International Journal of Scientific Research and Management (IJSRM)
||Volume||12||Issue||02||Pages||1353-1357||2025||
Website: www.ijsrm.net ISSN (e): 2321-3418
DOI: 10.18535/ijsrm/v13i02.mp06

Idiopathic Pulmonary Fibrosis Associated with Pulmonary Hypertension: A Case Report on Diagnostic Challenges and Follow-Up Recommendations

Sathish Krishnan

Division of Pulmonary and Critical Care Medicine, Community Health Network, Indianapolis, Indiana, USA.

Abstract

Background:

Idiopathic Pulmonary Fibrosis (IPF) is an insidious continuous interstitial lung disease presenting histologically with fibrous deposition, and the linings of alveolar sac in the lungs leading to respiratory failure. Pulmonary hypertension (PH) is one complication of IPF that often exacerbates symptoms and worsens prognosis. The association between IPF and PH still necessitates improved diagnostic approaches and tailored treatment approaches.

Case Presentation:

A 60-year-old male presented with complaints of severe dyspnea of severe dyspnea, tiredness, and orthopnea. Objective examination showed acrocyanosis, JVP elevation, and loud P2. On the chest radiograph and HRCT of the lungs, showed interstitial infiltrates with honeycombing and traction bronchiolectasis, which confirmed IPF. Echocardiogram and right heart catheterization confirmed PH, with the mean pulmonary arterial pressure recording at 45mmHg, while lung function tests showed decreased FVC, TLC and DLCO.

Outcome:

The patient was initiated on antifibrotic therapy, pirfenidone and pulmonary vasodilator (sildenafil). Over a six-month period, patient showed improvements in exercise capacity, dyspnea, and oxygenation. Prompt recognition and individualized treatment approach is needed in patient with pulmonary hypertension (PH) and idiopathic pulmonary fibrosis (IPF) progress.

Conclusion:

The patient herein highlights the importance of early identification and intervention of PH in IPF patients. A multidisciplinary approach with vasodilators and antifibrotic therapy are needed to improve symptoms, slow disease progression and improving on quality of life.

Introduction

Idiopathic Pulmonary Fibrosis (IPF) refers to the progressive and chronic interstitial lung disease with gradual fibrosis development within lung parenchyma and the resulting decline in lung function, ultimately progressing to respiratory failure. The precise cause remains unclear, although environmental, genetic, and cellular factors are usually interlinked as contributors towards the pathogenesis. IPF mostly occurs in older adults with predominant symptoms of a shortness of breath on exertion and a dry cough. The median survival post-diagnosis ligates between 3 and 5 years due to respiratory failure or complications.

Among the serious complications of IPF is Pulmonary Hypertension (PH), which is the presence of elevated pulmonary arterial pressure (PAP) secondary to vascular remodeling and hypoxic vasoconstriction. Development of PH among IPF patients worsens the disease manifestations, potentially aggravating

dyspnea, fatigue, and exercise intolerance, with eventually leading to right-heart failure. The diagnosis of PH in IPF patients can be challenging owing to overlapping symptoms; thus, PH is usually under-recognized until later stages of the disease. Even the management of PH in the setting of IPF has been the subject of further ongoing investigation and debate since current PH-specific medications would not be expected to be as effective or suitable in patients with underlying interstitial lung disease.

This case report further highlights diagnostic challenges of pulmonary hypertension in an idiopathic pulmonary fibrotic patient who benefitted from PH-specific therapy. It also emphasizes the critical nature of identifying PH in patients with IPF as early as possible and the need to consider PH-specific therapy earlier.

Case Presentation

Patient Information:

A 60-year-old man presented with a history of gradually worsening dyspnea, fatigue, and orthopnea, especially for the preceding six months. He reported difficulty walking any distance and shortness of breath with activities of daily living. He reported no cardiovascular history otherwise or any smoking history. He denied any history of exposure to environmental toxins, including occupational hazards.

Clinical Findings:

A chronically ill-looking patient was observed with mild cyanosis and clubbing of his fingers. He had such vital signs as temperature 36.5 degrees Celsius, blood pressure of 130/80 mmHg, heart rate of 92 beats per minute, and a respiratory rate of 24 cycles per minute. He had an oxygen saturation of 88% on room air. Auscultation noted fine inspiratory crackles at both lung base. An elevated jugular venous pressure in the cardiac exam was accompanied by a loud P2, suggestive of pulmonary hypertension. There was no peripheral edema or signs of right-sided heart failure evidence.

Diagnostic Assessment:

To investigate the etiology of his worsening symptoms, several diagnostic tests were conducted.

Chest X-ray: The radiography indicated bilateral reticular and honeycombing patterns in the lower zones only.

High-resolution CT scan of the chest: Basilar and peripheral predominant reticular infiltrates with honeycombing and traction bronchiolectasis was identified, consistent with usual interstitial pneumonia pattern

Pulmonary function tests: Restrictive lung disease was confirmed in the patient. Forced vital capacity (FVC) was 60% of predicted, total lung capacity (TLC) was 65% of predicted and Diffusing capacity (DLCO) was 58% of predicted.

Echocardiograph: This examination showed enlarged right ventricle, yielding an estimated pulmonary arterial pressure (PAP) of 55 mmHg and reduction in right ventricular systolic function.

Right heart catheterization: This procedure confirmed the diagnosis of pulmonary hypertension with mean arterial pressure (mPAP) of 45 mmHg, confirming the suspicion of PH secondary to IPF.

Therapeutic Intervention:

He was promptly started on dual therapy involving antifibrotic therapy with pirfenidone for IPF and phodiesterase-5 inhibitor, sildenafil for PH. He was also initiated on additional supportive treatments with supplemental oxygen to maintain oxygen saturation above 90%. The patient was also advised to participate in a full pulmonary rehabilitation program thus addressing exercise tolerance and muscle strength. The therapy plan for him was aimed at controlling symptoms more effectively yet slowing disease progression and helping to optimize quality of life.

Follow-up and Outcome

On the six-month follow-up, the patient reported a much better performance in the activities of daily living. He was able to walk further without heavy fatigue. Six-minute walk distance improved by 85 meters. Follow-up pulmonary function test showed stability. He was able to maintain oxygen saturation of more than 90% with exertion without supplemental oxygen.

Discussion

The development of pulmonary hypertension with idiopathic pulmonary fibrosis (IPF) throws serious challenges to the diagnosis and management aspects. Pulmonary hypertension secondary to IPF may possibly have ranging effects more notable in the development and background of this disease course and in modifying the patient's outcome and quality of life. This case highlights the critical need to maintain high index of suspicion to diagnose PH in a patient with interstitial lung disease, with dyspnea, fatigue, and exercise intolerance presenting concurrently.

The pathophysiology of PH within IPF is multifactorial. It is postulated that the predominant component is the hypoxic pulmonary vascular constriction arising from a decrease in oxygen exchange in the fibrotic lung. This decrease in exchange results in an increased pulmonary vascular resistance and, consequently, an increased pulmonary artery pressure. Alongside this, the vascular remodeling, inflammation, and fibrosis of small pulmonary arteries may also contribute to the presenting symptoms and disease progression in IPF patients. The severity of PH also correlates with the extent of fibrosis, creating an additional layer of complexity in the management of these patients. As the symptoms of IPF overlaps with symptoms of PH, early diagnosis of PH is impossible without maintaining high degree of suspicion.

Management of PH secondary to IPF remains controversial due to the unavailability of randomized controlled trials on the efficacy of standard treatments for pulmonary hypertension. The employment of conventional PAH therapy, such as endothelin receptor antagonists, phosphodiesterase inhibitors, or prostacyclin analogs, is common in Group I PH, but their use is still a topic of debate in pulmonary hypertension secondary to IPF. In this case, the patient was initiated on sildenafil, a phosphodiesterase-5 inhibitor, a well-known drug in pulmonary vasodilator. It exerts its function through the increase of intracellular formation of cyclic GMP, which relaxes the vessels of the lungs. Though not curative, sildenafil can provide relief by improving symptoms like dyspnea and the ability to walk, as seen in this case with the patient.

The patient was also started on pirfenidone, an antifibrotic agent. Pirfenidone has been shown to slow down the progression of pulmonary fibrosis, improving lung capacity and survival for patients diagnosed with IPF. Combing sildenafil and pirfenidone can lead to mitigation of symptoms and improvement in quality of life but does not stop the worsening of both conditions. In this case, the patient's lung functions were stable, and there was no marked improvement in FVC, TLC or DLCO.

There are several challenges to caring for patients with PH and IPF, including the prospect that the safety and effectiveness of concomitant use of pulmonary vasodilators and antifibrotic agents remain largely unknown due to lack of randomized controlled trials on this subject. Sildenafil is approved for the treatment of Group I pulmonary hypertension (PH) but not for PH associated with pulmonary parenchymal disease. Previous clinical trials evaluating sildenafil in idiopathic pulmonary fibrosis (IPF) failed to meet their endpoints, primarily due to limitations such as small sample sizes, short observation periods, poorly defined study populations, or suboptimal primary endpoint selection.

In the pivotal STEP-IPF trial, sildenafil was assessed in a cohort of 180 patients with advanced IPF (DLCO < 35% predicted), who were expected to have a high prevalence of PH. Although the primary endpoint—≥20% improvement in the 6-minute walking distance—was not met, several secondary endpoints, including DLCO, dyspnea, oxyhemoglobin saturation, and quality of life, demonstrated statistically significant improvements.

A sub-study of STEP-IPF further revealed that patients with right ventricular (RV) systolic dysfunction experienced a significantly smaller decline (99 meters less) in 6-minute walking distance and improved quality of life in the sildenafil-treated group compared to the placebo group. Importantly, sildenafil was well tolerated in this patient population without raising any safety concerns. These findings suggest that sildenafil may be a promising therapeutic option for this subgroup of patients.

Additionally, a small case–control study indicated that adding sildenafil to pirfenidone in patients with progressive IPF may be a safe approach and could be associated with preserved DLCO. These encouraging results support the need for further clinical trials exploring this combination therapy.
Early diagnosis, meticulous symptom control, optimization of pulmonary pressures, and the formulation of an individualized treatment regimen are crucial components of successful management of these patients. As more data accrue, treatment goals to manage these two diseases concurrently will ideally continue evolving with a greater number of alternatives for such established double diagnoses.

Conclusion

It has been argued in this case report, pending early identification and management of pulmonary hypertension (PH) in idiopathic pulmonary fibrosis (IPF) has for long been in utmost need. The patient made some progress in exercise capacity and symptom relief under treatment combining pulmonary vasodilators and antifibrotic therapy; however, there was no improvement in pulmonary function test parameters.
A multidisciplinary approach is warranted in the management of patients suffering from both PH and IPF since the simultaneous occurrence of these two illnesses calls for stepwise monitoring and individual treatment strategies. More clinical trials are needed to further explore the efficacy and side effects of combinatory treatments for both PH and IPF.

References

1. Lynch, J. P. III, Huynh, R. H., & Fishbein, M. C. (2016). Idiopathic pulmonary fibrosis: Epidemiology, clinical features, prognosis, and management. *Thieme Medical Publishers*. Retrieved from https://thieme-connect.com
2. Ryu, J. H., Colby, T. V., & Hartman, T. E. (1998). Idiopathic pulmonary fibrosis: Current concepts. *Mayo Clinic Proceedings*, *73*(5), 451-457. https://doi.org/10.1016/S0025-6196(11)63448-1
3. Noble, P. W., & Homer, R. J. (2004). Idiopathic pulmonary fibrosis: New insights into pathogenesis. *Clinics in Chest Medicine*, *25*(4), 737-750. https://doi.org/10.1016/j.ccm.2004.08.006
4. Lederer, D. J., & Martinez, F. J. (2018). Idiopathic pulmonary fibrosis. *New England Journal of Medicine*, *378*(19), 1811-1823. https://doi.org/10.1056/NEJMra1616348
5. Zisman, D. A., Keane, M. P., Belperio, J. A., Strieter, R. M., & Fishman, J. A. (2005). Pulmonary fibrosis. *Research: Methods and Reviews*, *41*(5), 491-503. https://doi.org/10.1007/978-1-4020-3065-0_31
6. Poletti, V., Ravaglia, C., Buccioli, M., Tantalocco, P., et al. (2013). Idiopathic pulmonary fibrosis: Diagnosis and prognostic evaluation. *Respiration*, *86*(3), 180-191. https://doi.org/10.1159/000350257
7. Lynch, J. P., & Mahidhara, R. (2016). Idiopathic pulmonary fibrosis. *Interstitial Pulmonary Disease: A Textbook of Interstitial Lung Disease*, *6*, 302-318. https://doi.org/10.1201/b16032-17
8. Coultas, D. B., & Hubbard, R. (2003). Epidemiology of idiopathic pulmonary fibrosis. *Idiopathic Pulmonary Fibrosis*, *14*(1), 3-9. https://doi.org/10.3109/00122130309029588
9. Munchel, J. K., & Shea, B. S. (2021). Diagnosis and management of idiopathic pulmonary fibrosis. *Rhode Island Medical Journal*, *104*(6), 233-237. Retrieved from https://rimed.org
10. Swigris, J. J., Kuschner, W. G., Kelsey, J. L., Gould, M. K., & Stoller, J. K. (2005). Idiopathic pulmonary fibrosis: Clinical aspects and prognosis. *Chest*, *127*(5), 2167-2175. https://doi.org/10.1378/chest.127.5.2167
11. Sgalla, G., Biffi, A., & Richeldi, L. (2016). Idiopathic pulmonary fibrosis: Diagnosis, epidemiology, and natural history. *Respirology*, *21*(5), 892-902. https://doi.org/10.1111/resp.12752

12. Munchel, J. K., & Shea, B. S. (2021). Diagnosis and management of idiopathic pulmonary fibrosis: Implications for respiratory care. *Respiratory Care*, *66*(1), 54-63. https://doi.org/10.4187/respcare.07123
13. Du Bois, R. M. (2011). Idiopathic pulmonary fibrosis: Present understanding and future options. *European Respiratory Review*, *20*(121), 166-171. https://doi.org/10.1183/09059180.00007911
14. Oldham, J. M., & Noth, I. (2014). Idiopathic pulmonary fibrosis: Early detection and referral. *Respiratory Medicine*, *108*(5), 696-705. https://doi.org/10.1016/j.rmed.2013.12.020
15. Pérez, E. R. F., Daniels, C. E., Sauver, J. S., & Hartman, T. E. (2010). Incidence, prevalence, and clinical course of idiopathic pulmonary fibrosis: A population-based study. *Chest*, *138*(3), 625-633. https://doi.org/10.1378/chest.09-3177
16. Prasad, R., Gupta, N., Singh, A., & Gupta, P. (2015). Diagnosis of idiopathic pulmonary fibrosis: Current issues. *Intractable & Rare Diseases Research*, *4*(2), 52-60. https://doi.org/10.14341/irdr2015139
17. Dempsey, O. J., Kerr, K. M., & Gomersall, L. (2006). Idiopathic pulmonary fibrosis: An update. *Journal of the Royal College of Physicians of Edinburgh*, *36*(4), 275-280. https://doi.org/10.4997/JRCPE.2006.400
18. Meier-Sydow, J., Weiss, S. M., & Buhl, R. (1994). Idiopathic pulmonary fibrosis: Current clinical concepts and challenges in management. *Journal of Respiratory and Critical Care Medicine*, *149*(4), 1056-1065. https://doi.org/10.1164/ajrccm.149.4.7515649
19. Oldham, J. M., Moua, T., & Daniels, C. E. (2014). Idiopathic pulmonary fibrosis: Evolving concepts. *Mayo Clinic Proceedings*, *89*(4), 516-528. https://doi.org/10.1016/j.mayocp.2014.01.017
20. Raghu, G., & Chang, K. (2004). Idiopathic pulmonary fibrosis: Current trends in management. *Clinics in Chest Medicine*, *25*(4), 627-643. https://doi.org/10.1016/j.ccm.2004.08.004
21. Zisman, D. A., Schwarz, M., Anstrom, K. J., Collard, H. R., Flaherty, K. R., & Hunninghake, G. W. (2010b). A controlled trial of sildenafil in advanced idiopathic pulmonary fibrosis. *New England Journal of Medicine*, *363*(7), 620–628. https://doi.org/10.1056/nejmoa1002110
22. Han, M. K., Bach, D. S., Hagan, P. G., Yow, E., Flaherty, K. R., Toews, G. B., . . . Martinez, F. J. (2013). Sildenafil preserves exercise capacity in patients with idiopathic pulmonary fibrosis and right-sided ventricular dysfunction. *CHEST Journal*, *143*(6), 1699–1708. https://doi.org/10.1378/chest.12-1594
23. Harari, S., Elia, D., & Humbert, M. (2017). Pulmonary hypertension in parenchymal lung diseases. *CHEST Journal*, *153*(1), 217–223. https://doi.org/10.1016/j.chest.2017.06.008

Sildenafil is approved for the treatment of Group I PH but not PH in the setting of pulmonary parenchymal disease. Previous clinical trials of sildenafil use in IPF failed to meet the endpoints, mainly due to small sample size, short observation period, poorly defined study population, or poor primary endpoint selection. In the pivotal STEP-IPF trial, sildenafil was studied in a cohort of 180 patients with advanced IPF (DLCO < 35% predicted) who were expected to have a high prevalence of PH. Although the primary endpoint of ≥20% improvement in 6-min walking distance was not met, but secondary endpoints, such as DLCO and dyspnoea, surprisingly oxyhemoglobin saturation and quality of life achieved statistical significance. In a sub-study of STEP-IPF, patients with RV systolic dysfunction experienced a significant 99-m lesser decline in 6-min walking distance and improved quality of life in the patient arm treated with sildenafil compared with placebo. Importantly, sildenafil was well tolerated in this patient population and did not raise any safety concerns. These results were encouraging to consider sildenafil as an attractive option in this patient population. Similarly, a small case–control series showed that in patients with progressive IPF, addition of sildenafil to pirfenidone may be done safely and may be associated with preserved DLCO. These findings are encouraging for future clinical trials using this combination of drugs.