Monitoring at Home Before and After Tonsillectomy

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Introduction: Tonsillectomy and/or adenoidectomy (T/A) are commonly performed procedures. The most common indication for surgery is suspected or diagnosed Obstructive Sleep Apnea (OSA). Polysomnography (PSG) is the gold standard for diagnosing and assessing OSA [1]. While pulse oximetry is part of the standard monitoring used during PSG, its potential as a standalone tool to diagnose those patients most at risk of post-operative respiratory events has been investigated but is yet to be fully realized [2]. We aim to determine the feasibility of using the Phone Oximeter-OSA app to monitor children at home before and after T/A procedures.

Methods: Following Research Ethics Board approval and informed consent, children from 3 months to 17 years of age, undergoing T/A, were enrolled in this study. A Masimo pulse oximetry sensor (LNCS Inf-3TM) was attached to the participant's big toe and connected to the Phone Oximeter. Overnight pulse oximetry data was collected on the Phone Oximeter-OSA app for three nights at home before surgery, as well as three consecutive nights immediately post-surgery at home or in the hospital, if admitted. The app records heart rate, blood oxygen saturation (SpO_2), photoplethysmography and signal quality index (SQI). Pre and post-operative recordings lasting at least 5 hours, with a SQI exceeding 80 were considered successful. The best preoperative recording was chosen and the following features were characterized in 1-min signal segments: the average SpO_2 signal (SpO_{2ave}), the cumulative time spent below 94% (t94%), and the number of SpO_2 desaturations >3% below baseline (n3%). In order to evaluate overnight SpO_2 dynamics the mean of each feature were compared using the Mann-Whitney U test.

Results: Pre-operative recordings have been completed for 60 participants thus far; 97% had at least one successful recording. Participants were stratified into two groups based on their post-op disposition: admitted for overnight monitoring or discharged home. No significant differences in the means of SpO_{2ave} (mean difference = .101), n3% (mean difference = .011) or t94% (mean difference = .978) were found between groups. Additionally, no significant differences in the above mentioned parameters were found between participants diagnosed with SDB (n=47) versus those without SDB (n=10).

Conclusion: The initial phase of the study has shown that it is feasible to obtain recordings of sufficient quality at home; however SpO_2 characterization features are not well correlated with a clinical diagnosis of OSA. This finding is not surprising as clinical history alone may not be able

to diagnose and determine OSA severity. Hence determining the best post-op disposition for children undergoing T/A is rather arbitrary. Further research into the use of OSA risk scores to assist with minimizing post-operative risk and assisting clinicians in management of T/A cases warrants further investigation.

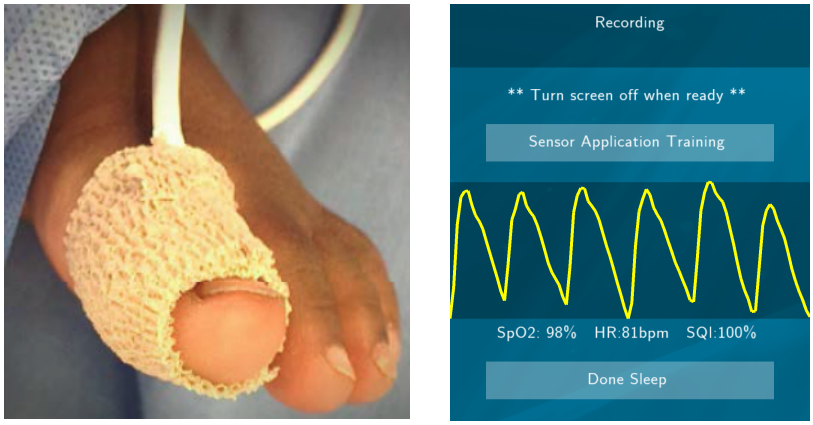

Figure 1: (a) Placement of the Masimo pulse oximetry sensor on the big toe. (b) Recording panel on the Phone Oximeter-OSA app including SpO_2, heart rate, photoplethysmography and SQI.

[1] Laryngoscope 123(10):254453, [2] J Clinic Sleep Med 2(2):145–53