NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Medical Factual Report

February 20, 2018
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Chief Medical Officer

A. ACCIDENT: CEN16LA312; Hickory Ridge, AR

On August 8, 2016, about 1415 central daylight time, an Air Tractor AT-502B airplane, N634LA, impacted a bean field following a collision with a transmission line near Hickory Ridge, Arkansas. The commercial rated pilot was fatally injured and the airplane was substantially damaged. The airplane was registered to and operated by Burnette Aviation Inc. under the provisions of 14 Code of Federal Regulations Part 137 as an aerial application flight, which operated without a flight plan. The local flight originated from a private airstrip at an unknown time.

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 for any medical conditions, the use of any medications/illicit drugs, and the presence of any toxins.

2. Methods

   The FAA medical case review, autopsy report, toxicology findings, personal medical records, a report to the FAA aviation safety hotline from the pilot's family member, and the investigator's reports were reviewed.

   FAA Medical Case Review and Hotline Report

   According to the FAA files, the 61 year old male pilot had reported 19,550 total hours of civil flight experience as of his last medical exam, dated 1/29/2014. At that time, he was 71 inches tall and weighed 202 pounds. He had reported no chronic medical conditions and no use of medications to the FAA but had reported having kidney stones in 2009. No abnormalities were noted on the exam and the pilot was issued a second

class medical certificate limited by a requirement to wear corrective lenses and possess glasses for near and intermediate vision. The pilot's last medical certificate expired for all classes 1/31/2016.

On March 17, 2016 the FAA received an initial report from a family member of the pilot. The report stated he was falling frequently and having trouble getting up, taking "heavy duty psych meds" and having fits of rage where he would threaten to crash his airplane into a variety of targets. In addition, he "liked to assume the identify of an ag pilot."

According to the records obtained from the FAA, pilot was sent a letter on April 7, 2016 indicating the FAA was investigating the matter. It was investigated initially by the regional flight surgeon's office, FAA law enforcement liaison personnel, and local law enforcement but not the FAA audit and evaluation section.

On April 18, 2016, the pilot's family member reported via email to the hotline that the pilot had had a pituitary tumor removed and was on numerous hormones as well as medications for his diabetes which was often out of control. The report included the names of the treating physicians and that the pilot's high sugars led to blurred vision and altered moods. In addition, his diabetes had led to neuropathy that caused him to fall frequently and to have difficulty getting in and out of his crop duster.

On June 1, 2016, the FAA received a report about the pilot flying without a valid medical from the Clark County Sheriff's office.

Autopsy

According to the autopsy performed by the Arkansas State Crime Laboratory, Medical Examiner Division, the cause of death was multiple blunt force injuries and the manner of death was accident.

The heart was described as larger in size than usual and weighed 500 grams; average for a 203 pound man is 375 grams with a range of 284-495 grams.[1] There was atherosclerotic heart disease: the proximal right was focally narrowed by 80%; the proximal left anterior descending coronary artery had an area of 60% narrowing, and the proximal 2nd diagonal branch of the left anterior descending coronary artery had a focal area of 90% narrowing. The remainder of the gross examination was unremarkable. On microscopic evaluation, mildly-increased, perivascular and interstitial myocardial fibrosis was identified in three sections. In addition, the kidneys were grossly scarred and showed evidence of

[1] 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.

inflammation and scarring on microscopy. There were multiple stones in both kidneys.

The medical examiner documented that the pituitary gland appeared grossly unremarkable but had cysts and evidence of scarring on the microscopic exam.

The medical examiner was aware the pilot had a history of diabetes, and clinically tested the vitreous humor which found a creatinine of 1.1 and a glucose of 23 gm/dl.

Toxicology

Toxicology testing performed by the medical examiner did not identify any alcohols.

Toxicology testing performed by the FAA's Bioaeronautical Sciences Research Laboratory identified acetaminophen, citalopram and its metabolite N-desmethylcitalopram, as well as pioglitazone in urine. Citalopram, N-desmethylcitalopram, and pioglitazone were also identified in heart blood.

Acetaminophen is a pain and fever medication available over the counter and commonly marketed at Tylenol. Citalopram is a prescription antidepressant commonly marketed as Celexa.[2] Pioglitazone is a prescription medication used to treat diabetes.[3]

While not generally considered directly impairing, the citalopram indicates the pilot was being treated for depression which is associated with significant cognitive degradation, particularly in executive functioning. As a result, depression is a disqualifying condition for pilot medical certification and according to the Guide for Aviation Medical Examiners; an aviation medical examiner should not issue a medical certificate to a depressed pilot. The FAA will consider a special issuance of a medical certificate for depression after 6 months of treatment if the applicant is clinically stable on one of four approved medications.[4]

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[2] National Institutes of Health. US National Library of Medicine. DailyMed. Citalopram. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=6daeb45c-451d-b135-bf8f-2d6dff4b6b01 Accessed 2/20/2018.

[3] National Institutes of Health. US National Library of Medicine. DailyMed. Pioglitazone. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=8f2d7000-37ca-4e09-98ec-07d1c0354cb3 Accessed 2/18/2018.

[4] Federal Aviation Administration, Guide for Aviation Medical Examiners, Item 47. Psychiatric Conditions - Use of Antidepressant Medications. https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item47/amd/antidepressants / Accessed 5/24/2016

Similarly, pioglitazone is not directly impairing, but the FAA requires regular additional evaluations of diabetic pilots to ensure their diabetes is properly controlled and they do not have neurologic, renal, or ophthalmologic complications of the disease that might impair their ability to safely fly an aircraft. If specific criteria are met for both these diseases, a pilot may be issued a medical certificate.

Personal Medical Records

Using the information supplied by the pilot's family member, records were obtained from the pilot's endocrinologist for visits from 2009 through April 2016. These records indicate the pilot had been diagnosed with diabetes mellitus (type 2) in 2006. In 2008, he was diagnosed with a large pituitary tumor which was large enough to compress his optic nerves and cause problems with his vision. It was removed in January 2009. As a result, the pilot had developed diabetes insipidus, hypothyroidism, hypogonadism, hypoadrenalism, and required hormone replacement to manage the effects.[5] Over the years, the pilot also developed peripheral neuropathy from his chronic, poorly controlled diabetes. At one point, he burned his foot because he could not feel it. The records indicate that the pilot refused to consider using insulin to treat his diabetes mellitus because it would not be allowed by the FAA.

On November 9, 2015, the pilot returned to the endocrinologist for the first time in 2 years; the pilot had stopped some of his medications during that time. Although the record mentions the pilot had continued to see his eye doctor, no examination of the pilot's vision was carried out and no name or consultation from another provider are present in the records. The records reflect the pilot told the physician he did not want to use insulin to manage his diabetes due to his pilot's license. He also reported to the endocrinologist that he had had "trouble with kidney stones earlier in the year" and that he had developed a right foot drop which was improving with physical therapy. Blood tests at that time revealed poor control of his diabetes and hypothyroidism and medications for those conditions were restarted. He was asked to return in 2 months.

The pilot returned to the endocrinologist on April 4, 2016 (5 months later). He mentioned he was having personal problems with his family member who "may have reported him to the FAA, alleging he is a danger in his business as a crop duster." The pilot mentioned that his license was expired and that he "might have trouble reinstating it." In addition, the physician recorded the pilot mentioned, "he may have failed to include some medication he was taking on prior flight physicals."

[5] Diabetes mellitus manifests with difficulty maintaining a normal glucose level. Diabetes insipidus manifests as difficulty maintaining a normal sodium level; the hormonal control of water and sodium is managed between the pituitary gland and the kidney.

At this visit, the pilot's prescription medications included: citalopram (an antidepressant); desmopressin (a hormone that treats diabetes insipidus); glimepiride, metformin, pioglitazone, and Victoza to treat his diabetes mellitus; hydrocortisone (to replace cortisol); levothyroxine (thyroid replacement); and pregabalin (a potentially impairing medication used to treat chronic nerve pain due to damage from diabetes).[6, 7, 8, 9, 10, 11, 12] His Hemoglobin A1C on this date was 11.4% and his creatinine was 1.4 indicating poor control of his blood sugar and kidney disease, most likely a complication of his diabetes mellitus.[13]

D. SUMMARY OF MEDICAL FINDINGS

The 61 year old male pilot had reported no chronic medical conditions and no chronic medications to the FAA. According to the autopsy performed by the Arkansas State Crime Laboratory, Medical Examiner Division, the cause of death was multiple blunt force injuries and the manner of death was accident. Scarring and damage to the kidneys as well as severe coronary artery disease were also identified. Toxicology testing identified acetaminophen, citalopram and its metabolite N-desmethylcitalopram, as well as pioglitazone in urine. Citalopram, N-desmethylcitalopram, and pioglitazone were also identified in heart blood.

At the time of the accident, the pilot did not hold a valid medical certificate. Review of personal medical records from his endocrinologist demonstrated he had begun treatment for type 2 diabetes mellitus in 2006. In 2009, he had brain surgery to remove a large tumor on his pituitary gland. As a result, he lost regulation of the hormonal systems

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[6] National Institutes of Health. US National Library of Medicine. DailyMed. Desmopressin. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=05e6330b-6569-436e-9caf-e86916460931 Accessed 2/18/2018.

[7] National Institutes of Health. US National Library of Medicine. DailyMed. Glimepiride. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=60e9397e-83b9-489e-9683-6f87e458bbaa Accessed 2/20/2018.

[8] National Institutes of Health. US National Library of Medicine. DailyMed. Metformin. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2d98aea3-35ba-447a-b88f-a5a20b612b2f Accessed 2/20/2018.

[9] National Institutes of Health. US National Library of Medicine. DailyMed. Victoza. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=5a9ef4ea-c76a-4d34-a604-27c5b505f5a4 Accessed 2/20/2018.

[10] National Institutes of Health. US National Library of Medicine. DailyMed. Hydrocortisone tablets. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=bc751403-94f2-4f9d-b533-cf6186a40ceb Accessed 2/20/2018.

[11] National Institutes of Health. US National Library of Medicine. DailyMed. Levothyroxine. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=2814fc0b-84ac-9f7b-5845-797d3d6d835b Accessed 2/20/2018.

[12] National Institutes of Health. US National Library of Medicine. DailyMed. Pregabalin. https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=54e6d137-a495-4b87-b3c2-2f5a0226dd3e Accessed 2/20/2018.

[13] Hemoglobin AIC is a measure of the percentage of hemoglobin molecules that have a glucose molecule attached to them (what percentage have been glycosylated). It is used as a measure of average blood glucose over the preceding several weeks. Non-diabetic levels are below 5.4%. Between 5.5 and 6.4% is considered "pre-diabetes" and above 6.5% indicates diabetes. For diabetic individuals, levels below 7.0% are considered "good control." Normal creatinine is at or below 1.0.

usually controlled by the pituitary. He began to take replacement hormones for hypoadrenalism, hypothyroidism, hypogonadism, and diabetes insipidus immediately after the surgery. Over the ensuing years, the pilot developed peripheral neuropathy and kidney dysfunction as a result of his diabetes mellitus. At his last endocrinology visit (4/4/2016), the pilot's medications included: citalopram (an antidepressant); desmopressin (a hormone that treats diabetes insipidus); glimepiride, metformin, pioglitazone, and Victoza to treat his diabetes mellitus; hydrocortisone (to replace cortisol); levothyroxine (thyroid replacement); and pregabalin (a potentially impairing medication used to treat chronic nerve pain due to damage from diabetes). Comments reported in the medical record from the last visit (April 2016) indicate the pilot told his physician that he had failed to fully report his medical conditions and medications to the FAA, and that his medical certificate had expired.

One of the pilot's family members had made a hotline call to the FAA in March 2016 reporting the pilot was falling frequently and having trouble getting up afterward, taking "heavy duty psych meds," and having fits of rage where he would threaten to crash his airplane into a variety of targets. In addition, he "liked to assume the identify of an ag pilot." In April 2016, the family member made an email report describing his medical conditions. A request for information from the pilot was made by the FAA in April 2016. This issue was being evaluated at the time of the accident.