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CAN BREATH HOLDING REFLECT PREOPERATIVE RISK OF PATIENTS UNDERGOING SURGICAL LUNG RESECTIONS?
Marius Roman1, M. Gregory2, M. Thompson1, A. Majewski3, E. Addae-Boateng1, J. Thorpe1, R. Kapila3, J. Duffy1
1Department of Thoracic Surgery, Nottingham City Hospital, Nottingham, United Kingdom; 2Department of Physiotherapy, Nottingham City Hospital, Nottingham, United Kingdom; 3Department of Anaesthetics, Nottingham City Hospital, Nottingham, United Kingdom

Objectives: Breath hold time is dependent on cardiorespiratory function and willpower. Voluntary and involuntary breaking points determine the breath hold time, with the voluntary threshold being dependent on willpower. Willpower and training have been shown to override the voluntary breaking point in deep water free divers and pearl divers.

Methods: Sixteen patients undergoing VATS or open lobectomy were assessed preoperatively by triplicate measurements of end-expiratory breath hold time. Oxygen desaturation was measured for 5 min following each breath hold with a standard pulse-oximeter. The breath hold time and desaturation were compared with spirometry and shuttle walk test results. The patients were divided into 3 groups based on the average breath holding time: <20 s, 20-40 s and >40 s. The Pearson test and two-way ANOVA were used.

Results: In this prospective cohort, positive correlation trends were found between breath hold time and FEV1/FVC ratio (R square = 0.69, 0.8; P = 0.04, 0.14) in the 20-40 and >40 s groups respectively. In the <20 s group this correlated with the TLCO (R square = 0.65, P = 0.09). The breath hold oxygen desaturation correlated with the breath hold time (R square = 0.58, P = 0.02), and reflected the shuttle walk distance and exercise desaturation only in the >40 s group (R square = 0.94, 0.51; P = 0.14, 0.48). There was no difference between the spirometry (P = 0.17) and shuttle walk test results (P = 0.79) between the three groups. Patients with significant desaturation (>5%) were observed in both 20-40 and >40 s groups.

Conclusion: Testing the breath hold time correlates with both lung function and exercise tolerance. In the worst performing group, it is more likely to reflect gas transfer than lung volumes. Willpower could influence both the results of the breath holding time, spirometry and exercise testing. Breath holding, as a surrogate marker of lung function and willpower could influence preoperative planning and risk assessment of patients undergoing lung resection.

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