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Uncovering Small Airway Dysfunction in Uncontrolled Asthma

Announcer:

You're listening to *On the Frontlines of Asthma* on ReachMD. And now, here's your host, Dr. Steve Jackson.

Dr. Jackson:

Welcome to *On the Frontlines of Asthma* on ReachMD. I'm Dr. Steve Jackson, and joining me to discuss the role of small airway dysfunction in uncontrolled asthma is Dr. Jonathan Bernstein. He's a Professor of Medicine in the Division of Rheumatology, Allergy and Immunology at the University of Cincinnati College of Medicine.

Dr. Bernstein, thanks for being here today.

Dr. Bernstein:

My pleasure.

Dr. Jackson:

To set the stage, Dr. Bernstein, how would you define uncontrolled asthma? And why do so many patients remain symptomatic despite standard treatment?

Dr. Bernstein:

Patients may not know they have asthma, first and foremost. They may have shortness of breath and tightness in their chest that they just dismiss because it doesn't impact their daily activities. Many times, they might adapt to it. Sometimes they might have had a history as a child, but they felt that they outgrew it or went away, and they aren't really recognizing that they actually do have asthma.

So I think that's the biggest problem—it's subclinical in many cases. It's really not brought out oftentimes until they have a cold and it gets into their chest, and then they're left with a chronic cough that lasts for weeks, and they might seek medical attention. My experience is that I diagnose asthma because they come in with upper respiratory symptoms. They have congestion and drainage, and maybe some allergies or maybe not, or maybe they have non-allergic rhinitis, but then they could get a little tightness with exercise. Or, "If I get a cold, it sticks with me for a long time and I can't shake it." And when you check a peak flow, you see their peak expiratory flow rate's a little bit low. And then you go do regular spirometry, and you see they have significant airway obstruction that has significant reversibility in the large airways as well as in the small airways.

Sometimes patients have a lot of symptoms that are more than what their lung function shows. You check their lung function and it's completely normal, but they complain of a lot of chest tightness, shortness of breath, and coughing. And so we sometimes have to bring out asthma doing something called a methacholine challenge test or a provocation test. And that is a standardized challenge that brings out asthma and allows us to diagnose whether someone has hyperreactive airways.

Dr. Jackson:

Now, what is small airway dysfunction, and why has it been under recognized in asthma care?

Dr. Bernstein:

We have large airways, medium-sized airways, and small airways. The small airways are deep down into the lungs, and they are subject to a lot of different issues. People can have collapsed airways just because of these being such small apertures. But asthma begins in the small airways and works its way up. And I think what people don't recognize is when we look at spirometry, we look at a test called the forced expiratory flow, and it's 25th to 75th percent of exhalation. This is where we can look to see if someone has small airway

obstruction. It's not as specific of a test as we would like, but it gives us an indication that there's small airway obstruction. And many times, we give them a bronchodilator treatment with albuterol, and then we can repeat that test and see that there's a significant increase in their small airways. It goes from maybe 35 percent up to 78 or 80 percent. So that's a significant improvement.

Asthma typically begins in the small airways and then moves up, but it can oftentimes just not be recognized because we have a lot of reserve in our lung function. We don't need a hundred percent of our lung function. People can get by on 50 percent lung function and not even realize it sometimes, even if they're running high. We had Olympic athletes who had severe asthma and 50 percent lung function and were gold medalists. So it's how you condition your accessory muscles, ribs, and diaphragm that will allow you to be effective even if you have significant airway obstruction. But that's the problem with asthma—it is oftentimes an insidious, unrecognized disease by the patient and the physician.

Dr. Jackson:

So how does small airway dysfunction contribute to poor asthma control and ongoing symptoms?

Dr. Bernstein:

That's where you get a lot of airway hyperresponsiveness. There's a lot of twitchy airways there, a lot of coughing, and a lot of shortness of breath. There's airway obstruction, so the air doesn't get down into the small airways where there's air transfer between the alveoli. It's not that far down, but there's obstruction, there's increased mucus, and there's increased smooth muscle. The apertures get blocked due to the inflammation that occurs, and then over time, there's remodeling and deposition of collagen. It's like wound healing in the airways. And so that can sometimes then lead to fixed obstruction. So it's important that we recognize small airway disease so we can treat it effectively and prevent any loss of lung function over time.

Dr. Jackson:

For those just tuning in, you're listening to *On the Frontlines of Asthma* on ReachMD. I'm Dr. Steve Jackson and I'm speaking with Dr. Jonathan Bernstein about small airway dysfunction in patients with asthma.

Dr. Bernstein, if we move onto management, how can clinicians better recognize small airway dysfunction in these patients?

Dr. Bernstein:

Importantly, you want to take a very good history on certain triggers like exercise, cold air, and viruses—they're big triggers. Allergens can be a trigger for asthma. And then I think they want to get objective testing. And typically, as I say, sometimes we do a screening test called a peak expiratory flow rate, which is just a quick inhalation and exhalation through a tube. A meter that gives you an idea of how much airflow you have, and then that sometimes can give you a hint. But it doesn't always give you the information you need, and it's not as accurate as doing spirometry

So we would recommend doing spirometry, and that then measures the FEV₁, your forced expiratory volume in the first second of exhalation. And it also measures the small airways—the FEV_{25-75%}, which is the marker that we use. It's more of a rate than it is a volume, but it does give us a good measurement

And we look at the force; we look at the total lung capacity and the forced vital capacity as well. So we can tell from spirometry whether someone has obstructive lung disease, restrictive lung disease, or a small airway disease, and that will help determine what we want to do in terms of management.

Dr. Jackson:

And how does recognizing small airway dysfunction influence your treatment decisions, especially when it comes to inhaled therapies?

Dr. Bernstein:

Well, a lot of times, depending on what the patient's symptoms are and what their lung function shows, we will determine if we use just an inhaled corticosteroid—which has a small particle size that can get deep down into the airways—or if we need to use something like a combination long-acting bronchodilator with an inhaled corticosteroid. Is that sufficient? So that will determine how they do.

If people have predominantly small airway disease, we might start off with a small particle size inhaled corticosteroid so it gets deep down into those small airways and reduces inflammation and prevents any obstruction from occurring or airway constriction. But if someone has a lot of smooth muscle dysfunction and they may need to add a long-acting bronchodilator, again, there are combination long-acting bronchodilators and inhaled steroids, but not so much as small particle size. So those are not necessarily combined with long-acting bronchodilators at the present time.

Dr. Jackson:

And as we wrap up, Dr. Bernstein, what steps can clinicians take today to better incorporate our understanding of small airway

dysfunction into asthma treatment?

Dr. Bernstein:

I think it's important to really get objective tests to see what's going on in their lungs, and to see if you know how much obstruction patients have and what isn't in their small airways. And then, based on the severity—mild, moderate, or severe—we try to characterize patients that way, and then we can select treatments appropriately. And sometimes patients start off on a combination long-acting bronchodilator and inhaled corticosteroids, which helps them, but they still have a cough. When they take a deep breath in, they might cough still, and they still can notice some deep down congestion. And sometimes, we even will add on a low, small particle size inhaled corticosteroid to that regimen for periods of time to see if that opens things up. There's different nuances and different caveats for using one medicine over another and whether we use them in combination or separately. Part of what a physician experiences with asthma—we'll determine the needs and we'll discuss that with the patient so that there is shared decision making in how they're treated.

Dr. Jackson:

I'll tell you another thing. There are so many patients who need to be counseled better by pharmacists. I'm a pharmacist, and such a large percentage of patients do not know how to correctly inhale.

Dr. Bernstein:

That's true. I think that there's a lot of elements that we take for granted that trivialize, but proper use of inhaler is extremely important. And also understanding the importance of adhering to it, rinsing your mouth out afterwards, and using a spacer device. We try to give patients the means to monitor their disease and give them peak flow meters at home so that they can measure their lung function, make sure it's at the right level, or do it periodically

There's a lot of things that we can do, and certainly, pharmacists are important part of the healthcare process because they have a lot of interaction with patients. It is important that there's a coordinated effort to help reinforce some of these principles.

Dr. Jackson:

That's a great way to round out our discussion, and I want to thank my guest, Dr. Jonathan Bernstein, for joining me to share his perspective on small airway dysfunction and uncontrolled asthma

Dr. Bernstein, thanks so much for being here.

Dr. Bernstein:

Thank you very much for having me.

Announcer:

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