

CASE STUDY

COR Pulmonale Secondary to Chronic Obstructive Pulmonary Disease: A Clinical Case report

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ABSTRACT

COR pulmonale refers to a condition of right ventricular dysfunction due to respiratory disorders. It is often associated with conditions like COPD and pulmonary hypertension. The case here describes a 70-year-old male patient who came to hospital with bilateral pedal edema and dyspnea on exertion (NYHA Grade II-III). He had a history of tuberculosis and prolonged respiratory illness and significant smoking history. Clinical examination revealed pallor, bilateral rhonchi, and reduced air entry. Laboratory tests disclosed an elevated serum creatinine, spirometry exhibited obstructive airway disease. Chest X-ray showed cardiomegaly which confirms COR pulmonale. The patient was started on diuretics (furosemide and spironolactone); bronchodilators (tiotropium and ipratropium); inhaled CORTicosteroids (budesonide/formoterol) and antihypertensives. Regular follow-up during hospitalization indicated improvement with reduced edema of the patient. The case study highlights the need for early diagnosis and proper management of COR pulmonale in patients with comorbid respiratory conditions, underlining a multidisciplinary treatment approach.

Keywords: COR pulmonale, chronic obstructive pulmonary disease, Right ventricular function, pulmonary hypertension, Diuretics, Forced Vital Capacity

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INTRODUCTION

COR pulmonale is a condition where the structure and function of the right ventricle are altered by respiratory disorders, such as thoracic or pulmonary vascular conditions and diseases of the bronchial-lung tissue[1]. This clinical condition, which is often brought on by chronic obstructive pulmonary disease (COPD), is linked to pulmonary hypertension and is often made worse by congestive heart failure[2]. Acute and chronic COR pulmonale are able to be distinguished based on the disease's onset and progression. While chronic COR pulmonale is primarily brought on by interstitial lung disorders and COPD, acute COR pulmonale is frequently observed in cases of acute pulmonary embolism. The prevalence of diseases like COPD and bronchial asthma, which contribute to chronic COR pulmonale, rises annually as the population ages as well as air pollution worsens, especially in emerging nations. Chest discomfort, dyspnea, coughing, irritation, and other symptoms are the primary clinical signs throughout the beginning stage. The patients' quality of life is significantly impacted by the disease's high occurrence in the winter and spring [1]. Increased right-sided filling pressure from pulmonary hypertension, which is linked to lung disorders, is the pathophysiology of the COR pulmonale. The right ventricle pumps against a low-resistance circuit under typical physiological circumstances. An increase in pulmonary vascular resistance is the first pathophysiologic event that leads to the development of COR pulmonale. Right ventricular enlargement, such as thickness, dilatation, or both, results from an increase in resistance, which also raises pulmonary arterial pressure and right ventricular work [3]. According to projections, 6-7% of all forms of adult heart disease in the US are caused by COR pulmonale, with over 50% of cases being caused by COPD, which is brought on by emphysema or chronic bronchitis[4]. Deep vein thrombosis, acute renal injury, respiratory failure, right heart failure, and CHF (chronic heart failure), Syncope, hypoxia, pedal edema, passive hepatic congestion, and death are among the complications of COR pulmonale [4,5]. In right-sided heart failure, physical manifestations can include narrow splitting of

the S2, jugular venous distension with a prominent V wave, peripheral edema, and abdominal signs such as hepatomegaly and ascites. Chest radiographs demonstrating cardiomegaly, an ECG demonstrating right ventricular hypertrophy, and Doppler echocardiography to evaluate pulmonary hypertension are laboratory tests for COR pulmonale [3]. The goal of COR pulmonale therapy is to treat or eradicate the underlying illness that causes the condition. Through increased contractility and decreased vasoconstriction in the lungs, the therapy aims to improve the right ventricle's function and promote oxygenation. By treating pulmonary vasoconstriction, oxygen treatment can raise cardiac output (CO). Patients with chronic COR pulmonale may benefit from diuretic medications to control their right ventricular filling capacity [5].

CASE REPORT

A 70 years old male patient came to tertiary care hospital on Feb 14, 2024 with the chief complaints of pedal edema since 1 month which was bilateral pitting type and started asymmetrically (left>right) and dyspnea on exertion since 6 months (NYHA Grade II-III) which was better at rest. He has a past medical history of Tuberculosis 7-8 years back and is a known case of some respiratory illness in the last 10 years. Prostatectomy for Benign Prostate Hypertrophy was performed twice once 5 years back and second time 1 year back. He has taken AKT for 7-8 months for tuberculosis and is on regular medication of rotahaler. He was a bidi smoker for 24-25 years and has stopped for 7 years. On examination, his vitals were normal; he was having edema and was pallor. Also, on respiratory system examination bilateral rhonchi sound was present and Air Entry Bilaterally Equal was reduced. Lab parameters showed Hemoglobin was 11.07g/dL, RBCs was 3.93.10⁶ cells/cmm, WBCs was 9200 cells/cmm, Platelets was 244000/cmm, ESR was 62mm/hr. Liver function tests were performed which showed Total Protein was 5.69 g/dL, Albumin was 2.86 g/dL, Globulin was 2.83g/dL, A/G ratio was 1.01, AST was 26 IU/L, ALT was 13 IU/L. Serum electrolytes showed Urea was 45 mg/dL, Serum Creatinine was 1.54 mg/dL and Serum C Reactive Protein was 7.30md/dL. Physician asked for a Spirometry test which resulted in Obstructive Airway Disease (FEV₁/FVC ratio is reduced) and Sonography which demonstrates Left Kidney has a 2.5 * 2.2 cm raised simple cyst at upper pole. Chest X-ray shows Cardiomegaly. In the above report, the patient had COR Pulmonale. For the suspected manifestation he was hospitalized for 4 days. He was being treated with the following medications:

Table1; Patient's Current Treatment chart during hospitalization

DRUGS	DOSE	ROUTE	FREQUENCY	ON ADMISSION	D-1	D-2	D-3
INJ. Furosemide	40mg	IV	12h	+	+	+	+
INJ. Pantoprazole	40mg	IV	12h	+	+	+	+
INJ. Ondansetron	4mg	IV	8h	+			
T. Spironolactone	25mg	PO	2-0-0	+	+	+	+
T. Doxophylline	400mg	PO	1-0-1	+	+ 1/2	+1/2	+1/2
RC Tiotropium		INHALER	1-0-0	+	+		
Formoterol +	12mg	INHALER	1-0-1	+	+	+6mg	+6mg
Budesonide	400mg	INHALER	1-0-1	+	+	+	+
Neb. Ipratropium Bromide		INHALER	8h		+	+	+
T. Nephrosave		PO	1-0-1				+
T. LTK-H	50/12.5 mg	PO	1-0-1				+

Inj. FUROSEMIDE and Tab. SPIRONOLACTONE are diuretics given to decrease the elevated right ventricle filling volume in patient, DOXOPHYLLINE is used for chronic COR pulmonale adjuvant to COPD, TIOTROPIUM and IPRATROPIUM is used to control symptoms of breathing problem, Inhaler BUDESONIDE/FORMOTEROL is used for management of COPD in these patient, Tab. LTK-H is used to lower the blood pressure which is added at 4th- day because he was having blood pressure of 140/90 mmHg on Day-2 and 150/90 mmHg on Day-3. Tab. NEPHROSAVE is used to protect kidneys. Inj. PANTOPRAZOLE for acid reflux. Follow up of the patient was done regularly during his hospital stay and it was found that on

DAY-1, Vitals were normal, Respiratory sound showed bilateral bronchi positive, and Air Entry Bilaterally Equal was reduced. Also, the patient was advised for a Strict Renal Diet.

DAY-2, BP was 140/90 mmHg, there was no abnormal respiratory sound found but Air Entry Bilaterally Equal was reduced and the patient was guarded with medications. Also, the patient was advised for a Strict Renal Diet and Urine Output Monitoring.

DAY-3, BP was 150/90 mmHg, there was no abnormal respiratory sound found and the patient was feeling better with his respiratory condition. Also, the patient was advised for a Strict Renal Diet and Urine Output Monitoring.

DISCUSSION

COR pulmonale is a condition where the structure and function of the right ventricle are altered by respiratory disorders such as pulmonary embolism, COPD, Pulmonary Fibrosis and many more. Here, we presented the case of a 70 years old male patient who had similar complaints as that of COR pulmonale i.e., Pedal edema (pitting type) and dyspnea on exertion with a history of some respiratory illness. On performing Chest X Ray it was found that patient had cardiomegaly and Spirometry test showed Obstructive Airway Disease (FEV₁/FVC ratio is reduced) which indicated COR Pulmonale secondary to COPD. The most common medications used for management of COR pulmonale includes Oxygen Therapy, Diuretics, Vasodilators, Theophylline, PDE5 inhibitors, Cardiac Glycosides-Digitalis, Anticoagulant Therapy-Warfarin and Guanylate cyclase stimulants. In individuals with chronic COR pulmonale due to COPD, theophylline has been shown to acutely lower pulmonary arterial pressures and pulmonary vascular resistance. Therefore, it makes sense to consider about using theophylline as an adjuvant treatment for patients with underlying COPD who have chronic or decompensated COR pulmonale [4]. Here, the patient was prescribed diuretics i.e., Furosemide and Spironolactone to manage pedal edema and fluid overload related to COR Pulmonale. Doxophylline was prescribed as an adjuvant treatment for COR pulmonale secondary to COPD, Tiotropium and Ipratropium was given to relieve breathing symptoms, budesonide/formoterol was given for management of COPD and LTK-H was prescribed as vasodilator. Cardiac arrhythmia, which can reduce cardiac output, can also result from the negative electrolyte and acid-base effects of diuretics. Consequently, even if diuresis is advised in the treatment of chronic COR pulmonale, it must be administered extremely carefully. Theophylline is a narrow therapeutic index drug and has adverse effects of seizures and tachycardia hence it should be monitored closely [4].

CONCLUSION

This case report highlights a 70-year-old male patient diagnosed with COR pulmonale secondary to COPD, presenting with bilateral pitting edema and dyspnea. Key findings included cardiomegaly on chest X-ray and a reduced FEV₁/FVC ratio indicative of obstructive airway disease. The patient's condition was closely monitored, showing gradual improvement in respiratory symptoms and hence discharged with appropriate medications. This case emphasizes the need for early diagnosis and comprehensive management of COR pulmonale in patients with chronic respiratory diseases. It highlights the importance of individualized treatment plans that consider the patient's overall health status, comorbidities, and medication interactions.

REFERENCES

1. He Y, Cun S, Fan J, Wang J. (2024): Screening for promising multi-target bioactive components from CORTex Mori Radicis for the treatment of chronic COR pulmonale based on immobilized beta1-adrenergic receptor and beta2-adrenergic receptor chromatography. *Journal of Chromatography B*. Jul 15; 1242:124175.
2. Rossi R, Coppi F, Sgura FA, Monopoli DE, Arrotti S, Talarico M, Boriani G. (2023): Effects of ivabradine on right ventricular systolic function in patients with chronic obstructive pulmonary disease and COR pulmonale. *The American Journal of Cardiology*. Nov 15;207:179-83.
3. Garrison DM, Pendela VS, Memon J. COR pulmonale.
4. Derek Leong, Ravi H Dave, Abraham G Kocheril, Ali A Sovari. (2023): "COR Pulmonale." *Medscape*, Mar 14, <https://emedicine.medscape.com/article/154062-overview>
5. Regina AA, Anisa A, Maharani AD, Ramadhan AN. (2023): Acute COR Pulmonale. *Journal of World Future Medicine, Health and Nursing*. Sep 1;1(3):250-7.

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