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Platypnea-Orthodeoxia Syndrome: From Gastroesophageal Reflux to Hypoxemia

To the Editor:

Platypnea-orthodeoxia syndrome is a rare phenomenon characterized by dyspnea and hypoxemia on sitting or standing that improves in the recumbent position. It has been associated with an intracardiac shunt, pulmonary vascular shunt, ventilation-perfusion mismatch, or a combination of these.[1]

We present a case of new-onset platypnea-orthodeoxia syndrome in a woman after elective laparoscopic Nissen fundoplication.

CASE SUMMARY

A 53-year-old woman was referred for unexplained hypoxia. She had a history of mild chronic obstructive pulmonary disease, chronic pancreatitis, Behcet's disease on daily prednisone, migraine with aura (diagnosed at the age of 20 years), cryptogenic stroke (age 50 years), and hiatal hernia status, post-Nissen fundoplication 7 months ago. The patient reported dyspnea on exertion for several months after surgery and was found to have an oxygen saturation of 78% by pulse oximeter. She was treated with continuous nasal oxygen at 2 L/min.

Pulmonary function testing demonstrated mild airway disease. Chest x-ray and computed tomography pulmonary angiogram were unremarkable. The patient described a 7-month history of dyspnea that was worse on sitting and standing with improvement when lying flat. The patient's room air oxygen saturations were 96% while supine, 83% on sitting, and 80% on standing. A transthoracic echocardiogram with bubble study revealed normal left and right ventricular size and function, normal right-sided pressures, but immediate opacification of the left atrium after intravenous saline injection, consistent with a large intracardiac shunt. A transesophageal echocardiogram bubble study demonstrated the presence of a patent foramen ovale. The patient underwent percutaneous patent foramen ovale closure with a 30-mm Cardioform device (WL Gore & Associates Inc, Newark, Del) under intracardiac echocardiogram and fluoroscopic guidance. One day after closure, her oxygen saturations were 98% lying flat and 95% sitting upright. She was able to complete a 6-minute walk test with minimal dyspnea and only transient decreases in her oxygen saturation to 88% (Table). Both postprocedure intracardiac echocardiogram and transthoracic echocardiogram showed no residual right-to-left shunting. She no longer required supplemental oxygen.

DISCUSSION

To date, there have been only 3 prior reports of platypnea-orthodeoxia syndrome as a complication of Nissen fundoplication.[2-4] Although patent foramen ovale is present in 20% to 25% of the adult population, it is rarely associated with platypnea-orthodeoxia syndrome.[5] Some of the possible pathophysiologies that can lead to right-to-left shunting through an existing patent foramen ovale after surgery are (a) creation of a pneumoperitoneum during laparoscopy causes an upward shift of the diaphragm, increasing right atrial pressures, which can precipitate shunting; (b) elevated right hemidiaphragm, due to phrenic nerve injury during the surgery, can cause right atrial distortion and redirection of inferior vena cava flow to the fossa ovalis with an increase in right atrial pressure; (c) after pneumonectomy, mediastinal remodeling causes right atrial stretching and mechanical distortion of the fossa ovalis, which can lead to preferential flow directed from the inferior vena cava into the fossa ovalis.[3] In our patient, a change in the position of the atrial septum due to surgical manipulation of the diaphragm and shifting of the mediastinal contents, may have precipitated the right-to-left shunting and subsequent platypnea-orthodeoxia syndrome.

CONCLUSIONS

Given that patent foramen ovale is common, there should be a clinical suspicion for platypnea-orthodeoxia syndrome in patients presenting with unexplained hypoxia after thoracic

Table Oxygen saturations pre and post-PFO closure

	Supine (SpO_2)	Sitting (SpO_2)	Standing (SpO_2)	6-Minute Walk Test (SpO_2)
Pre-PFO closure (%)	96	83	80	78*
Post-PFO Closure (%)	98	95	95	88†

PFO = patent foramen ovale; Spo_2 = arterial oxygen saturation.
*Tolerated only first 30 seconds of 6-minute walk test.
†Tolerated full 6-minute walk test.

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or upper abdominal surgery. Successful closure of the patent foramen ovale may resolve symptomatic postural dyspnea and profound hypoxemia, as it did in our patient.

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