



CIVIL AVIATION AUTHORITY OF MALAYSIA

CEREBROVASCULAR ACCIDENT AFTER COVID 19 VACCINE IN PILOT – A CASE REPORT

**SECOND AVIATION MEDICAL EXAMINER
REFRESHER WORKSHOP.**

13 DECEMBER 2022

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Disclosure Information

I have the following financial relationships to disclose:

I am an employee of the Civil Aviation Authority of Malaysia

I will not discuss off-label use and/or investigational use in my presentation



49 years old previously healthy captain in a major airline presented with:

- Acute weakness and numbness on right leg and right sided of body, nearly fell down.
- Broca's Aphasia - Difficulty in forming words and producing speech
- Attacks last for few minutes and recovered fully and spontaneously.

Happened in 3 episodes:

- 1st episode – During a pre-flight briefing in flight operation room
- 2nd episode – 15 minutes after he has recovered from first episode.
- 3rd episode – Occurred during transfer to boarding gate.
- Attacks were not associated with loss of conscious, headache and blurring of vision.

The pilot recovered fully from the attacks without any neurological deficit

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What should the pilot do?

① Start presenting to display the poll results on this slide.

Annex 1, ICAO

1.2.6 Decrease in medical fitness

1.2.6.1 Holders of licences provided for in this Annex shall not exercise the privileges of their licences and related ratings at any time when they are aware of any decrease in their medical fitness which might render them unable to safely and properly exercise these privileges.

Question 1:

What should the pilot do?

- A. Report to his company to call off his flight duty immediately. Notify the CAA as Decreased in Medical Fitness.
- B. Carry on with his command flight duty. See a doctor after his flight duty.
- C. Step down as captain, fly as a co-pilot.
- D. Continue flight duty with a standby captain preparing to take control in case of cockpit incapacitation occur.

2 days after, the Captain saw a neurologist

- **MRI and MRA** showed evidence of Acute Cortical Infarct in the Left Frontal Lobe.

“ Small cortical area of restricted diffusion is seen in the left high frontal lobe”

- **Doppler Ultrasound** of bilateral carotid arteries showed only minimal soft plaque seen at the right and left carotid bifurcation and not causing stenosis.
- **2D echocardiogram**: Normal, EF: 65%
- **Medication:**
 - Aspirin
 - Statin

- Blood Ix:

-Total Cholesterol	: 4.9 mmol/L (<5.2)
- HDL	: 1.0 mmol/L(>1.0)
- Non-HDL	: 3.9 mmol/L (<3.4)
- LDL	: 3.1 mmol/L (<2.6)
- Triglycerides	: 1.8 mmol/L (<1.7)
- Chol/HDL	: 4.9 mmol (<3.5)
- HbA1c	: 5.2
- Creatinine	: 91 (60-168)
- Hb	: 15.5
- Platelet	: 195
- WBC	: 15.8
- D-Dimer	: 0.5 (<0.50)

Further history:

- Social alcohol drinker, never smoke, only started to do exercise regularly on a treadmill and cycling after this CV accident.
- Ht: 177cm, BW: 78 kg, BMI: 24.8
- Physical examination were all normal, no neurovascular deficit.
- BP 116/76, HR: 72/min
- Neuropsychiatry (Using NUCOG questionnaire): Normal (100%)
- MSE: normal
- ECG was normal.
- Stress ECG was negative.
- Received mRNA vaccine 13 days prior to attack.
- Conclusion: Normal neurological examination.

DOC 8984, Manual of Civil Aviation Medicine

1. Aeromedical considerations:

- Cause of stroke
- Recurrence-free observation period prior to medical re-certification following ischaemic stroke
 - Young and known mechanism (e.g PFO, successful closure) – 1 year
 - Arterial dissection – 1 year
 - Lacunar stroke with HPT-related small blood vessels – 1 year
 - Artherothrombotic stroke with risk factor – 2 years.

Recurrent risk of stroke:

Table 29.2, Chapter Neurological Disease, Ernsting's Aviation and Space Medicine, 5th edition

- 3 % – 10 % in 30 days
- 10%-14% in 1 year
- 25% - 40% in 5 years

Clinical Practice Guidelines, Management of Ischaemic Stroke, 3rd edition, 2020. Published by Malaysian Society of Neurosciences reported

- 3 % - 4% in 30 days
- 12 % in first year.
- 26.4 % - 30% in 5 years
- 40 % at 10 years.

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What is the next step?

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1. The captain continued his grounding period to explore the cause.
2. Second opinion from another neurologist.
 - Repeated MRI and MRA Brain 3 months after the 1st insult. (5mm axial T1, T2 and FLAIR sequence. 3D MRA of the brain)
 - There is a band hyperintensity of T2 and FLAIR seen in the white matter of the left frontal lobe.
 - **Old Ischaemic Gliosis at left frontal lobe, no other abnormality.**
 - Thrombotic stroke is likely secondary to an immunological response to **the mRNA vaccine** that the captain received 13 days prior to his stroke.
 - The captain did not show imaging evidence of ongoing endothelial disease anywhere in the brain.

CEREBROVASCULAR ACCIDENT ASSOCIATED WITH COVID 19 VACCINE IN A PILOT

1. There are increasing reports of various types of stroke including ischemic stroke, and hemorrhagic stroke, as well as cerebral venous sinus thrombosis (CVST) after COVID-19 vaccination. (Kakovan et al, 2022)
2. Vaccination induces a series of immunological events which may cause neurological problems, for example, demyelinating diseases, epileptic seizures, Guillain-Barre syndrome, and stroke (Kakovan et al, 2022).
3. COVID-19 vaccines may trigger stroke with thrombotic thrombocytopenia with or without the presence of anti-platelet factor 4 antibody (anti-PF4 antibody) (Kakovan et al, 2022)
4. Thrombosis can occur in the vessels following COVID-19 vaccination. (Kakovan et al, 2022)
5. Ischemic or hemorrhagic stroke may occur with CVST subsequent to COVID-19 vaccination. Obstruction of the brain's venous system increases ICP and may rupture blood vessels leading to hemorrhagic stroke. (Kakovan et al, 2022)

6. Clinicians should maintain a high degree of suspicion in patients with symptoms suggestive of thrombotic events after COVID-19 vaccination, and along with this, wise comprehensive diagnostic criteria can be advantageous. (Kakovan et al, 2022)
7. 51.1% were diagnosed with Acute Ischemic Stroke associated with Vaccine-induced immune thrombotic thrombocytopenia (VITT) (Kolachi et al, 2022).
8. The majority of cases with Acute Ischemic Stroke and VITT were female (77.2%) and aged below 60 years (68%) (Kolachi et al, 2022).
9. Acute Ischemic Stroke has been reported as a rare complication within 4 weeks post COVID-19 vaccination, particularly with viral vector vaccines. (Kolachi et al, 2022).

Conclusion

1. Stroke might be developed after the COVID-19 vaccine.
2. Designated Medical Examiner should familiar with this rare consequence of stroke post COVID-19 vaccination to make an appropriate aeromedical disposal.
3. The risk of recurrence of the COVID 19 Vaccine induced Acute Ischemic Stroke is yet to be determined.
4. The pilot is therefore continue to be grounded for recurrence free period for at least a year.
5. The re-certification will include a medical flight test to ensure the normal cognitive function.

Bibliography

1. Maryam Kakovan, Samaneh Ghorbani Shirkouhi, Mojtaba Zarei, Sasan Andalib, Stroke Associated with COVID19 Vaccines, Journal of Stroke and Cerebrovascular Diseases, Volume31, Issue 6, 2022,106440, ISSN10523057, <https://doi.org/10.1016/j.jstrokecerebrovasdis.2022.106440>.
2. Kolahchi Z, Khanmirzaei M, Mowla A. Acute ischemic stroke and vaccine-induced immune thrombotic thrombocytopenia post COVID-19 vaccination; a systematic review. J Neurol Sci. 2022 Aug 15;439:120327. doi: 10.1016/j.jns.2022.120327. Epub 2022 Jun 20. PMID: 35752132; PMCID: PMC9212261.
3. Department Editor: Charles M. Yarborough III, MD, MPH. Ernsting's Aviation and Space Medicine, 5th Edition. Journal of Occupational and Environmental Medicine: September 2016 - Volume 58 - Issue 9 - p e335 doi: 10.1097/JOM.0000000000000821.

4.

T1 - Clinical Practice Guidelines Management of Ischaemic Stroke 3rd Edition 2020

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