Manual Therapy, an Alternative Treatment Option for Idiopathic Pulmonary Fibrosis

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References and E-copy of Poster

Introduction

Idiopathic pulmonary fibrosis (IPF) is a lung disorder of unknown cause that leads to progressive scarring of the lungs, hardening of the tissue and a resulting decreased pulmonary function [1-2]. Patients with exposure to wood and metal dust, livestock, microaspirations, or tobacco smoke have increased risk of IPF [3-4].

IPF commonly presents with dyspnea, a nonproductive cough, decreased mobility, and fatigue [1-2]. Disease progression is variable for each patient, with a median survival rate of less than 5 years after a patient is diagnosed with IPF [2,5]. There is currently no cure for IPF, with treatment focusing on slowing the progression of the disease while stabilizing the patient [6].

The current standard of care includes two medications, nintedanib and pirfenidone, along with oxygen therapy [1-2, 6-7]. If a patient fails standard therapy, or standard therapy alone is insufficient, pulmonary rehabilitation may be added with consideration of lung transplantation [1,7]. However, it is important to note that patients placed on a transplant waiting list often perish prior to their transplant, as wait times may be up to 2-3 years [1]. Our patient forewent this intervention and instead pursued pulmonary therapy.

Here, we present a case detailing how pulmonary rehabilitation, in the form of manual therapy, improved a patient's oxygenation, and mobility with stabilization of her pulmonary function test (PFT) values.

Case Presentation and Rehabilitation Protocol

Case Presentation

A 73-year-old female with a past medical history of IPF and gastroesophageal reflux disease (GERD) presented to a chiropractic and rehabilitation center looking for pulmonary rehabilitation after failing standard medication therapy for IPF. The patient was intolerant to both pirfenidone, due to the negative side effects experienced, and nintedanib, due to elevation of her liver function tests (LFTs) following medication treatment.

Upon presentation, the patient complained of dyspnea with a modified medical research council (mMRC) grade of 4 and decreased mobility. A detailed physical exam including evaluation of range of motion, palpation and special tests, was performed revealing multiple joint restrictions throughout the spine resulting in hypomobility, spasms, and end point tenderness in her cervical, thoracic, and lumbar spine. It was also noted that the patient had decreased rib expansion during ventilation. Following review of the patient's records, history of present illness, and discussing treatment options, it was determined that the best treatment for the patient's symptoms included the following manual therapy techniques.

Rehabilitation Protocol

1) Joint Mobilization with an Activator

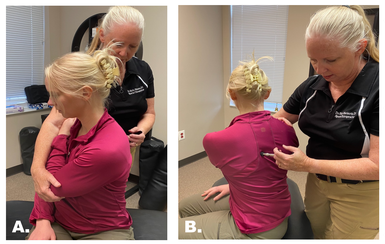

Figure 1. Joint Mobilization with an Activator **(A)** Anterior View **(B)** Posterior View

Participants pictured in the figure are researchers on the study, not the patient.

Key Points

- The patient was in a seated position and twisted both directions.
- An activator targeted the transverse process and costovertebral joints, aimed 15-20 degrees laterally.
- Performed along the cervical, thoracic and lumbar spine bilaterally.

2) Myofascial Release Technique (MRT)

Figure 2. MRT **(A)** MRT conducted on intercostal muscles **(B)** Labeled image of axillary lines used in MRT on intercostal muscles

MRT: Myofascial Release Technique. Participants pictured in the figure are researchers on the study, not the patient.

Key Points

- The patient laid in the lateral recumbent position opposite of the side being treated with MRT.
- The patient's arm was in an abducted position with flexion at the elbow for comfort.
- MRT was performed bilaterally along the anterior axillary line, midaxillary line and posterior axillary line.

3) Trunk Rotation Exercise

Figure 3. Trunk Rotation Exercise **(A)** Initial position **(B)** Transition position **(C)** Final position

Participant pictured in the figure is a researcher on the study, not the patient.

Key points

- The patient was in a seated position with arms crossed, moving the arms above their head in an alternating fashion.
- The patient was advised to perform trunk rotation with arm elevation exercises at home daily

Treatment Discussion

The patient was advised to return for treatment one to three times per week for a total of 10 weeks. Status at each visit determined the frequency of treatment and the addition of alternative techniques. The patient reported that she was compliant with home exercises.

- ❖ Joint mobilization with an activator focused on aligning the joints and increasing mobility of the spine, thus allowing for improved ventilatory function.
- ❖ Trunk rotation with arm elevation and intercostal muscle stretching with MRT directly lessened the anatomic restrictions developed around the respiratory system, thus allowing for full expansion and contraction of the lungs.
- ❖ At-home self-led therapy recruited the patient to adopt a responsible change-driven mindset.

Outcome

While at the outpatient clinic prior to initial treatment, the patient's oxygen saturation was fluctuating around 85% on room air. The patient endorsed dyspnea consistently, which increased upon exertion. Additionally, the patient reported she had a frequent cough, decreased mobility, and required supplemental oxygen. Following one therapy session, the patient's oxygen saturation increased to 90% on room air and remained steady. Following multiple sessions, the patient reported now doing activities she was unable to do previously, including walking to and from her barn to brush her horses without dyspnea, with an mMRC grade decrease from 4 to 2. She also reported increased mobility since treatments began, less coughing, and no longer requiring supplemental oxygen during the day. Overall, the patient expressed improvement in symptoms overall and a positive change in her lifestyle since beginning treatments, which remained stable throughout the duration of care. Additionally, the patient's PFT values had stabilized as reported by her pulmonologist (Table 1).

	Pre-Therapy						Post-Therapy				
Spirometry	**Pred**	**Actual**	**LLN**	**ULN**	**% Pred**	**Spirometry**	**Pred**	**Actual**	**LLN**	**ULN**	**% Pred**
FVC (L)	2.89	2.05	2.09	3.72	70	**FVC (L)**	2.85	2.06	2.05	3.69	72
FEV1 (L)	2.22	1.73	1.61	2.82	77	**FEV1 (L)**	2.19	1.79	1.58	2.78	81
FEV1/FVC (%)	78	85	64	89	108	**FEV1/FVC (%)**	78	87	64	89	111
FEF 25-75% (L/sec)	1.84	2.29	0.83	3.29	124	**FEF 25-75% (L/sec)**	1.81	2.45	0.81	3.25	135
FEF Max (L/sec)	5.65	6.67	3.88	7.42	118	**FEF Max (L/sec)**	3.57	7.86	3.8	7.34	141
Expiratory Time (sec)		7.1				**Expiratory Time (sec)**		7.16			
FEF 50% (L/sec)	3.28	4.22	1.47	5.1	128	**FEF 50% (L/sec)**	3.25	3.68	1.44	5.07	113
FIF 50% (L/sec)	3.31	2.13	1.87	4.74	64	**FIF 50% (L/sec)**	3.25	4.15	1.81	4.68	127
FEF 50%/FIF 50% (%)	90-100	198				**FEF 50%/FIF 50% (%)**	90-100	89			
Diffusion						**Diffusion**					
DLCOunc (ml/min/mmHg)	19.98	11.09	14.15	29.25	55	**DLCOunc (ml/min/mmHg)**	19.91	13.67	14.08	29.2	68
DLCOcor (ml/min/mmHg)	19.98		14.15	29.25		**DLCOcor (ml/min/mmHg)**	19.91		14.08	29.2	
DL/VA (ml/min/mmHg)	3.84	3.11			80	**DL/VA (ml/min/mmHg)**	3.83	3.86			100
VA (L)	5.2	3.57	4.32	6.09	68	**VA (L)**	5.2	3.55	4.32	6.09	68
IVC (L)		1.97				**IVC (L)**		1.86			
Lung Volumes						**Lung Volumes**					
SVC (L)	2.89	2.11	2.09	3.72	73	**SVC (L)**	2.85	1.87	2.05	3.69	65
TLC (Pleth)(L)	5.2	3.45	4.13	6.28	66	**TLC (Pleth)(L)**	5.2	3.86	4.13	6.28	74
RV (Pleth)(L)	2.28	1.34	1.52	3.04	58	**RV (Pleth)(L)**	2.3	1.99	1.54	3.06	86
RV/TLC (Pleth)(%)	44	39	33	55	87	**RV/TLC (Pleth)(%)**	45	52	34	56	115
TGV (L)	2.98	2.51	1.94	4.03	84	**TGV (L)**	2.99	2.62	1.94	4.03	87
ERV (L)	1.01	1.18			116	**ERV (L)**	0.99	0.63			63
Raw (cmH2O/L/s)	1.86	1.06	1.15	2.56	57	**Raw (cmH2O/L/s)**	1.86	1.26	1.15	2.56	67
sGaw (1/cmH2O*s)	0.2	0.39	0.14	0.26	191	**sGaw (1/cmH2O*s)**	0.2	0.31	0.14	0.26	157

Table 1. Pre-Therapy PFTs vs. Post-Therapy PFTs. Pre-Therapy data represents PFTs from February. Post-Therapy data represents PFTs from May of the same year.

FVC: forced vital capacity; FEV1: forced expiratory volume in 1 second; FEF: forced expiratory flow; FIF: forced inspiratory flow; DLCOunc: diffusing capacity of the lungs for carbon monoxide uncorrected; DLCOcor: diffusing capacity of the lungs for carbon monoxide corrected; DL/VA: diffusing capacity of the lungs for carbon monoxide divided by the alveolar volume; VA: alveolar volume; IVC: inspiratory vital capacity; SVC: slow vital capacity; TLC: total lung capacity; RV: residual volume; TGV: thoracic gas volume; ERV: expiratory reserve volume; Raw: airway resistance; sGaw: specific airway conductance

Discussion

While this is not the first study to demonstrate the positive effects adjunctive or alternative treatments have on patients with IPF, it shows how manual therapy techniques can greatly enhance care for IPF patients.

- ❖ Vainshelboim reports that exercise training demonstrates short term improvement in dyspnea, exercise capacity, and quality of life [8].
- ❖ Studies have observed improvements in exercise capacity, quality of life, and functional capacities in patients who participated in pulmonary rehabilitation programs [9-12].
- ❖ Cheng reports in their analysis, pulmonary rehabilitation improves short term, but not long-term impacts on exercise capacity and health related quality of life [13]. Further investigation is needed to elucidate the long-term impacts of pulmonary rehabilitation on IPF [13].
- ❖ Other lung diseases such as chronic obstructive pulmonary disease (COPD), pneumonia and tuberculosis, have been shown to positively benefit from pulmonary rehabilitation as a treatment [14-16].

The rehabilitation within this case prioritized increasing mobility of the respiratory system. The focus largely targeted aligning the joints, increasing mobility of the spine and stretching the musculature reducing anatomic restriction to improve ventilatory function. The culmination of utilized techniques was shown to be positive, with a decrease in symptom burden, improved respiratory function, and oxygenation.

Conclusion

This patient's positive response to a non-invasive technique after failing standard of care demonstrates a benefit to the consideration and utilization of alternative treatments, such as manual therapy. Further research is needed to evaluate the effect of this treatment protocol on patients of different ages and backgrounds. The non-invasive nature of manual therapy and positive response in this patient supports further exploration and supplementation in clinicians' knowledge of treatment options for those who have failed standard of care.