CHALLENGES WITH AEROMEDICAL CERTIFICATION AFTER A ‘FUNNY TURN’

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INTRODUCTION
A 48-year-old ATPL Pilot with 8600 hours of total flight time experienced an episode of feeling confused or ‘off’ with no chest pain or palpitations in mid-June 2015. He bent down to pick up a salad in the local supermarket and collapsed between the vegetables and bakery section. The incident was witnessed by an off-duty paramedic. When the pilot woke up he was told by the bystander that he had had a ‘seizure’ and that an ambulance was on the way. The pilot was clear headed on waking, asked what had happened and felt embarrassed. The observer said the incident lasted about 30 seconds.

The paramedics found the pilot’s BP to be 75/40 mmHg, and they took him to a major hospital where he was admitted for observation and investigation. He did not bite his tongue or soil himself. He rang his colleagues at work to tell them what had happened and to pick up his car to avoid excessive parking charges. Neurological and cardiological examinations were normal.

As a result of the fall the pilot sustained a small haematoma on the back of his skull, which resolved over the next few days. He had no other injuries.

Unfortunately his partner was unable to obtain any CCTV image of the incident as it occurred between two cameras in the ‘dead’ zone of the supermarket. No one was able to track down the off-duty paramedic.

In the week prior to the incident, the pilot had undertaken several long-haul flights. He was relatively sleep deprived as he finds it hard to sleep during the day in the layovers.

He reported it was the first syncopal event he had experienced. He said he remembered once feeling lightheaded during a long parade when he had been in the military many years ago, but he did not lose consciousness on that occasion. There was no family history of sudden death. He was not on any medication, was a non-smoker and drank alcohol only occasionally. He is a divorced father of two, living with his new partner.

The pilot had multiple tests in hospital. The EEG showed no epileptogenic activity, and EEG and stress echocardiogram were normal. An MRI of the skull showed no evidence of local cortical dysplasia, intracranial mass lesion, haemorrhage or significant focal gliosis.

After discharge the pilot had a normal sleep deprived EEG, 24hr ambulatory BP and Holter monitor. The tilt table test was positive with “evidence of neurocardiogenic syncope. Mixed cardio-inhibitory/vasodepressor response”. He had no neurological evidence of epilepsy or structural cardiac disease. The neurologist did not commence him on an antiepileptic medication and didn’t plan to, unless he had a further event.

In the Brignole article 3, syncope is classified according to aetiology and mechanism with a great overlap between the two. Most studies and clinicians agree that history is of paramount importance with 21% diagnoses made at the initial evaluation in the Syncope Unit Project (SUP) Study5. This study included 16% were hospitalised patients. Reflex syncope as a cause was established in 90% of syncopal events in a videometric analysis of 56 episodes of transient cerebral hypoxia noted by Lempert et al6. So the evidence from a witness may be incorrect and may lead to a false diagnosis. Most studies reiterate that syncope per se is not the problem but the underlying cause is, particularly cardiac syncope. The problem is that trying to simulate syncope is very difficult and that presyncope may not be an adequate substitute for the actual event.

A recent study by Brignole and Hamdan2 found that syncope is relatively common. The prevalence of syncope in Utah was 9.5 per 1000 inhabitants, with one out 10 being hospitalised; however, most don’t seek medical assistance. The frequency of syncope occurs in a bimodal pattern, between 10-30 years of age then in the over 65-year group. The US Air Force Waiver Guide 2003 quotes the incidence of syncope in the US Air Force population to be between 12-48%. As many as one third to two thirds of the population experience an attack of vasovagal or neurocardiogenic syncope at least once in their life.

In the Brignole article, syncope is classified according to aetiology and mechanism with a great overlap between the two. Most studies and clinicians agree that history is of paramount importance with 21% diagnoses made at the initial evaluation in the Syncope Unit Project (SUP) Study. This study included nine syncope units in Italy with 941 patients from March to September 2008. Of those, 60% were referred from out of hospital services, 24% from the ED and 16% were hospitalised patients. Reflex syncope as a cause was established in 67%, orthostatic hypotension in 4%, cardiac 6%, nonsyncopal events in 5%. There was unexplained syncope in 18% despite having an average of 3.5 +/- 1.8 tests per patient. These types of clinics have been organised in Italy, the UK and the USA and lead to reduced hospital admissions, tests, improved diagnostic yield and decreased cost per diagnosis.

Table 1. Classification of syncope. Adapted from Brignole et al².

<table>
<thead>
<tr>
<th>Clinical Form</th>
<th>ECG/BP documentation</th>
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<tbody>
<tr>
<td>Reflex (neurally mediated)</td>
<td>Bradycardia</td>
</tr>
<tr>
<td>Orthostatic hypotension</td>
<td>Tachycardia</td>
</tr>
<tr>
<td>Cardiac or cardiovascular</td>
<td>No or slight rhythm disturbance; hypotension</td>
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ABOUT THE AUTHOR
Dr Priti Bhatt initially studied Medicine at University of NSW, but she went on to obtain a second medical degree from the University of Wien, Austria. She has undertaken post-graduate training in acupuncture, occupational medicine, as well as underwater and aviation medicine. In 1996, she established her practice in aviation medicine and general practice. Priti has been an MRO since 2008, and is a DAME and FAA medical examiner.

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ABSTRACT
Temporary loss of consciousness is unnerving for anyone, however the consequences in some professions can be devastating. This paper discusses the case of an Airline Transport Pilot License pilot who experienced a ‘funny turn’ resulting in loss of consciousness, with reference to the aeromedical decision-making process and a literature review.

Perhaps Syncope Units may be something to introduce in Australia. However the results of the studies show marked variation in the diagnostic tests used and admission, which may or may not have been necessary because there are many guidelines on the assessment and approach to syncope.

More diagnoses are made by monitoring than a laboratory approach, due to difficulty in simulating/duplicating the exact condition as in the primary syncopal event. In some cases diagnoses are made by Implantable Loop Recorder (ILR) up to two years after implantation.

Tilt table testing is given higher significance in aviation due to its operational relevance. It is used relatively infrequently in general medicine. Studies of tilt table testing can be difficult to assess as they use different protocols and hence no gold standard has been established\(^8,9\). In diagnosing vasovagal syncope, a paper by Richard Hongo et al (in 2004) states that the specificity of tilt table testing in a passive test is variable from 50-100%\(^8\), with false positives generally about 10-15%. There are many variations in protocols such as the length of time from supine to tilt, the angle of the tilt and whether or not pharmacological agents such as isoproterenol or nitroglycerin are used. Reproducibility of tilt table testing is also variable from 35-87%, partially due to the inability to reproduce the exact autonomic state from test to test and the original syncope. Both true and false positives are readily increased by steeper angles of tilt. This is a relatively safe procedure with low rates of complications. Asystolic pauses can occur but are rapidly reversed with return to the supine. Case reports have documented life threatening ventricular arrhythmias in trials using isoproterenol in patients with heart disease, and headaches have been reported by patients given nitroglycerin.

Table 2. Classification of Tile Table Test responses. Adapted from Hongo et al\(^8\)

<table>
<thead>
<tr>
<th>Response</th>
<th>Haemodynamics</th>
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<tr>
<td>Type 1. Mixed.</td>
<td>Fall in HR &lt;40 bpm or systolic BP &lt;80 mmHg; no asystole or bradycardia.</td>
</tr>
<tr>
<td>Type 2. Cardioinhibition – A or B</td>
<td>Severe bradycardia (B) or Asystole (A)</td>
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<tr>
<td>Type 3. Vasodepression.</td>
<td>Fall in systolic BP &lt;80 mmHg without fall in HR.</td>
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The Implantable Loop Recorder is gaining importance as a diagnostic tool in recurrent syncope, as it works in monitoring events in real time. It is a device placed under local anaesthetic two finger breadths under the left clavicle subcutaneously and secured to the pre-pectoral fascia. The newer devices have a battery life of up to three years and a monitor with a solid state loop memory that captures high fidelity electrocardiographic events of up to 42 minutes of rhythm after activation of the device by the patient after the event or by a bystander. The newer models have auto-activation modes and record up to 5-6 events when predefined parameters are met. The device is interrogated using a standard pacemaker program and is removed either after a diagnostic trace is obtained or on expiry of the battery.

Complications of the ILR are relatively few and include localised infection, persistent pain at the infra-mammary site and local erosion. A great impediment is the cost of the device. One study by Krahn et al\(^10\) reported a diagnostic yield of 58% in 85 patients. Of 50 recorded episodes, 21 were arrhythmias - 18 bradycardias, two SVTs, and one AF; 29 had sinus rhythm. There was no VT or recurrence of syncope and felt insecure and unable to continue as episodes became unpredictable. Unfortunately, CASA and the FAA do not provide clear guidance for the management of syncope in the aviation domain.

DISCUSSION

From an aeromedical perspective, loss of consciousness and hence of control of aircraft is catastrophic. The questions to be answered are: Is it syncope or another event? And if it is syncope, what is the cause? Is the event fully explicable as benign syncope or is there potentially serious disease present? What is the risk of recurrence in the flight environment?

Another way of thinking of it is ‘would you let your child or significant other fly with this pilot?’

Certification of pilots after a single syncopal episode where all serious cardiac and neurologic disease has been ruled out could be possible after a period of observation which is arbitrarily stated by the second European Workshop in Aviation Cardiology\(^11\) as six months with ‘as or with co-pilot’ restriction and full certification no sooner than five years - provided there were no recurrences. Of the 1,900 pilots and ATC on the author’s books, there were five other cases of loss of consciousness, of which only two were considered syncope: one a pilot for a major airline and the other an ATC, both with micturition syncope. Both returned to work after serious causes were excluded, however one had recurrence of syncope and felt insecure and unable to continue as episodes became unpredictable. Unfortunately, CASA and the FAA do not provide clear guidance for the management of syncope in the aviation domain.

CONCLUSION

Given the prevalence of syncope in the general population, clear guidance for the investigation and management of syncope in pilots would fill a much-needed gap.

REFERENCES

2.   Lempert T, Bauer M, Schmidt D. Syncope: A videometric analysis of 56 episodes of transient cerebral hypoxia

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