The Selection of Patients with Cardio-pulmonary Diseases for Air Travel*

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Patients with heart and lung diseases who have traveled long distances to hospitals for treatment, sometimes inquire if they may return home by airplane. They may express timidity or uncertainty because of a patient or friend who had become seriously air-sick and generally disturbed. Close questioning usually discloses the incident as completely inconsequential. In doubting the safety of air travel, patients may not be aware of the remarkable record of the Air Transport Command in transporting countless injured and sick during World War II and the present action in Korea. However, the questions are pertinent and considerable responsibility is placed on attending physicians to give correct and timely advice, especially in cases with possible contraindications for flying.

The basic reasons for anxiety are the fear of a lung complication or a heart attack. In order to throw light on the hazards and safety for cardio-pulmonary cases, a group of patients has been surveyed to determine the incidence of untoward effects. During the past two and a half years, 28 patients from various parts of the United States were examined and treated privately or hospitalized at the Woman's Medical College. Their diseases were as follows: pulmonary emphysema, etiology unknown, nine cases; emphysema associated with silicosis, six cases; pulmonary fibrosis due to long-standing disease such as tuberculosis, six cases; spontaneous pneumothorax (cured), three cases; spontaneous pneumothorax, three cases; pulmonary neoplasm, one case; and failure of the right heart in association with emphysema (as noted above), four cases. The destinations for travel included Florida, Missouri, Illinois, western Pennsylvania, California, Wisconsin, Ohio and West Virginia. After completing the studies the patients were advised to travel in pressurized airplanes and given letters to the air hostess indicating the diagnosis and treatment in case of emergency.

Of this group, 25 arrived safely and comfortably. The following patients left the airplane because of sickness: One patient with spontaneous pneumothorax, one case of emphysema with failure of the right side of the heart, and one with emphysema who developed marked distension of the stomach with vomiting and dehydration. All were treated by local physicians and travel was resumed by land. Correspondence indicated there was no actual emergency, although the possibility of increased intrapleural

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pressure in the spontaneous pneumothorax case and the manifestations suggesting oxygen-lack in the other patients were sufficiently important for them to receive every benefit of the doubt in treatment. It is significant to point out that the pneumothorax case traveled unexpectedly part distance in a non-pressurized airplane.

The following cases of advanced pulmonary emphysema will illustrate the safety of air travel:

R.H., age 63 years, industrialist from California, with a marked increase of residual air in the lungs (55.8 per cent of total lung volume), low oxygen saturation of the arterial blood (93 per cent), and reduced maximal breathing capacity (78.1 per cent based on predicted figure), travels extensively by pressurized airplanes. While at home and abroad he is under treatment with intermittent positive pressure (oxygen) breathing and takes the apparatus with him on airplanes for emergency use. He has suffered no untoward effects, not even when crossing the Andes Mountains.

H.T., age 64 years, industrialist from Wisconsin, is affected with severe emphysema, the tests indicating a high content of residual air in the lungs (54.7 per cent of total lung volume), decreased arterial oxygen (92 per cent) and reduced vital capacity (41 per cent decrease from predicted figure). He travels extensively by pressurized airplanes with no difficulty.

The basic disturbances of air travel relate to motion sickness and the physiological effects of increased barometric pressure, especially while passing through undulating air to altitudes of 10,000 feet or more. There are marked individual differences in the response to both conditions; i.e., some persons are remarkably free from manifestations, while a few are extremely susceptible. With motion sickness, the dizziness and unsteadiness with gastrointestinal symptoms may result from vestibular disturbances, while in altitude sickness, oxygen-lack or anoxia is the chief cause, as manifested by dyspnea, wakefulness, nervousness, anxiety, palpitation, prostration, and in severe cases gas on the stomach with nausea and vomiting. It is interesting that aging persons enjoy a remarkable freedom from the symptoms of anoxia, both on the ground and in airplanes, due in part to the adaptability of their collateral circulation acquired through the years. In pressurized cabins, even at altitudes of 10,000 feet or more, the pressure within the plane is reduced to a mere 3,000 to 5,000 feet, and any tendency to anoxia is minimized. Serious oxygen-lack may be expected in emphysema with extreme mixing and dilution problems of the lung and in pneumothorax cases when the intrapleural pressure is excessive, the heart displaced to the opposite side and the burden of breathing is left to the opposite lung.

Referring especially to the behavior of gas on the stomach and intestines while flying, it should be mentioned that gas increases in volume proportionally to the reduction of barometric pressure as the higher altitudes are reached. However, with modern air transportation employing pressurized cabins, the expansion of gas in the stomach is negligible; more often its occurrence is precipitated by air swallowing, salivation, and loosening the belt to permit abdominal relaxation. Prolonged or repeated vomiting,
with depletion of the fluid reserves of the body, is closely associated with fatigue, anxiety, and over-eating before flight time, accentuated by high temperatures or limited ventilation, especially when the plane jostles or ascends rapidly. Vistibular disturbances of the ear, once a frequent problem in the lighter aircraft of the 1930's, is extremely uncommon today. The occurrence of hemoptysis has not been noted in the present series.

Recommendations for patients with cardio-pulmonary disease are as follows:

1) Travel should be in pressurized cabins only.
2) Patients with manifest coronary insufficiency; extreme hypertension; cystic disease of the lung; recent hemoptysis; excessive cough, especially with expectoration; and recent or recurrent spontaneous pneumothorax should be advised against air travel.
3) With artificial pneumothorax cases, the pressure of the pleural cavity before flight time should be reduced to the range of −1 and +3 mm. Hg.
4) In cases of dilatation of the right side of the heart associated with advanced emphysema, air transportation should not be advised unless oxygen inhalation apparatus is readily available.
5) It is advisable for patients with a flabby and relaxed abdomen to wear a soft, pliable support in order to avoid undue relaxation of the abdominal wall and its contents.
6) Flight should be delayed in cases of acute sinusitis, chest colds and acute exacerbations of chronic pulmonary disease.
7) Patients who are susceptible to motion sickness should be given a prescription for an antihistaminic drug.
8) A letter should be written for the air hostess to read if/when medical problems require attention.

Patients should receive the following instructions:
1) Avoid over-eating and the use of alcohol 24 hours before flight time.
2) Obtain ample sleep and rest before the flight.
3) Don't board the airplane nervous and fatigued.
4) Don't chew gum incessantly to fill the stomach with gas and saliva.
5) Don't loosen the belt or girdle to permit the abdomen to relax and distend.
6) Don't slump down in the chair to encourage inadequate movement of the lungs.
7) Eat sparingly during flight.
8) Consult the airplane hostess if squeamishness or shortness of breath occur.

SUMMARY

The transportation by air of patients with cardio-pulmonary disease is satisfactory and usually agreeable, providing the distance is sufficient to justify the long trip to and from airports. In any event, traveling should be in pressurized cabins only, since the higher barometric pressure of the ordinary types may cause symptoms of oxygen-lack. The contraindications to air travel are cystic disease of the lung, recurrent spontaneous pneu-
mothorax, high pressure artificial pneumothorax, acute upper respiratory tract infections with exacerbations of chronic lung disease, manifest coronary insufficiency, failure of the right side of the heart, and recent hemoptysis.

RESUMEN

El transporte aereo de enfermos cardio-respiratorios es satisfactorio y generalmente agradable siempre que la distancia justifique el traslado a los aeropuertos que requiere a veces largo tiempo. El viaje debe hacerse solo en aviones con presión compensada puesto que la presión barométrica aumentada en los aviones corrientes no equipados así, pueden producir síntomas de escasez de oxígeno. Las contraindicaciones para el viaje en avión son la enfermedad cística del pulmón, neumotorax espontáneo recurrente, neumotorax artificial hipertensivo, infecciones agudas del tracto respiratorio superior con exacerbaciones en la enfermedad pulmonar crónica, insuficiencia coronaria manifiesta, insuficiencia cardíaca derecha y hemoptisis reciente.

RESUME

Le transport par voie aérienne de malades atteints d'affections cardio-pulmonaires donne toute satisfaction et est habituellement agréable si la durée du voyage est suffisante pour justifier la longueur du parcours jusqu'à l'aéroport à l'aller et au retour. En tout cas, ce n'est que dans des avions pressurisés que le voyage doit s'effectuer, de crainte que les modifications de la pression barométrique n'entrainent des troubles de l'oxygénation. Les contre-indications au voyage aérien sont: les kystes aériques du poumon, les pneumothorax spontanés récidivants, les pneumothorax artificiels à pression élevée, les infections aigues des voies respiratoires supérieures avec exacerbation d'affections pulmonaires chroniques, les affections coronariennes certaines, les insuffisances des cavités droites du coeur, et les hémoptysies récentes.