



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

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Chief Medical Officer

A. ACCIDENT: WPR16FA029; Carlsbad, CA

On November 18, 2015, about 1624 Pacific standard time, an Airbus Helicopters AS350B3E, N711BE, departed controlled flight while landing on a moveable helipad at Mc Clellan-Palomar Airport, Carlsbad, California. The pilot, who was the owner, was operating the helicopter under the provisions of 14 Code of Federal Regulations Part 91. The private pilot and private pilot-rated passenger were fatally injured; the helicopter sustained substantial damage. The local personal flight departed Carlsbad at 1411. Visual meteorological conditions prevailed, and no flight plan had been filed.

B. GROUP IDENTIFICATION

No group was formed for the medical evaluation in this accident.

C. DETAILS OF INVESTIGATION

1. Purpose

This investigation was performed to evaluate the pilot/owner and the pilot rated passenger for any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins. In this accident, a second question was to understand why the occupants did not turn off the engine during the helicopter's prolonged period of spinning.

2. Methods

The FAA medical case review, autopsy reports, toxicology results, video evidence from a bystander, and the investigator's reports were reviewed.

Pilot/Owner

FAA Medical Case Review

According to the FAA medical case review, the 65 year old male pilot had reported 25,000 total flight hours as of his last medical exam, dated

1/19/2015. At that time, he was 73 inches tall and weighed 247 pounds. He had reported hypertension, Lasik eye surgery, multiple shoulder surgeries, and a foot surgery to the FAA. At the time of his last exam, he reported medications including nebivolol (a blood pressure medication also called Bystolic), pantoprazole (a prescription medication for heartburn also known as Protonix), and rosuvastatin (a cholesterol medication also marketed with the name Crestor).^{1, 2, 3} The pilot was issued a third class medical certificate limited by a requirement to have available glasses for near vision.

Autopsy

According to the autopsy performed by the County of San Diego Office of the Medical Examiner, the cause of death was multiple injuries and the manner of death was accident.

The pilot/owner's injuries included significant intracranial injuries with bilateral subdural, subarachnoid hemorrhage more pronounced on the right side and the base of the brain, extending into the foramen magnum and cervical canal. Intraventricular hemorrhage without parenchymal contusions was also noted. In addition, hemorrhage of the anterior cervical ligament associated with fractures of the body of C6 (and perhaps C7) with associated subdural hemorrhage surrounding the cervical spinal cord was identified. Finally, there were fractures of ribs #2, 4, 5 and 6 on the right, and ribs #5-7 on the left.

The heart weighed 640 grams; average for a 247 pound man is 414 grams with a range of 314- 546 grams.⁴ Although the heart was described as enlarged, there was no description of which chambers were enlarged and no wall thickness were documented in the report. In addition, the heart had mild atherosclerotic coronary artery disease with less than 50% stenosis mentioned but the locations of the stenoses were not provided.

Toxicology

Toxicology testing performed by the County of San Diego, Office of the

¹ National Institutes of Health. US National Library of Medicine. DailyMed. Bystolic.
<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=8b8ad213-1dc8-454e-a524-075685c0e1a8>
Accessed 3/28/2017.

² National Institutes of Health. US National Library of Medicine. DailyMed. Pantoprazole.
<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=f3ded82a-cf0d-4844-944a-75f9f9215ff0>
Accessed 3/28/2017.

³ National Institutes of Health. US National Library of Medicine. DailyMed. Rosuvastatin.
<https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=134c5455-5171-66f3-e0c4-c475978ffb22>
Accessed 3/28/2017.

⁴ Kitzman DW, Scholz DG, Hagen PT, Ilstrup DM, Edwards WD. Age-related changes in normal human hearts during the first 10 decades of life. Part II (Maturity): A quantitative anatomic study of 765 specimens from subjects 20 to 99 years old. Mayo Clinic Proc., 1988. 63(2):137-46.

Medical Examiner identified alprazolam at less than <0.05 mg/l and amlodipine in the pilot's blood.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified alpha-hydroxyalprazolam and salicylate in urine, as well as amlodipine, valsartan, and rosuvastatin in liver and heart blood. Finally, diphenhydramine was identified in liver and at 0.538 ug/ml in heart blood.

Alprazolam is a benzodiazepine sedative medication available by prescription as a Schedule IV controlled substance, intended for the treatment of panic disorders. Alpha-hydroxyalprazolam is an active metabolite of alprazolam. Commonly marketed with the name Xanax, it carries warning, "Because of its CNS (central nervous system) depressant effects, patients receiving alprazolam tablets should be cautioned against engaging in hazardous occupations or activities requiring complete mental alertness such as operating machinery or driving a motor vehicle. For the same reason, patients should be cautioned about the simultaneous ingestion of alcohol and other CNS depressant drugs during treatment with alprazolam tablets."⁵ However, the toxicology report additionally states that the metabolite was not found in the pilot's blood.

Salicylate is a metabolite of aspirin, a commonly available over the counter analgesic that also has anti-platelet properties. Amlodipine and valsartan are prescription blood pressure medications commonly sold with the name Norvasc and Diovan, respectively.^{6,7} Rosuvastatin is described above.

Diphenhydramine is a sedating antihistamine used to treat allergy symptoms and as a sleep aid. It is available over the counter under the trade names Benadryl and Unisom. Diphenhydramine carries the following FDA warning, "May impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery)." The therapeutic range for diphenhydramine is 0.0250 to 0.1120 ug/ml.⁸ Compared to other antihistamines, diphenhydramine causes marked sedation; this is the rationale for its use

⁵ National Institutes of Health. US National Library of Medicine. DailyMed. Alprazolam. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2238e083-08f2-0aa8-59b7-16b6d68dbd48> Accessed 3/28/2017.

⁶ National Institutes of Health. US National Library of Medicine. DailyMed. Amlodipine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=1cec7a02-b7a5-49e1-ab64-3a4dab4149d2> Accessed 3/28/2017.

⁷ National Institutes of Health. US National Library of Medicine. DailyMed. Valsartan. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=9402b022-5809-4251-dfef-54f6ef5723fe> Accessed 3/28/2017.

⁸ Federal Aviation Administration. Civil Aerospace Medical Institute. Toxicology Drug Information: Diphenhydramine. <http://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=50> Accessed 8/9/2016.

as a sleep aid. Altered mood and impaired cognitive and psychomotor performance may also be observed. In fact, in a driving simulator study, a single 50 mg dose of diphenhydramine impaired driving ability more than a blood alcohol concentration of 0.100.⁹

Pilot Rated Passenger

FAA Medical Case Review

According to the FAA medical case review, the 60 year old male pilot rated passenger had reported 200 total flight hours as of his last medical exam, dated 5/29/2014. At that time, he was 72 inches tall and weighed 200 pounds. He had reported having had Lasik eye surgery but had not reported any chronic medical conditions or the use of any medications to the FAA. He was issued a third class medical certificate without limitations.

Autopsy

According to the autopsy performed by the County of San Diego Office of the Medical Examiner, the cause of death was multiple injuries and the manner of death was accident.

The pilot rated passenger's injuries included bilateral subdural and subarachnoid hemorrhages, ligamentous instability at C1/C2 and fracture at C6/C7 with associated subdural hemorrhage but without obvious spinal cord injury. In the torso, there was a fracture of the sternum along with fractures of ribs #4-9 anteriorly and rib #7 posteriorly on the right. On the left side, there were fractures of ribs # 3, 5, 6, and 7 anteriorly, and ribs #11 and 12 posteriorly, associated with retroperitoneal hemorrhage. Finally, there were widely open fractures of both bones of the lower left leg.

The heart weighed 510 grams and was described as mildly enlarged; average for a 203 pound man is 375 grams with a range of 284- 495 grams.⁴ In addition, he had minimal coronary artery disease with vessels that were described as "widely patent." The right ventricle, left ventricle, and interventricular septum measured 0.5 cm, 1.5 cm, and 1.5 cm, respectively. Average for these measurements is 0.3 cm, 1.23 cm and 1.23 cm.⁴ Microscopic examination of the heart revealed focal myocardial hypertrophy without evidence of a remote or acute myocardial infarction.

Toxicology

Toxicology testing performed by the County of San Diego, Office of the Medical Examiner identified no tested-for substances.

⁹ Weiler JM, B.J., Woodworth GG, Grant AR, Layton TA, Brown TL, McKenzie DR, Baker TW, Watson GS., Effects of fexofenadine, diphenhydramine, and alcohol on driving performance. A randomized, placebo-controlled trial in the Iowa Driving Simulator. Ann Intern Med. 2000;132(5): 354-63.

Toxicology testing performed by the FAA's Bioaeronautical Research Laboratory identified ranitidine in the pilot rated passenger's urine but not in blood.

Ranitidine is a medication used to control heartburn; it is available over the counter, commonly with the name Zantac.¹⁰

D. SUMMARY OF MEDICAL FINDINGS

According to the medical investigation, the 65 year old male pilot/owner had a current third class medical certificate. He had reported hypertension and the use of medications including nebivolol (blood pressure medication), pantoprazole (heartburn medication), and rosuvastatin (cholesterol lowering medication) to the FAA.

According to the autopsy performed by the County of San Diego Office of the Medical Examiner, the cause of death was multiple injuries and the manner of death was accident. At autopsy, the pilot's heart was enlarged at 610 grams but few additional details were provided. Mild coronary artery disease with 50% stenoses was also described but the remainder of the examination was unremarkable.

Post mortem toxicology testing identified amlodipine, valsartan, and rosuvastatin as well as diphenhydramine at 0.538 ug/ml and alprazolam at less than <0.05 mg/l, in heart blood. In addition, alpha-hydroxyalprazolam and salicylate were found in urine. Amlodipine and valsartan are blood pressure medications and rosuvastatin is a cholesterol lowering medication; these three are generally considered non-impairing. Alprazolam is a potentially impairing anxiety medication; diphenhydramine is an antihistamine that is so sedating it is often marketed as an over the counter sleep aid; it has been shown to significantly impair performance at routine doses.

The 60 year old male pilot rated passenger had a current third class medical certificate but had reported no chronic medical problems and no medications to the FAA. According to the autopsy performed by the County of San Diego Office of the Medical Examiner, the cause of death was multiple injuries and the manner of death was accident. At autopsy, he was found to have an enlarged heart with thickened walls, weighing 510 grams, and minimal coronary artery disease. Toxicology testing identified ranitidine (generally non-impairing heartburn medication) in the pilot rated passenger's urine but not in his blood.

¹⁰ National Institutes of Health. US National Library of Medicine. DailyMed. Ranitidine. <https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=c0b66aaf-b40d-4827-ae13-549d1ddef96c> Accessed 3/28/2017.