Cardiovascular Disease and Air Travel

Traveler Summary

Key Points

- Obtain specific clearance for each trip if under a cardiologist's ongoing care.
- Do not adjust medications within 2 weeks of long-distance travel. Stabilization and correct management of cardiac conditions before travel is important.
- Be aware that travelers with recent episodes of unstable angina, myocardial infarction, cardiac bypass surgery, acute episodes of heart failure, cardiac ablation, coronary stenting, or angiography are subject to waiting periods of 1 to 10 days if stable. Specific guidelines will be in place and the cardiologist's advice should be followed.
- Obtain travel medical and evacuation insurance that covers preexisting cardiac conditions.
- Carry or store medical history and a current EKG in an email inbox, on an app, or on a website for immediate availability during travel.
- Inform security staff of implanted defibrillators or pacemakers before going through screening and follow instructions of staff. Such devices are usually not affected by flying, but settings may need to be checked and reset after long-haul travel.
- Prearrange in-flight oxygen to be supplied by the airline. An online medical application must be completed, often in concert with a treating physician. Comply with requirements of connecting and code-share airlines. Separate arrangements need to be made for oxygen within all airports en route.
- Be aware that some airlines may not permit portable oxygen concentrators (POC) and instead require use of the airline's oxygen system (see airline websites for allowed POC models). If a POC is used, carry enough spare batteries in hand luggage to power the POC for 150% of the entire trip duration in case in-flight power is not available.

Introduction

Heart- and blood-vessel-disease related events are the most common causes of death among adult travelers and the second-most common reason for medical evacuation. Most of these events are due to coronary artery disease.

Before flying, those who have heart disease or have undergone a cardiac procedure should discuss their plans with a doctor. Some of the risk factors that might affect that decision include an unstable heart condition, long flights, flying to a high-elevation destination, and personal risk for blood clots.

Effects of Flight

Airplane cabins are not pressurized to sea level. Air pressure in the cabin falls with increasing altitude, resulting in a decrease in blood oxygen level (hypoxemia), more so in elderly passengers. Hypoxemia does not become apparent until marked decreases in cabin pressure occurs. Persons who are already at risk from a preexisting cardiovascular disorder, especially if unstable, are at higher risk. Inactivity during flight, especially during long flights, reduces blood flow in the legs thus increasing the risk of blood clots.

Risk Factors

In general, travelers with stable heart conditions (recovered from a heart attack, stable and corrected heart failure, stable angina pectoris; and controlled atrial fibrillation) are unlikely to experience ill effects from cabin hypoxia and are fit to fly (usually in 1-10 days if stable) unless a critical risk factor is already present at sea level. The cardiologist’s advice, based on specific guidelines, should be followed.

Persons with unstable heart conditions (e.g., acute heart failure, severe angina pectoris, or ventricular arrythmia) should delay flying until the condition has stabilized. Stabilization time can range from a few days to several weeks, depending on age, history of previous heart problems, recovery time, other high-risk conditions that might be present, plans for further interventions or testing, and complications that may have arisen. Even if cleared to fly, some travelers may need to allow extra time at both ends of the journey and ask for assistance at the airport.

Certain cardiac events (e.g., acute left ventricular failure or myocardial infarction) or diagnostic or therapeutic procedures (cardiac catheterization, insertion of pacemaker or other device, ablation therapy, or open chest surgery including bypass or valve replacement) may pose a short-term risk for a further event or complication. Those with a history of ischemic heart disease

(including coronary artery bypass graft or percutaneous coronary intervention) or anemia that is considered a risk to a cardiac condition should not fly with low hemoglobin levels.

Pre- and postflight circumstances may pose potential risks to passengers with cardiovascular disease due to anxiety, stress from security measures, frustration and anger over delays, and unaccustomed exercise while getting to the airport, checking in, boarding, and disembarking.

Studies have shown that the risk of blood clots on commercial flights is multifactorial. Cabin-related risk factors include long flight duration (over 4 hours), frequent long-haul flights in close succession, and immobility during flight. Personal risk factors include age greater than 50 years, body shape and size (very tall, very short, or obese), pregnancy and the first 6 weeks after childbirth, previous history of blood clots, recent surgery, cancer, use of oral birth control, and abnormal blood coagulation. See also the article ***Travelers' Thrombosis***.

Symptoms

During flight, difficulty breathing, persistent cough, chest discomfort, heart racing or pounding, or lower leg swelling may indicate cardiovascular compromise.

Need for Medical Assistance

Persons experiencing symptoms as noted above during flight should seek immediate attention from the crew who have the capability of air-to-ground communication with a physician-directed medical communications center. Most major carriers, especially on international routes, carry automated external defibrillators (AEDs) with EKG monitors, oxygen, resuscitative equipment, and a variable number of first aid kits (which may include basic cardiac drugs that can be utilized by passenger health care professionals who respond to the in-flight emergency). Travelers with known cardiac disease who experience chest pain, shortness of breath, angina, or an irregular heartbeat should insist that the captain contact ground support for immediate evaluation of the condition via satellite connection.

Persons experiencing symptoms any time during the trip should seek immediate medical attention.

Prevention

Persons with cardiovascular disease should examine the risks of traveling if their condition is unstable, especially if the destination is at a high elevation, if personal risk factors exist for blood clots, or if the planned flight duration is longer than 4 hours. Allow plenty of time for check-in and security clearance to reduce stress from these activities. Avoid unusual physical exertion at the airport if already experiencing mild shortness of breath or angina.

Fitness to Fly Assessment

Some passengers that need special medical consideration may be asked to submit the airline's passenger medical clearance form. This may involve clearance for fitness to fly from the airline's Aviation Medicine Unit. Guidelines differ among the airlines; therefore, passengers should check with specific airlines to clarify. Medical clearance to fly may be required for a passenger with:

- A recent illness, hospitalization, injury, or surgery that may need extraordinary medical assistance during the flight.
- An existing medical condition that may need extraordinary medical assistance during the flight.
- A need for supplemental in-flight oxygen or a POC.
- A need for medical equipment, such as a stretcher or incubator.

If under a cardiologists ongoing care, specific clearance for each trip should be obtained.

Basic Pretravel and Travel Planning Measures

Travelers should:

- Plan a pretravel consultation at least 4 to 6 weeks before departure.
- Notify the health care provider or travel medicine provider of any prior intolerance of air travel and provide a medical history and baseline laboratory results if available.
- Verify with the doctor that the underlying heart condition does not pose a risk for flying. Medication changes should not occur within 2 weeks of long-distance travel.

- Carry a letter with physician's official letterhead that lists medical conditions, medications prescribed, and any medical supplies such as oxygen.
- Pack sufficient medications for the trip (plus extras in the event of delays); carry medications in original containers in carry-on luggage and carry a copy of the prescriptions.
- Ensure that vaccinations are up to date prior to travel, especially influenza and pneumococcal vaccinations.
- Clarify health insurance coverage (including for preexisting cardiac conditions) internationally and obtain supplemental insurance and evacuation insurance if needed.
    - Have a clear plan of action in the event that complications arise during travel, including how to handle emergencies at any time of the day or night, who to contact, and a method of transport to a preferred provider or hospital.
    - Identify a medical provider at the destination country that can manage the underlying cardiovascular disease.
    - Pack a first aid/medical kit with consideration for underlying cardiovascular disease, including nitroglycerin for angina, antivirals for influenza, and antibiotics for respiratory tract infections. Consider carrying a face mask for travel to areas with severe air pollution. See ***Packing Personal Medications and Supplies***.
    - Carry or store medical history and a current EKG in an email inbox, on an app, or on a website for immediate availability during travel.

Flying with a Pacemaker or Other Implanted Device

Pacemakers and implantable cardioverter defibrillators (ICD) are susceptible to electromagnetic interference (EMI); however, modern devices are well protected against EMI. Advise security staff of the implanted device, present the device identification card, and follow security staff instructions.

Airport metal detectors produce EMI at a very low frequency and interference is highly unlikely, although the metal casing of the implanted device may trigger the alarm; walk normally through the detector and then move away from it. Full-body scanners are considered safe. Hand-held metal detectors contain a magnet and may alter the implanted device settings if held over the chest; request a pat-down search or that the hand-held detector not be passed over the chest.

In the aircraft, the risk to pacemakers and ICDs from EMI is negligible, but cosmic radiation may, rarely, reset an ICD. After a long-haul flight, have the device settings checked and reset if necessary.

Pacemaker or ICD rate settings may increase as a result of high levels of vibration when traveling by helicopter but will return to normal once the engine has been switched off or by external magnet application.

Flying with Oxygen

Persons needing oxygen should carry their own supply and verify that supplemental oxygen is available if needed. Some individuals who are not oxygen-dependent on the ground may require oxygen during air travel due to the lower cabin pressure and oxygen levels. These persons should also verify that supplies of oxygen are available at the destination.

Most POCs are not considered hazardous equipment but they may not be allowed on all flights, so travelers should contact the airline well ahead of flying. In-flight oxygen can be arranged by contacting the airline at least 48 hours before the scheduled flight. Even if using the airline's oxygen while in flight, the traveler will still need to arrange for supplemental oxygen during transfers, layovers, and at the destination. A physician's prescription is required for in-flight oxygen that states the flight duration, intermittent or continuous use, and flow rate at 2,400 m (8,000 ft), with an extra supply in case of flight delays.

Most POC devices are designed to operate on both AC and DC battery currents. In the US, the AC current from wall outlets is 110 volts. Overseas, the AC current is usually 220 or 240 volts; a plug adaptor may be needed. If a POC is to be used, carry enough spare batteries in hand luggage to power the POC for 150% of the entire trip duration in case in-flight power is not available.

If travelers or their health care providers have concerns about fitness for air travel or the need to obtain a medical certificate before travel, the medical unit affiliated with the specific airline is a valuable source for information. Travelers can contact TSA Cares Help Line (toll-free at 855-787-2227) or check website information (https://www.tsa.gov/travel/special-procedures) to obtain information on how to prepare for the airport security screening process with respect to a particular disability or medical condition.

Table: Flying with Health Care Devices

Device	Examples/Types of Product	Airline Allowance or Provision	Security Screening Process[1,2]	Comment
Portable oxygen concentrator (POC)[3,4]	Any POC bearing the FAA-approved red label stating: "The manufacturer of this POC has determined this device conforms to all applicable FAA acceptance criteria for POC carriage and use on board aircraft." Previous FAA-approved POCs (listed below) are excluded from label requirement. <u>Previously FAA-approved POCs:</u> • AirSep FreeStyle • AirSep Freestyle 5 • AirSep LifeStyle • AirSep Focus • (Caire) SeQual eQuinox/Oxywell (model 4000) • Delphi RS-00400/Oxus RS-00400 • Devilbiss • Healthcare iGo • Inogen One • Inogen One (G2 or G3) • Inova Labs LifeChoice Activox • International Biophysics LifeChoice/Inova Labs LifeChoice • Invacare XPO2/XPO100 • Invacare SOLO2 • Oxlife Independence Oxygen Concentrator • Precision Medical EasyPulse • Philips Respironics EverGo • Philips Respironics SimplyGo • SeQual Eclipse • SeQual SAROS • VBox Trooper	***Allowed on board:*** yes ***Use during flight:*** Check with the airline because policies may differ. Some require use of the aircraft's on-board oxygen whereas others allow use of POC on the ground but require a switch to the aircraft's oxygen during flight.	Subject to screening, including x-ray ***Traveler can completely disconnect from the POC:*** Place the equipment in checked luggage whenever possible. ***Traveler can disconnect during screening but is bringing the POC in carry-on baggage:*** The equipment will either undergo x-ray screening or inspection. ***If a traveler cannot disconnect or chooses not to be screened by imaging technology or a walk-through metal detector:*** The traveler will be screened using a thorough pat-down procedure instead, which is also used to resolve any metal detector alarms or anomalies identified by imaging technology.	A physician's order is required to carry oxygen. All POCs (including their batteries) must be appropriately protected from damage. Airline-supplied oxygen face masks are often uncomfortable. Personal nasal prongs, extra connectors, and small scissors should be carried aboard for back-up. US companies that rent FAA-approved POCs: • OxygenToGo (http://oxygentogo.com) • Advanced Aeromedical (http://aeromedic.com)

1. Inform a screening officer of the device and any special requirements before the screening process begins.
2. If the device cannot be x-rayed (or x-rayed adequately), an inspection and test for traces of explosives will be done (which may necessitate removal of the device from its protective plastic bag). Tubing and face masks may remain in the case.
3. In the US, air carriers with 19 or more seats must permit a person with a disability to use a POC if it meets applicable FAA requirements.
4. Travelers with a POC not on the FAA-approved list may still wish to bring it along for use at the destination and rent an approved POC for use in flight.