Uncharted Skies: Validating the Controversial Diagnosis of Aerotoxin Syndrome

Meghan Oswald, DMD, MD; Saad Khan, DO, FAPA; Jenna Taglienti, MD

Introduction

- Aerotoxic syndrome (AS) is a controversial diagnosis which encompasses symptoms experienced by pilots and cabin crew following exposure to airborne contaminants.
- Aircraft cabins are typically pressurized with air taken from the engine's compressor, known as "bleed air."
- Occasionally, this air may become contaminated with engine oil, hydraulic fluids, or other chemicals if there's a leak.
- Some components of engine oil contain toxic organophosphates, which can potentially enter the cabin if the seal between the compressor and cabin system fails.
- Such events are often noticed by a distinct smell of oil, "dirty socks," or chemicals.
- Acute manifestations of AS include:
  - Eye, skin, and respiratory irritation
  - Headaches
  - Gastrointestinal issues.
- Chronic symptoms of AS include:
  - Cognitive impairment
  - Gastrointestinal problems
  - Myalgias
  - Palpitations
  - Fatigue
  - Apathy
  - PTSD
  - Anxiety (Hageman, 2020).
- Here we present a case of AS referred to psychiatry for new-onset neuropsychiatric symptoms after suspected toxin exposure.

Case

A 59-year-old female flight attendant with no past medical or psychiatric history was working a flight when she noticed a mist from a vent which smelled like "dirty socks." Upon toxin exposure, she developed confusion, shortness of breath, chest and neck pressure, palpitations, headache, and dizziness. Subsequently, she developed cognitive deficits, insomnia, anxiety, weight loss, fatigue, and gait instability. She was referred to occupational medicine by the airline and diagnosed with AS. She was referred to psychiatry for further evaluation. Due to late onset of symptoms and extensive physical symptoms, a comprehensive medical work-up was indicated. She was referred for neurological evaluation. Despite notable cognitive deficits, gait abnormalities, and positive Romberg's sign on neurologic exam, no primary neurologic disorder was diagnosed. Neuropsychiatric testing revealed deficits in various cognitive domains lower than expected for level of education and professional attainment. Lab work yielded serum antibodies against neuronal proteins (MAP-2 and MAG) and glial protein (GFAP). Throughout this evaluation period, the patient was treated with fluoxetine for anxiety and referred for cognitive behavioral therapy with only mild improvement in symptoms.

Discussion

- This case underscores the complexity of Aerotoxic Syndrome (AS) and its long-term impacts on physical and mental health.
- Antibodies against MAP-2 and GFAP in this patient align with markers of brain injury (Burdon, 2023).
- Neurobehavioral symptoms observed in AS parallels those in agricultural workers, pesticide sprayers, and Gulf War veterans.
- These neurological symptoms are often linked to organophosphate exposure (Burdon, 2023).
- Currently, no evidence-based guidelines exist for managing the neuropsychiatric aspects of AS.
- We believe chemical exposure played a role in her chronic physical and neuropsychiatric symptoms.
- With no predisposing psychological factors found, her psychiatric symptoms likely stem from AS rather than a primary psychiatric disorder, leading to her disability retirement.

Conclusion

- This case highlights the complex interplay between environmental factors and neuropsychological health, particularly in the context of early-onset cognitive disturbances.
- Psychiatry can play a vital role in validating the diagnosis of organic etiology through interdisciplinary collaboration.
- More research is needed to develop effective therapies for the neuropsychiatric symptoms of AS.

References:

Burdon J, et al. Health consequences of exposure to aircraft contaminated air and fume events: a narrative review and medical protocol for the investigation of exposed aircrew and passengers. Environ Health. 2023 May 16;22(1):43.

Hageman G, et al. Aerotoxic syndrome, discussion of possible diagnostic criteria. Clin Toxicol (Phila). 2020 May;58(5):414-416. 64.