

## Improvement in spirometry and oxygenation of chronic obstructive pulmonary disease during pregnancy

Sir,

Chronic obstructive pulmonary disease (COPD) with pregnancy is limited to a case report.<sup>[1]</sup> Pregnancy, which can have a detrimental outcome on chronic respiratory failure due to obvious reasons, showed contradicting effect. This asthma-like behavior of COPD during pregnancy is likely to improve the management of the “irreversible disease” in future.

A 35-year-old female, mother of three children, eldest one of 17 years of age, was admitted with acute on chronic respiratory failure. She had progressive dyspnea on exertion for the past 2–3 years and a history of smoking since the age of 10 years. She used to smoke 8–10 bidis per day. On admission, her oxygen saturation was 75%, respiratory rate was 40/min, and heart rate was 120/min. There were bilateral crackles and rhonchi. She was treated with oxygenation, noninvasive ventilator, nebulized bronchodilators, short course of oral steroids, and injectable antibiotics. Her baseline saturation improved to 84%. The arterial blood gas (ABG) on admission and discharge is given in Table 1.

The routine biochemical investigations were normal. High-resolution computed tomography and pulmonary angiography were normal. Two-dimensional echocardiography showed dilatation of the right atrium, right ventricle, and pulmonary artery pressure (PAP) of 75 mmHg. The left atrium, ventricle, and ejection fraction were normal. The spirometry showed severe obstructive defect [Table 1]. Enzyme-linked immunosorbent assay for human immunodeficiency virus was negative. Thyroid function test was normal.

Counseling and strict vigilance helped her quit smoking before discharge. On follow-up, her saturation at 1 month, 6 months, and 1 year was 84%, 78%, and 82%, respectively. ABG on 1 month of follow-up is given in Table 1. She

was prescribed long-term oxygen therapy (LTOT). She was taking LTOT for 18 h daily along with inhaled beta-2 agonist, anticholinergic, and inhaled steroid.

After about 1.5 years when she came for routine evaluation, the saturation was 96%. On further questioning, she gave a history of being pregnant for 3 months. She refused medical termination of pregnancy. At 7<sup>th</sup> month of pregnancy, the saturation had improved to 98%. The improved ABG and spirometry are given in Table 1. Two-dimensional echocardiography revealed normal PAP. She was advised to continue LTOT and inhalers. She was admitted in labor at 9 months and was recorded to have a saturation of 96%; however, she was kept on oxygen. She had full-term normal delivery, and the infant cried immediately. There were no obvious congenital anomalies. A day after her delivery, her saturation was 88% [Figure 1]. The worsened ABG and spirometry are given in Table 1.

Smoking since childhood can cause COPD at a young age.<sup>[2]</sup> The case was unique in two ways – (a) she had COPD with pregnancy and (b) she improved during pregnancy. COPD with pregnancy is rarely seen as COPD usually develops in



**Figure 1:** Oxygen saturation after delivery, which dropped again to prepregnancy levels

**Table 1: Serial arterial blood gas and spirometry**

	On admission	On discharge	Prepregnancy (stable state)	During pregnancy	Postdelivery
FVC (l) (percentage predicted)	Not done	Not done	1.45 (44)	1.97 (60)	1.26 (37)
FEV <sub>1</sub> (l) (percentage predicted)	Not done	Not done	0.72 (25)	1.04 (36)	0.54 (18)
FEV <sub>1</sub> /FVC %	Not done	Not done	49.91	52.91	42.64
pH	7.29	7.35	7.35	7.38	7.35
PaO <sub>2</sub> (mmHg)	35.2	50	53	77.6	51.9
PaCO <sub>2</sub> (mmHg)	72.4	51	50	47.4	50.5
SaO <sub>2</sub> %	75	84	85	95	80

FVC: Forced vital capacity, FEV<sub>1</sub>: Forced expiratory volume in 1 s

the fifth to sixth decade of life. There have been no studies on pregnancy in COPD patients. The literature is limited to a case report<sup>[1]</sup> that was managed successfully during pregnancy and delivery. No case reports have, however, described improvement in spirometry and oxygenation during pregnancy.

The reason why she improved during pregnancy may be attributed to the secretion of prostaglandins (PGs) during pregnancy. PGE1 and E2 have long been known to elicit bronchodilatation and protect against bronchoconstriction provoked by a variety of stimuli.<sup>[3]</sup> In addition, PGE2 also inhibits mast cell secretory responses,<sup>[4]</sup> trafficking of neutrophils<sup>[5]</sup> and eosinophils,<sup>[6]</sup> dendritic cell activation or function,<sup>[7]</sup> and proliferation of both type 1 and type 2 Th cell.<sup>[7]</sup> This profile of actions identifies PGE2 as an attractive candidate for exogenous administration in asthma and nonemphysematous type of COPD.<sup>[3]</sup> Unfortunately, these beneficial actions are counterbalanced by the fact that inhaled PGE2 induces severe cough in animal models and human subjects.<sup>[8]</sup> Recently, it has been shown that PGE2 can bind with four distinct receptors and E-prostanoid (EP) 1, 2, 3, and 4.<sup>[9,10]</sup> It is now apparent that PGE2 mediates cough through the EP3 receptor,<sup>[11]</sup> but bronchodilatation in humans is through EP4 receptor,<sup>[12]</sup> thus offering the possibility of treatment with a receptor-selective agonist.<sup>[3]</sup>

To conclude, our patient dramatically improved during pregnancy but deteriorated once she delivered suggests that pregnancy had a partial reversal of the disease. This finding may be beneficial in identifying treatment options for COPD, which is otherwise considered to be an irreversible disease.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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#### Conflicts of interest

There are no conflicts of interest.

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