

The Effects of Different Incentive Spirometry Breathing Methods on Pulmonary Function and Heart Rate Variability in Patients after Cardiac Surgery

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摘要

誘導型肺計量器普遍應用於心臟手術後病人，作為促進換氣與肺部擴張的方法；臨床實際發現病人操作時深呼吸作法大多是採取動用肩頸及胸廓的胸式呼吸，而不是運用腹式呼吸。本研究目的為比較腹式呼吸法與胸式呼吸法操作誘導型肺計量器在心臟手術後病人肺功能及心率變異影響之差異。採實驗性設計，選取南部某兩所醫學中心心臟手術病人共 31 位，以抽籤方式分為兩組；組一介入腹式呼吸法操作誘導型肺計量器，組二則觀察並確認使用胸式呼吸法操作誘導型肺計量器。收集手術前、手術後轉入病房第一天與第三天之肺功能，以及每日測量兩次誘導型肺計量器操作前及操作後的心率變異。以重複測量變異數分析檢視兩組在不同時間點肺功能以及心率變異改變量之變化。結果顯示兩組的用力肺活量百分比預測值在時間與組別上出現交互作用 ($F=9.233$; $p<.05$)，腹式呼吸組比胸式呼吸組能降低低頻功率比 ($F=12.006$; $p<.05$)、低高頻功率比 ($F=7.664$; $p<.05$) 以及增加高頻功率比 ($F=12.006$; $p<.05$)。本研究驗證使用腹式呼吸法比使用胸式呼吸法操作誘導型肺計量器的肺功能恢復程度較佳，且能增加副交感神經驅動並降低交感神經驅動。

Abstract

Incentive spirometry is commonly used to prevent postoperative lung atelectasis and pulmonary complications in cardiac surgery patients. However, when incentive spirometry is used clinically, patients frequently breathe by chest stretching until reminded by clinical experts to breath abdominally. This study examined the effect of different breathing methods on pulmonary function and heart rate variability in cardiac surgery patients using incentive spirometry. An experimental design was utilized for research in which 31 patients undergoing median sternotomy for cardiac surgery from two medical centers in southern Taiwan were invited to participate. Group 1 ($n=16$) received abdominal breathing as their incentive spirometry intervention. Group 2 ($n=15$) used incentive spirometry with thoracic breathing method. Both groups received three pulmonary function tests administered, respectively, prior to the operation and on the 1st and 3rd day in the general ward. Heart rate variability was measured twice per day beginning on the day before the operation and ending three days after being transferred to the general ward after receiving incentive spirometry. Data were analyzed using repeated measures ANOVA. Results showed significant interaction between time and group in the % FVC pred ($F=9.233$; $p<.05$). Additionally, when using incentive spirometry, LF%

($F=12.006$; $p<.05$) and LF/HF ratio ($F=7.664$; $p<.05$) were reduced, and HF% ($F=12.006$; $p<.05$) was enhanced during abdominal breathing as compared with thoracic breathing. The present study demonstrated optimal lung function recovery and also reflected a shift to the dominance of parasympathetic nerves regulation in using abdominal breathing rather than thoracic breathing with the application of incentive spirometry.