Feasibility of structured light Plethysmography (SLP) in patients with coronavirus disease 2019 (COVID-19)

Natalie Simon¹, Azhar Hussain²*, Priyanka Kolvekar³ and Shyam Kolvekar²

Abstract

As a result of the COVID-19 pandemic, most institutions have changed the way patients are assessed or investigated. Using novel non-contact technology, it is possible to continuously monitor the lung function of peri-operative patients undergoing cardiothoracic procedures. Primarily, this results in increased patient surveillance, and therefore, safety. Many centres, globally, are starting to use structured light plethysmography (SLP) technology, providing a non-aerosol generating procedure in place of traditional spirometry. While more evidence is needed, our clinical usage; previous and on-going studies; demonstrate definite potential that SLP is a valuable tool.

Keywords: Coronavirus, Chest wall deformity

Correspondence: azharhussain@nhs.net

2Thoracic Surgery, Bart’s Heart Centre, St Bartholomews Hospital, London, UK

© The Author(s). 2021 Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated in a credit line to the data.
enrolled 20 patients in our pilot study comparing the feasibility of SLP measurements as parameters indicative for lung function. Our initial results demonstrated a correlation between the IE50\textsubscript{SLP} (inspiratory to expiratory flow at 50% tidal volume) measurement and the forced expiratory volume in the first second of expiration ($p = 0.021$, $r = -0.62$). We feel it is intuitive to use and, therefore, does not require trained technicians, resulting in increased patient throughput and lower costs to the department. Care efficiency also improves as the time-per-appointment is reduced, benefitting patient wait times and increasing satisfaction. Importantly, SLP offers clinicians continuous measurement of mechanical chest wall displacement, a surrogate marker for fatigability and neuromuscular strength.

For the aforementioned reasons, we feel that SLP is a viable alternative to spirometry, especially in the current pandemic. Spirometry remains the gold-standard PFT, however, and the field would certainly benefit from studies evaluating the sensitivity, specificity and clinical validity of SLP in impairment detection, against gold-standard PFT.

**Abbreviations**
COVID-19: Coronavirus disease; SLP: Structure light plethysmography; PFT: Pulmonary function tests; COPD: Chronic obstructive pulmonary disease

**Acknowledgements**
Not applicable.

**Authors’ contributions**
NS wrote the initial draft. All authors were involved in the concept and editing of the final version. The author(s) read and approved the final manuscript.

**Funding**
No funding was received for this.

**Availability of data and materials**
Not applicable.

**Declarations**

**Ethics approval and consent to participate**
Ethics approval was waived.

**Consent for publication**
Not applicable.

**Competing interests**
The authors declare they have no competing interests.

**Author details**
1Cambridge University NHS Foundation Trust, Cambridge, UK. 2Thoracic Surgery, Bart’s Heart Centre, St Bartholomew’s Hospital, London, UK. 3University of Warwick, Coventry, UK.

Received: 11 January 2021 Accepted: 18 February 2021 Published online: 03 March 2021

**Reference**
1. Motamedi-Fakhr S, Iles R, Barney A, De Boer W, Conlon J, Khalid A, Wilson RC. Evaluation of the agreement of tidal breathing parameters measures simultaneously using pneumotachography and structured light plethysmography. Physiol Rep. 2017;5(3):e13124. https://doi.org/10.14814/phy2.13124.

**Publisher’s Note**
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.