be contracted. This sounds a formidable list, but the dangers are much reduced by sensible precautions such as regular malaria prophylaxis, care in the preparation and storage of food, boiling water when necessary, insect screening of houses, and immunisation. Hazards arising from climatic conditions are less frequent but include heat exhaustion, sunburn, and prickly heat. A different way of life, boredom, frustration, and loneliness may lead to psychological problems or alcoholism. Helpful information is contained in the booklet *Preservation of Personal Health in Warm Climates*, 7th edition (1979), published by the Ross Institute of Tropical Hygiene, London School of Tropical Medicine and Hygiene, Keppel Street, London WC1E 7HT.—D R W HADDOCK, senior lecturer in tropical medicine, Liverpool.

### How is vaginal thrush contracted and what treatment is advised?

Rectal carriage of *Candida albicans* occurs in up to 70% of the population<sup>1</sup> and oral carriage in up to 50%. It is thought that the vagina is often contaminated from the perineum and that the minor trauma of sexual intercourse is usually necessary to initiate infection.<sup>2</sup> True sexual transmission may sometimes happen: in about 10% of cases balanitis occurs in the sexual partner, and some recurrences have been blamed on orogenital contact.<sup>3</sup> During pregnancy the vagina is more susceptible to thrush infection, which may then become persistent after delivery. Asymptomatic women may carry the fungus in the vagina; perhaps such women eventually develop symptoms. So far as treatment is concerned, nystatin and the various newer antifungal agents<sup>4</sup> may give mycological cure rates up to 90%, but relapse is common, and mycological findings may not be related to symptoms.<sup>2</sup> Since sexual transmission is possible, it would seem sensible to advise against intercourse during treatment, but the

partner needs treatment only if he has symptoms. To decrease the relapse rate, prolonged courses of treatment have been recommended<sup>4</sup>—two weeks being optimal. Intermittent prophylactic courses may also help. Only local treatment to the vulva and vagina is necessary, and there is no evidence that treating the bowel decreases the frequency of recurrences.<sup>2</sup> Women who relapse should be checked for predisposing factors such as glycosuria or anaemia.<sup>1</sup> Disposable pants may be advised to minimise the risk of recontamination. Rarely, an intractable case may require more old-fashioned, messy treatment with gentian violet.—J O DRIFE, lecturer in obstetrics and gynaecology, Bristol.

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A patient almost certainly had a reaction to tetanus toxoid as a young girl 15 years ago. She is shortly going to Sri Lanka; what would be the risks of giving tetanus toxoid? If it is given what precautions should be taken?

The risks of tetanus are world wide, and we are not told whether the visit to Sri Lanka entails activities increasing the risks of exposure or lowered standards of wound care—for instance, in a remote rural area. If the suspected reaction 15 years ago was no more than trivial and local, with perhaps transient fever, there is little chance of a more severe reaction now. In any case the chance and degree of reaction may be minimised by giving plain (not adsorbed) vaccine intradermally in a dose of 0.1 ml, and this is recommended as the booster when there is a history of previous reaction to adsorbed vaccine. Adrenaline BP should be to hand, as always, in case of a rare anaphylactic reaction.—N R GRIST, professor of infectious diseases, Glasgow.

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