CASE REPORT

Did you hear the one about the policeman, the doctor and the pharmacist at 30 000 feet?

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SUMMARY

This is the remarkable story of survival against all the odds. A passenger had a myocardial infarction complicated by a witnessed cardiac arrest while on a commercial flight through some of the most remote airspace on the planet. Immediate cardiopulmonary resuscitation and use of an automatic external defibrillator achieved rapid return of spontaneous circulation. Passengers and crew worked effectively together, under the guidance of a physician, to provide critical care to the patient while the flight diverted so he could be transferred to an emergency hospital in Beijing for eventual thrombolysis and postresuscitation care. He made a rapid and full recovery to be discharged from hospital, neurologically intact, 10 days later.

BACKGROUND

Medical emergencies on commercial flights are a common occurrence. This case highlights the ability of lay-people with basic training to provide advanced critical care at times of extreme need under the appropriate guidance.

Telemedicine is already widely used for guiding management decisions of such incidents but is limited by the speed at which clinical information can be relayed to the medical consultant. High-resolution, real-time, audiovisual links facilitate supervision of life-saving intervention for critically ill patients awaiting aeromedical retrieval in rural Australia. Such advances in telemedicine may help coordinate the successful in-flight resuscitation and transfer to definitive care of patients in the future.

CASE PRESENTATION

A 65-year-old, Vietnamese man reported chest pain to cabin crew while on board a flight from Toronto to Hong Kong. A request for medical assistance was made and answered by a doctor with prehospital critical care experience.

Initial assessment revealed that the patient had no comorbidities or allergies and was fully conscious with no signs of respiratory distress and had good volume peripheral pulses. During this examination the patient reported that the pain was radiating to his ears and gums. Shortly after, he lost consciousness and had no palpable pulse. Chest compressions were started in the seat before, with the help of two fellow passengers, he was quickly lifted to an open area near the middle cabin emergency exit. The two passengers were a policeman and a pharmacist from Toronto. The policeman resumed chest compressions to allow the physician

to attend to the airway while the automatic external defibrillator (AED) was applied. Resuscitation equipment was made available to the team by the crew.

TREATMENT**Defibrillation**

As soon as applied, the AED directed a defibrillating shock. A further cycle of cardiopulmonary resuscitation (CPR) was delivered before pausing to allow the AED to advise a second shock. During the subsequent cycle of CPR the patient began to show spontaneous movement and respiratory effort although peripheral pulses were weak.

Postresuscitation critical care

At this point the policeman moved to allow him to hold open the patient's airway and the pharmacist took responsibility for monitoring the patient's pulse. There was no automated blood pressure (BP) machine and the ambient cabin noise did not allow for manual measurement so he continuously palpated the radial pulse while monitoring the man's conscious level. While the physician tried to obtain intravenous access the radial pulse became weak before disappearing and the patient, again, lost consciousness. CPR was briefly restarted but stopped when signs of life were observed.

Pharmacist-delivered, timed-boluses of low-dose epinephrine

Once intravenous access was secured, 10 µg boluses of epinephrine were given as required to maintain a palpable radial pulse. This responsibility, along with monitoring of the portable pulse oximetry finger probe, was given to the pharmacist. It soon became apparent that the patient required an inotropic infusion. Estimating that he had received a 10 µg bolus of epinephrine every 2 min to maintain peripheral pulses, a timer was started and the same dose was delivered at that frequency. This was reviewed every 5 min and the dose altered depending on the response over the previous period.

Airway management

After return of spontaneous circulation the patient made noises consistent with an obstructed upper airway and exhibited a 'see-saw' respiratory pattern. His airway tone and reflexes precluded laryngeal mask airway placement and so an oropharyngeal airway and jaw thrust were successfully used to achieve a patent airway. The policeman was given brief instruction in simple airway opening manoeuvres and the signs of airway obstruction

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and subsequently took responsibility for maintaining an open airway and monitoring the respiratory rate and pattern. During an episode of vomiting, the policeman rapidly coordinated with the cabin crew to move the patient into the recovery position. Over the course of the next 2 h the patient became increasingly conscious and no longer required airway adjuncts or support.

Transfer to definitive care

Throughout the resuscitation the cabin crew provided excellent support to the team. They helped locate equipment and drugs and coordinated communication with the cockpit and ground resources. The aircraft was in Chinese airspace and, as it was our nearest metropolitan destination, the pilot diverted to Beijing. Owing to technical difficulties with the satellite phone it was not possible to alert an interventional cardiology team to our arrival but once on the ground the patient was quickly transferred, with on-going epinephrine 'infusion', to a hospital capable of performing percutaneous coronary intervention (PCI).

OUTCOME AND FOLLOW-UP

ECG demonstrated anteroapical ST segment elevation and, due to an anticipated delay in the arrival of the on-call interventional cardiology team, the patient received thrombolysis, 3 h after the onset of his symptoms. The beginning of resolution of the ischaemic ECG changes was observed within 30 min.

The patient refused PCI. Echocardiography revealed an enlarged left ventricle (LV) with an akinetic anterior wall and diastolic dysfunction. LV ejection fraction was estimated at 45%. Inotropic support in a Coronary Care Unit/High Dependency Unit environment was required for 2–3 days. The patient made a full recovery with no detectable neurological injury and was discharged 10 days later.

DISCUSSION

Around 1000 passengers per year suffer sudden cardiac death on commercial flights.¹ This is more than die due to airplane crashes. The 'Lethal Cocktail' of travel-related stress, disturbed circadian rhythm and lower ambient cabin oxygen levels has been implicated in increasing the probability of a coronary event.² A study of a 65-month period of AED use on a commercial carrier noted 27 cardiac arrests with six passengers having ventricular fibrillation identified as the initial rhythm.³ Five were successfully defibrillated and there were two long-term survivors who were neurologically intact.

Given the two billion commercial flights made by passengers each year, the International Civil Aviation Organisation still considers this a rare event and does not mandate that commercial carriers include AEDs among their emergency equipment. Despite this there has been widespread adoption of a policy of carrying this valuable device and at least one flight attendant trained in its use. In April 2001 the US Federal Aviation

Authority made this compulsory for all US-based commercial passenger aircraft.

This case emphasises the importance of community education and training in basic life support and the use of the AED. This training starts for many in school and is updated regularly in many professional roles outside of the hospital. In this remarkable case, the competence of the cabin crew and non-medical resuscitators allowed the physician to remotely direct the post-resuscitation care of this patient while co-ordinating with the ground crew for an efficient transfer to definitive care.

New monitors, made for out-of-hospital environments, have been made available on some commercial flights allowing ECG monitoring, pulse-oximetry, automated BP measurement, defibrillation and audio-video link to ground medical resources. Telemedical links to rural Australian clinics already provide supervising critical care doctors, from referral hospitals, a real-time and high-resolution video of the resuscitation scene.⁴ This facilitates much improved care and regularly guides the safe performance of life-saving, time-critical intervention while awaiting aeromedical retrieval. This case illustrates how advanced critical care, delivered by a competent non-medical resuscitation team can be locally supervised by a critical care physician. It is possible, even in the absence of a critical care doctor, that remote supervision may guide the success of future resuscitations on commercial flights.

Learning points

- ▶ Community training in basic life support and automatic external defibrillator (AED) use is of great value.
- ▶ AEDs and well-equipped medical kits should be available on all commercial flights.
- ▶ High-resolution audiovisual telemedicine may have an increasing role to play in the management of in-flight medical emergencies.

Contributors DTM, RG and PCML were involved in the in-flight resuscitation. MS treated the patient in the ED of Beijing United Family Hospital.

Competing interests None.

Patient consent Obtained.

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