Chest tube and air travel "Patient worsening and improving spontaneously"

Dear Editor,

We recently had a patient shifted to our tertiary care intensive care unit (ICU) via air travel. The patient was spontaneously breathing with oxygen by facemask. He had chest tube *in situ* and had no signs of respiratory distress prior to airlift, however, during the air travel in a medically equipped helicopter his condition worsened (desaturation up to 85% with tachypnea) and he required endotracheal intubation with ventilatory assistance, however after landing he improved within minutes and his requirement for mechanical ventilation vanished. The above finding prompted us to examine possible causes of his unique condition of spontaneous worsening and improvement.

The literature on management of patients with pneumothorax and chest drains *in situ* is scarce. Patients are often not optimally managed prior to air travel and clinical condition worsens in air, where management resources are limited. We discuss the physics and physiological management involved for better outcomes of such patients.

Medical helicopters fly around 500-1000 feet above the ground while commercial/medical airplanes fly at 24-40 thousand feet above the ground level. The plane cabins are often pressurized and atmosphere barometric changes may be minimal, depending upon the efficacy of pressurizing. Presuming the temperature of flight is maintained as at the ground level, thus by "Boyle's Law" the volume of gas is inversely related to its pressure.[1] So as the flight ascends the atmospheric pressure falls and the volume of gas trapped in closed body cavity would expand. Normal sea level pressure is 760 mmHg and on ascent to 8000 feet it falls to 560 mmHg (a 25% reduction), this would mean that air in cavities expands by 25%. Another aspect important in these patients is the decrease in PaO_2 with ascent. At sea level the partial pressure of oxygen is around 150 mmHg, on ascent it falls to around 110 mmHg (this is equivalent to use of FiO_2 of only 15% at sea level).[2]

In our patient, it was later realized that although chest tube was optimally functioning, he still had loculated collection that expanded (compressing lung) and in addition the lower apparent FiO_2 lead to dyspnea.[3] As per guidelines by American College of Chest Physicians, patients with spontaneous pneumothorax should not air travel for at least a week after complete resolution on imaging. Patients with recurrent pneumothorax or predisposition should not air travel unless a chest drain or surgical intervention is done.[4] In patients with a chest drain, the functioning of drain must be confirmed and no clamping should be done at the time of travel. Prior to travel, imaging must be done to rule out any extra-pulmonary air not in communication with the drain. Wherever possible patients must be transported in closed pressurized chamber planes, as the artificial air 'pumped in' maintains both external pressure and FiO_2.[5]

In our patient, the size of loculated air, on landing again decreased and FiO_2 increased, thus patient immediately recovered. It must be kept in mind that these problems are preventable if appropriate steps are taken.

Preet Mohinder Singh, Anuradha Borle, Ajisha Aravindan, Anjan Trikha

Department of Anaesthesia,
All India Institute of Medical Sciences, Delhi, India

Address for correspondence: Dr. PM Singh,
Department of Anaesthesia, All India Institute of Medical Sciences, Delhi, India.
E-mail: preetrajpal@gmail.com

References

1. Carvalho AM, Poirier V. So you think you can fly? Can Fam Physician 2009;55:992-5.
2. Ruskin KJ, Hernandez KA, Barash PG. Management of in-flight medical emergencies. Anesthesiology 2008;108:749-55.
3. Baumann MH. Pneumothorax and Air TravelLessons Learned From a Bag of Chips. Chest J 2009;136:655-6.
4. Currie GP, Kennedy AM, Paterson E, Watt SJ. A chronic pneumothorax and fitness to fly. Thorax 2007;62:187-9.
5. Samra T, Pawar M, Wasnik S. Safety of Air Travel in H1N1-positive Patient with Hydropneumothorax. J Glob Infect Dis 2011;3:405.

Access this article online	
Quick Response Code:	Website: www.joacp.org
	DOI: 10.4103/0970-9185.111743