September 28, 2021

CTS INSPIRATIONS

CTS NEWS

President's Message

On behalf of CTS, I want to congratulate the entire CTS community for doing their part as *front liners* during the fourth and current COVID-19 Delta surge. While we have distinguished ourselves as the state with the lowest coronavirus in the USA, that wasn't quite true for the Central Valley which got hit the hardest, resulting in the region's most populous city's medical center - UCSF-Fresno —going into disaster mode in early September. Although now at a very high plateau, the region seems to be past its peak. The rest of the state seems to have also plateaued if not down trending.

I want to remind everyone to look out for burnout not just within our colleagues but ourselves as well and encourage everyone to maintain a balance between your professional and personal responsibilities, as best as possible. Admittedly easier said than done, I can't say that I have done that perfectly and am still learning! It is however important for us to be healthy first, both emotionally and physically to assure the best healthcare delivery to our communities as well as for the sake of our families and friends.

We are pleased to inform you that CTS has launched a Career Center for job seekers and employers. Nicholas Kolaitis, MD (UCSF) and George Su, MD (UCSF, ZSFGH) have worked on developing the CTS Job board powered by Naylor solutions. All institutional members get a free listing, the overall fee structure is designed to be competitive. I anticipate this to significantly enhance visibility at both ends, job seekers and employers, given our extensive institutional network within California.

CTS business operations continue to do well. Our financial health and projections continue to look encouraging. The CTS educational webinar series remains popular and continues to grow. I want to thank the education committee chairs Michelle Cao, MD (Stanford) and Shazia Jamil, MD, (Scripps Health) as well as the 2022 annual Monterey Conference chairs Gaurav Singh, MD (Stanford) and Kristina Kudelko, MD (Stanford) for their tireless efforts in getting the Phase 2 submitted to ATS last week. Short of a yet another 5th COVID wave, we anticipate this meeting to be in person as planned. The overall agenda will focus on lessons learned from COVID-19 acute respiratory failure and ICU management, post COVID related issues, advances in lung cancer diagnostics and therapeutics, sleep disorders, and climate change. The meeting will also have a special session for trainees and junior faculty on career planning and burn-out, a poster session, and a women's forum on "Family Matters: Challenges and Lessons Learned". *New for 2022, CTS will host a CME educational program on advances in interventional pulmonology, which is planned for Sunday, March 13th right after the annual conference.*

Finally, a welcome to the newest member of CTS Inspirations Editor team: Erica Lin, MD (UCSD)!

The items cited above are just a fraction of the work that our executive office and committees are engaged in. I am indebted to various members of CTS that remain deeply committed to the success of CTS. THANK YOU.

Sincerely,

Vipul V. Jain, MD, MS
UCSF Fresno

EDITOR'S NOTE

September is Pulmonary Fibrosis Awareness month. For more information, click on the following link: https://www.pulmonaryfibrosis.org/

In addition, ATS has an outstanding patient information series covering a variety of lung-related topics available for free. The ILD collection https://www.thoracic.org/patients/patient-resources/topic-specific/interstitial.php includes a nice overview of anti-fibrotic medications.

Greed does not make need, but struggles to. (Paul Quinton, PhD)

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Evaluation and Management of post-COVID Interstitial Lung Abnormalities

Erica Lin, MD[1], Angela Wang, MD[1]

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Key Points:

- There is a paucity of literature on post-COVID interstitial lung abnormalities (ILA).
- Current guidelines for the initial evaluation of long-term respiratory sequelae vary by organization.
- Future studies are ongoing to determine whether additional medical therapies, such as anti-fibrotic agents or corticosteroids have any role in the management of COVID-19 associated interstitial lung abnormalities (ILA).

Introduction:

In Spring 2020, the World Health Organization (WHO) declared the coronavirus disease 2019 (COVID-19) outbreak a global pandemic. Since then, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has infected more than 190 million people.[1] Evidence suggests that some of these survivors may suffer long-term sequelae, ranging from mild[2, 3] to severe forms (such as post-COVID interstitial lung disease[4]). Given the prevalence of this disease, even low frequency complications may have a significant impact on the healthcare system. Therefore, attention should be focused on understanding the trajectory of COVID-19 survivors.

This review is based on a comprehensive review of current literature and is designed to guide pulmonologists in the initial evaluation and management of post-COVID interstitial lung abnormalities (ILA).

Post-COVID Interstitial Lung Abnormalities

Approximately one-half of the patients who suffered from SARS-CoV-2 infection have not returned to their pre-COVID baseline based on modified Medical Research Council (mMRC) dyspnea scale measurements during outpatient follow-up 2 months after their acute illness.[5] The majority reported fatigue as their major complaint 60 days after symptom onset.[3, 5] Potential post COVID-19 pulmonary sequelae include asthma, respiratory muscle weakness as well as interstitial lung disease.

Prior to hospitalization discharge, the most common pulmonary function test (PFT) abnormality was an impaired diffusing capacity with differences that corresponded to the severity of illness.[6] Two weeks after discharge, the majority of patients with abnormal spirometry had evidence of a restrictive ventilatory defect.[7] One study showed that 25% of patients had abnormal PFTs at 3 months, even in those with minimal respiratory symptoms.[8]

Studies have also evaluated evolution of radiographic changes following acute COVID-19 illness. While the majority of hospitalized patients had computed tomography (CT) abnormalities prior to discharge,[9] only 5-13% had abnormalities on chest x-ray (CXR) during follow-up.[2, 5] It may be that a more precise evaluation with high-resolution CT chest would show a higher percentage of radiologic abnormalities during follow-up.[5] In general, 70-75% of patients still had some radiographic findings at 2-3 month follow-up: 7-37% with GGOs, and 21-27% with other interstitial findings.[5, 8, 10] These interstitial lung abnormalities may herald the development of fibrotic-like changes in some survivors, as some longer term studies are beginning to reveal.

In most post-COVID patients, the extent of pulmonary abnormalities decreased on 6-month CT follow-up; however, 10-35% of patients still had fibrotic-like changes seen on follow-up imaging studies.[10-13] There was a higher proportion of post-COVID pulmonary fibrosis in patients of advanced age,[12] of male gender,[10, 11, 14] and with active or prior tobacco use.[10, 14] These fibrotic-like changes were also more prevalent in those with

prolonged hospital and ICU stay, those who underwent mechanical ventilation, and those who developed acute respiratory distress syndrome (ARDS).[12, 15-17] Additional studies are needed to clarify the significance and long-term prognosis of these residual abnormalities.

In one single-center prospective observational study, 59 of the 837 hospitalized survivors were diagnosed with post-COVID ILA with 35 considered as post-COVID interstitial lung disease (ILD) based on a consensus by a multi-disciplinary team (MDT).[4] Ultimately, an incidence of 5% of post-COVID ILD was reported with the majority having organizing pneumonia-like pattern on imaging.[4] Given their persistent respiratory symptoms, restrictive physiology and radiologic abnormalities, 66% of these patients received up to a 3-week course of oral corticosteroids. All patients had symptomatic and objective improvement with increase in FVC and improvement on CT.

Outpatient Management of post-COVID Interstitial Lung Disease

a. Monitoring

The American Thoracic Society (ATS) and the European Respiratory Society (ERS) make no official recommendations either for or against routine follow-up PFTs, CXRs, or chest CTs after hospitalization.[18] However, the majority do favor follow-up PFTs within 30-60 days.[18] It was suggested that the official consensus was formed while acknowledging the practical limitations of obtaining PFTs at centers that were already struggling with backlogs.[18] Other societies have come out with more definitive statements for pulmonary follow-up and testing.[19, 20] For example, the Swiss Society for Pulmonology (SSP) recommended pulmonary follow-up within 3 months for all hospitalized COVID-19 patients and all COVID-19 patients with persistent symptoms.[19] Additionally, SSP advocated for blood gases, plethysmography, and diffusion capacity measurement in COVID-19 patients with persistent respiratory symptoms.[19] British Thoracic Society (BTS) recommended a 4-6 week check-in and a 12-week in-person visit with a follow-up chest x-ray for patients with severe COVID-19 pneumonia, defined as those requiring prolonged high flow nasal cannula, non-invasive ventilation, ICU stay or supplemental oxygenation on discharge.[20] Additionally, BTS proposed a 12-week virtual visit with a follow-up chest x-ray in patients with milder forms of COVID-19 including those managed out of the hospital or on the floor.[20] Opinion pieces have also varied in terms of how aggressive their follow-up should be.[21-23]

b. Diagnosis

The nomenclature being used to describe post COVID interstitial lung abnormalities is not well defined and includes post-COVID pulmonary fibrosis or ILD. Some studies[10] have based the definition of post-COVID pulmonary fibrosis on the diagnostic criteria for idiopathic pulmonary fibrosis (IPF) and include honeycombing, reticular pattern, and traction bronchiectasis.[24] Others do not require honeycombing, defining it as “extensive and persistent fibrotic changes including parenchymal bands, irregular interfaces, reticular opacities and traction bronchiectasis with or without honeycombing”.[11] Both studies require a consensus by radiology.[10, 11] Tanni et al. goes one step further, characterizing it as the radiologic presence of persistent fibrotic changes but also includes functional impairment on PFTs in its definition.[25] While the majority of post-COVID ILA improve over time, there is a subset of patients with persistent radiographic abnormalities concerning for post-COVID ILD. This diagnosis of post-COVID ILD should be based on a consensus by a multi-disciplinary team (MDT), similar to the integrated approach for non-COVID ILD classifications.[26]

c. Management

Currently, there are no proven medical therapies for the treatment of post-COVID ILA. The use of corticosteroids has been discussed for the management of possible post-COVID organizing pneumonia (OP),[19, 27, 28] especially given its benefit in the acute setting based on the RECOVERY trial.[29] There are differing views towards its use in the non-acute setting,[19, 27, 28] as the benefit vs risks of corticosteroid-associated myopathy and secondary infections must be weighed.[30] Currently, we recommend general supportive care for most patients with subjective and objective improvement on follow-up imaging. Corticosteroids can be considered in symptomatic patients with persistent radiologic abnormalities such as OP or non-specific interstitial pneumonia (NSIP) concerning for post-COVID ILD.

The potential role of anti-fibrotic therapy has also been extrapolated from its use in IPF and progressive fibrosing ILDs.[27, 31, 32] Specifically, pirfenidone and nintedanib have been proposed, given the possibility of a shared pathogenetic mechanism in the fibrotic process between COVID-19 ARDS and ILDs.[31-34] Currently, its use has only been described in case reports.[35] Multiple clinical trials are ongoing to determine their efficacy in the management of COVID-19 associated lung disease.[34, 36-38] At this time, we have not adopted the use of anti-fibrotic therapy, as there is minimal evidence of progression of post-COVID fibrotic findings and important concerns of cost and known potential side-effects in treated patients.

Other non-pharmacologic management has been described, similar to that for other chronic lung diseases. In particular, participation in a rehabilitation program is of particular importance with overwhelming support from a wide range of specialties.[19, 39] Some patients ultimately have been referred for lung transplantation due to persistent hypoxic respiratory failure as well as PFT and radiographic abnormalities 4-6 weeks after initial insult.[40]

It is too early to determine whether these respiratory sequelae will improve, stabilize or progress,[27] more questions have been raised about the appropriate management of residual lung disease in COVID-19 survivors. Future studies are needed to better determine the incidence of post-COVID ILD as well as risk factors for their development.[41] Additionally, research is needed to determine whether immunomodulatory medications or anti-fibrotic agents may have benefit for the chronic manifestations of COVID-19.[41]

Conclusion

Current literature on post-COVID ILA is lacking; however, additional research on this topic is growing as longer term follow-up data is being collected and published. Therefore, recommendations for its evaluation and management are still based on clinical practice patterns and expert opinion. There is a pressing need for more research in this patient population, although we are optimistic that more answers are on the horizon.

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What is **pulmonary fibrosis?**

Pulmonary Fibrosis Foundation™

pulmonaryfibrosis.org

There are more than 200 types of **interstitial lung diseases (ILD),** which are characterized by varied amounts of inflammation, scarring, or both, that damage the ability of the lung to absorb oxygen from the air. **Pulmonary fibrosis (PF)**, means scarring of the lung, and can be seen in many types of ILD. More than 250,000 Americans are living with PF and ILD. Difficult to diagnose, PF and ILD can be debilitating and, in some cases, incurable. Causes of PF and ILD include the use of certain medications, radiation to the chest, autoimmune diseases, environmental, and occupational exposures. Idiopathic pulmonary fibrosis, which has no known cause, is one of the most common forms of PF. The prevalence of PF and ILD is on the rise with more than 50,000 new cases diagnosed annually.

With no known cure, certain forms of PF, such as idiopathic pulmonary fibrosis, (IPF), may take the lives of patients within three to five years from diagnosis. The good news for people living with PF is that there are treatments designed to specifically manage the symptoms of the disease and researchers are studying new ways to halt its progression.

PREVALENCE

250,000+
people are living with PF and ILD in the U.S.

CASES

50,000
new cases of PF and ILD are diagnosed annually

DIAGNOSIS

1 in 200
over the age of 70 are diagnosed with IPF

SYMPTOMS

- Shortness of breath
- Dry, hacking cough
- Fatigue and weakness
- Discomfort in chest

CAUSES

- Airborne contaminants
- Radiation treatments
- Some medications
- Genetics
- Autoimmune diseases

TREATMENTS

- Supplemental oxygen
- Pulmonary rehab
- Medications
- Lung transplantation

The **Pulmonary Fibrosis Foundation** mobilizes people and resources to provide access to high quality care and leads research for a cure so people with pulmonary fibrosis will live longer, healthier lives. For more information, visit **pulmonaryfibrosis.org** or call **844.TalkPFF.**

CA ILD Virtual Support Programs

https://www.pulmonaryfibrosis.org/patients-caregivers/medical-and-support-resources/find-a-support-group

ILD Support Program	Contact Information
Central Valley Pulmonary Fibrosis Support Group	· Chelsea Thompson at cvthomps@ucdavis.edu · Maya Juarez at mmjuarez@ucdavis.edu
Sacramento CA Inland Empire Pulmonary Fibrosis Support Group	· Magdalena Pacheco at m4unont@aol.com
UCSF Living Well with ILD	· Wendy Chen at wendy.chin@ucsf.edu · Elida Oettel at elida.oettel@ucsf.edu
San Francisco CA San Francisco Veterans' ILD Support Group	· Jennifer Ryan at Jennifer.Ryan@va.gov
One Breath Foundation Transplant and PF Support Group	· Terri Pilawa at onebreathfoundation2007@gmail.com
Pulmonary Fibrosis Support Group at Stanford	· Susan Jacobs at ssjpulm@stanford.edu
Support Group for IPF, PF and Lung Disease	· Irene White at icwhite1@yahoo.com
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USC Center for Advanced Lung Disease Interstitial Lung Disease Support Group	· Lorelie Evangelista LCSW or Carina Palacios MSW at (323)442-5358 or pulmonary@med.usc.edu
Cedars Sinai Support Group	· Sari Steinberg, LCSW at (310) 423-5792 or sari.steinberg@cshs.org

MEET LAREN TAN, MD

CTS PAST PRESIDENT-ELECT

Laren Tan, MD, MBA, FCCP
CTS Past President (2020-2021)
Associate Professor of Medicine
Assistant Dean, Continuing Medical Education
Vice Chair, Innovation and Practice Development
Loma Linda University Health

A glimpse of CTS that reminded me of my childhood:

While cleaning the rim of the toilet bowl, I remember muttering to myself, "keep your eyes on the prize." It was very early in my childhood after migrating from Singapore while dad was working multiple jobs and myself helping mom clean houses to make ends meet. I realized that the difficult things in life are that much more bearable when you "keep your eyes on the prize." While the idiom likely became popularized by a song of the same name during the Civil Rights Movement, I now realize that it was also the spark that started me on a journey of seeking creative and innovative ways to better the way we do things in life. Of course, my life story is my own, but I also acknowledge that many in CTS have varying iterations of my story and are also pursuing to make this world a better place. Most recently, I witnessed this same drive during a CTS leadership virtual meeting. In discussing the various uncertainties due to the COVID19 pandemic, I was humbled and amazed to see our CTS executive committee and executive office formulate and strategically provide creative and innovative solutions to the many difficulties while "keeping their eyes on the prize." Such creativity, innovation, dedication, and passion are just a few of our society's many strengths, which is what makes me so proud to be part of CTS.

How would you describe yourself (as an introvert or extrovert)?

I would describe myself as an ambivert that is easily entertained and seeks out the little things in life. My wife and three kids (10-year-old son and twin 7-year-old girls) will testify that I am an introvert who is addicted to quiet moments for self-reflection, but the truth is, it's because I believe I experience what psychologists call an "introvert hangover." The definition distills down to my nervous system being overly stimulated by my three children's gifted vocal cords and endless energy, leading me to seek a quiet place to "self-reflect." Don't get me wrong, my children and wife bring me great joy (yes, I'm purposely writing this on the off chance they read our CTS inspirations) and in various settings, I find myself being an extrovert. Still, perhaps, for now, I do find myself gravitating towards what the Japanese call *shinrin-yoku (shinrin in Japanese means "forest," and yoku means "bath." So shinrin-yoku means bathing in the forest atmosphere, or taking in the forest through our senses)*.

Have you read any good books?

I will be the first to admit that reading a book would not be the first thing I would gravitate to when I have some free time, but as part of my self-growth regimen, I've made it a point to read 1-2 books every month. A list of books that have made a significant impact and that have helped me in my academic, clinical and leadership roles have been: Extreme Ownership by Jocko Willink, Purple Cow by Seth Godin, The Magic of Thinking Big by David Schwartz, Grit by Angela Duckworth, The Laws of Human Nature by Robert Greene, Creating Magic by Lee Cockerell, David and Goliath by Malcolm Gladwell, Relentless by Tim S. Grover and most recently Exponential Organizations by Salim Ismail. These readings led me to want to expand my skill set and knowledge base, which ultimately nudged me to pursue my MBA in healthcare with an additional emphasis on strategic leadership and innovation. Enrolling before the pandemic and having classes through the pandemic was a challenge but again, muttering to myself, "keep your eyes on the prize," leaning on books I have read and many answered prayers was what helped me finish my MBA this summer.

SWJPCC Update

The August 2021 Case of the Month is a case of pulmonary venous infarction following pulmonary vein stenosis occlusion induced by radiofrequency ablation for atrial fibrillation which is a very rare, reported complication. The Medical Image of the Month shows a case of bleomycin-induced pulmonary fibrosis. An 8/5/21 editorial describes the Arizona Thoracic Society support for mandatory COVID-19 vaccination for healthcare workers. The Impact of In Site Education on Management of Cardiac Arrest after Cardiac Surgery shows that clinical behavior can be modified by an education course on special circumstances after cardiac surgery. Lastly, the news article from 8/27/21 echoes warnings from several sources on the probability of increased ivermectin overdosages and a description of the nonspecific signs and symptoms of an overdose.

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Title (Click on title to open the manuscript)	**Journal Section**	**First Author**	**Year**	**Vol**	**Issue**	**Pages**	**Date Posted**
CDC Warns of Increased Ivermectin Overdoses	News	Robbins RA	2021	23	2	62-63	8/27/21
Impact of In Situ Education on Management of Cardiac Arrest after Cardiac Surgery	Critical Care	Gali B	2021	23	2	54-61	8/16/21
Arizona Thoracic Society Supports Mandatory Vaccination of Healthcare Workers	Editorial	Robbins RA	2021	23	2	52-3	8/5/21
Medical Image of the Month: Bleomycin-Induced Pulmonary Fibrosis in a Patient with Lymphoma	Imaging	Dufwenberg MA	2021	23	2	49-51	8/2/21
August 2021 Imaging Case of the Month: Unilateral Peripheral Lung Opacity	Imaging	Gotway MB	2021	23	2	36-48	8/1/21

California Thoracic Society
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