The effects of eccentric and concentric exercise training on muscle strength in COPD: Preliminary results

Riany Sena 1,2, Jacinthe Baril 1, Sophia Kapchinsky 1, Norah MacMillan 1, Danielle Vieira Rocha 1, Richard Ruddy 1, Helen Pernault 1, Taivassalo Tanja 1, Jean Bourbeau 1, 2. 1Respiratory Epidemiology and Clinical Research Unit, McGill University, Montreal, Canada; 2Physiotherapy, University of Fortaleza, Brazil.

Since in eccentric exercise greater force is produced at a reduced oxygen cost, this modality of exercise could be attractive for pulmonary rehabilitation of severe COPD patients.

Objective: To estimate the extent to which eccentric compared to concentric exercise training produces greater increases in quadriceps force, and leads to better improvements in hamstring force, exercise capacity and physical activity.

Methods: Pilot randomized clinical trial in which COPD patients were randomly assigned to either a concentric (CON) or eccentric (ECC) cycling protocol, 3 sessions/week for 10 weeks. In the CON group, target training intensity was set as 80% of peak work rate (Wmax) while in the ECC group the target intensity was set as 4-times 80% of baseline Wmax. Lung function, muscle strength (Biodex), maximal work capacity (Wmax) and physical activity (Armband) were assessed.

Results: Preliminary analysis included 11 male COPD patients (69 ± 6 years; FEV1: 41 ± 10%pred; BMI: 27 ± 6 kg.m-2). After 10 weeks of training, isometric quadriceps force was 14% (20Nm) [95%CI: 2-26%, p=0.03] and concentric hamstring force was 27% (14Nm) [95%CI: 2-50%, p=0.03] higher in the ECC. A trend for greater improvements in concentric quadriceps force was observed only in the ECC group (ECC=16% of change, p=0.06 vs CON=1%,p=0.6). Both ECC and CON training yielded similar improvements in Wmax (ECC 18%,p=0.01 vs CON 16%; p= 0.03). Steps/day remained unchanged (p > 0.05) in both groups.

Conclusion: Preliminary results show a trend for greater improvements in quadriceps muscle force with ECC compared to CON training in severe COPD patients.

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Acute effect of chest wall muscle stretching on chest wall volumes distribution in chronic obstructive pulmonary disease: A randomized controlled trial

Rafaela Sá 1, Shirley Campos 1, Maira Pessoa 1, Ana Gabriela Cavalcanti 1, Cyda Reinaux 1, Catarina Rattes 1, Guilherme Fregonezi 1, Andrea Aliverti 2, Armelé Dornelas de Andrade 1. 1Dept. Fisioterapia, Universidade Federal de Pernambuco, Recife, Brazil; 2Dept. Fisioterapia, Universidade Federal do Rio Grande do Norte, Natal, Brazil

Inspiratory muscles function is compromised in COPD due to increased loads, reduced mechanical advantage, and increased ventilatory requirements. The hyper-inflation of COPD reduces the flow and pressure-generating capacity of the diaphragm

Aims: To analyze the acute effects of chest wall muscle stretching on chest wall volumes distribution in subjects with COPD.

Methods: It was a randomized controlled trial, involving 28 COPD patients divided into two groups: 14 subjects to treatment group (TG, mean age 61.79 ± 8.31years) and 14 to control group (CG, 62.38 ± 8.33years). TG was composed for patients that received a program of chest wall muscle stretching and patients allocated in CG remained at rest in the similar conditions as in GT. Respiratory variables were measured during quiet breathing by Opto-Electronic plethysmography (OEP) before and after one intervention. Statistical analysis was performed using independent samples t-test.

Results: Tidal volume (Vt) presented a significant increase immediately after the chest wall muscle stretching in rib cage pulmonary compartment (Vlrcp, p=0.02), in rib cage abdominal compartment (Vlrca, p=0.04) and their percentages regarding thoracic wall, Vlrcp% (p=0.04) and Vlrca% (p=0.02). Thus, there was a significant increase in the rib cage compartiment.
a reduction in respiratory rate (p=0.011) and minute ventilation (p=0.03), and a increase in a respiratory time p=0.026).

Conclusions: The chest wall muscle stretching has been beneficial on chest wall volume distribution in patients with COPD. For reason, this technique should be considered to treat these patients.

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**P484**

Physiological performance of patients with COPD during activities of daily living after a physical training with and without inspiratory muscle training;

**P485**

Effect of positive expiratory pressure on sternocleidomastoid and parasternal muscle in patients with COPD: A randomized clinical trial

**Table 1**

<table>
<thead>
<tr>
<th>GPT/GPT+IMT</th>
<th>∆VE (L/min)</th>
<th>∆VO2 (ml/kg/min)</th>
<th>∆ Borg</th>
<th>∆SpO2 (%)</th>
<th>∆Time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-3.3 ± 4.1 - 11.3</td>
<td>-8.7 ± 6.4 - 14.1</td>
<td>-1.1 ± 1.1 - 1</td>
<td>+2.8 ± 4.4 ± 2</td>
<td>-900.36 - 87.49</td>
</tr>
<tr>
<td>2</td>
<td>+1.1 ± 3.3 - 10.3</td>
<td>-5.6 ± 2.6 - 11.2</td>
<td>+2.1 ± 2.2 + 3</td>
<td>-692.89 -110.2 ± 37</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-1.2 ± 10.3 - 10.3</td>
<td>-6.8 ± 5.6 - 11.2</td>
<td>+1.2 ± 2.4 + 2</td>
<td>-981.80 -114.6 ± 66</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>+1.1 ± 3.3 - 11.3</td>
<td>-7.5 ± 6.5 - 11.2</td>
<td>+2.3 ± 2.4 + 2</td>
<td>-9.1 ± 100 -158.7 ± 77</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>-1.2 ± 3.3 - 11.3</td>
<td>-5.7 ± 4.5 - 11.2</td>
<td>+2.3 ± 2.4 + 2</td>
<td>-100.12 -165.6 ± 86</td>
<td></td>
</tr>
</tbody>
</table>

**Introduction:** Chronic obstructive pulmonary disease (COPD) leads to chronic airway obstruction and air trapping, affecting diaphragmatic action and placing it at a mechanical disadvantage, requiring the recruitment of accessory muscles.

**Objective:** To investigate the effect of 10 and 15 cmH2O EPAP on the activity of sternocleidomastoid (SCM) and parasternal muscles in patients with stable COPD.

**Methods:** A randomized clinical trial with twenty-one COPD patients. Subjects were randomly allocated to two groups: 10 cmH2O Group (n=10) and a 15 cmH2O Group (n=11). We evaluated the electromyographic (EMG) activity of SCM and parasternal muscles in spontaneous breathing (Pre-EPAP), during application of EPAP by face mask for 20 minutes, and for 10 minutes after mask removal (Post-EPAP).

**Results:** The application of 10 cmH2O EPAP promoted reduction EMG activity in the SCM muscle (p<0.001) and increased parasternal muscle activity (p=0.001). The group submitted to 15 cmH2O EPAP showed a tendency towards greater EMG activity in the SCM muscle and a significant decrease in activity of the parasternal muscle (p=0.005).

**Conclusions:** In patients with stable COPD, 10 cmH2O EPAP induced a significant decrease in activity of the inspiratory accessory muscle and increased parasternal muscle activity after the application. This may be of practical benefit to reverse the extensive use of the chest wall muscles and reduce their mechanical disadvantage in patients with COPD.

**P486**

Does tolerance of neuro-muscular electrical stimulation (NMES) relate to gender in patients with an acute exacerbation (AE) of chronic obstructive pulmonary disease (COPD)?

Emma Chang1, Linzy Houchen1, Neil Greening1, Theresa Harvey-Dunstan1, Michael Steemer1, Sally Singh1,2, 3Pulmonary Rehabilitation, Glenfield Hospital, Leicester United Kingdom; 2Faculty of Health and Life Sciences, Coventry University, Coventry, United Kingdom

**Introduction:** The maximum intensity tolerated using NMES is relatively unknown in patients with an AECOPD. Previous data suggest that healthy males are able to tolerate higher intensities than females. The aim of this study was to compare the tolerance of NMES in patients admitted with an AECOPD between males and females.

**Methods:** 188 patients hospitalised with an AECOPD were recruited [85 male, MRC: 4 (IQR 4-5), mean SD age 70.7 ±(9.3) years, FEV1 1.38L ±0.71L, BMI 26.7(7.0)]. All patients were paroxysmal daily to both quadriceps muscles (30 mins, frequency 50Hz, pulse duration 300usec) for the duration of hospital stay.

**Results:** 175 patients completed the NMES intervention. A statistically significant difference between genders was seen in the intensity tolerated at both baseline and at discharge (< p= 0.01) as well as change in intensity. This change remained significantly different when correcting for baseline intensity (p=0.001) There was no significant difference in the number of sessions completed during hospitalisation between genders.

**Conclusion:** The intensity of NMES is tolerated at significantly higher levels in males. This may have clinical implications for NMES prescription and relate to outcome measures (eg. strength).

**P487**

Responsiveness of different multidimensional severity indices to pulmonary rehabilitation in patients with COPD

Rafael Mesquita1, 2, Nádia Araujo-Hernandes1, 2, Thais Sant’Anna1, 2, Vanessa Suzane Probst1, 2, Fábio Pita1, 3Centro de Pesquisa em Ciências da Saúde (CPCS), Centro de Ciências Biológicas e da Saúde (CCBS), Universidade Norte do Paraná (UNOPAR), Londrina, Brazil; 2Fisioterapia Pulmonar (LFP), Departamento de Fisioterapia, Universidade Estadual de Londrina (UEL), Londrina, Brazil

**Background:** Multidimensional indices have been used to assess disease severity in patients with COPD. The responsiveness of these indices to pulmonary rehabilitation (PR) needs to be better investigated.

**Objective:** To evaluate the responsiveness of five multidimensional severity indices to PR in patients with COPD.

**Methods:** 35 patients with COPD (17 men, 66±8 years, FEV1 43±16%pred) participated in a PR program of high-intensity endurance and strength training during 3 months. Demographic data, lung function (spirometry), exercise capacity (six-minute walking test [6MWT] and incremental shuttle walking test [ISWT]), dyspnea (Medical Research Council [MRC] scale) and quality of life (St George Respiratory Questionnaire [SGRQ]) were assessed before and after the program, and the following indices were calculated: BODE, SAFE, updated BODE (ubBODE), ADO and i-BODE.

**Results:** Age, distance walked in the 6MWT and SGRQ score were the only components of the indices which changed after PR (p<0.05 for all). Table 1 summarizes the responsiveness of the indices to PR.

**Table 1**

<table>
<thead>
<tr>
<th>Pre-PR</th>
<th>Post-PR</th>
<th>p value</th>
<th>Standardized Response Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>BODE</td>
<td>4.29 ± 1.84</td>
<td>4.17 ± 1.49</td>
<td>0.66</td>
</tr>
<tr>
<td>SAFE</td>
<td>4.1 ± 2.5</td>
<td>3.1 ± 0.7</td>
<td>0.07</td>
</tr>
<tr>
<td>ubBODE</td>
<td>3.2 ± 3.5</td>
<td>4.2 ± 0.4</td>
<td>0.47</td>
</tr>
<tr>
<td>ADO</td>
<td>4.89 ± 1.55</td>
<td>4.89 ± 1.39</td>
<td>1.00</td>
</tr>
<tr>
<td>i-BODE</td>
<td>4.31 ± 1.89</td>
<td>4.62 ± 1.50</td>
<td>0.34</td>
</tr>
</tbody>
</table>

The percentage of subjects that decreased their score (i.e., improvement) in the BODE, SAFE, ubBODE, ADO and i-BODE was 23%, 49%, 20% and 23%, respectively (p<0.05).

**Conclusions:** These preliminary findings indicate that the severity indices evaluated in patients with COPD in this study present very modest responsiveness to pulmonary rehabilitation, despite the improvement in some of its components.
P488
Where are they now? Four years after the completion of a maintenance exercise program in people with COPD
Luisa Spencer, Zoe McKeough, Jennifer Alison. Physiotherapy Department, Royal Prince Alfred Hospital, Sydney, NSW, Australia Discipline Physiotherapy, University Sydney, Sydney, Australia; and Discipline Physiotherapy, University Sydney, NSW, Australia
Introduction: To determine if quality of life and exercise capacity had been maintained four years after the completion of a 12-months maintenance exercise program (MEP) that followed an eight-week pulmonary rehabilitation program (PRP), in people with COPD.
Methods: At the completion of the 12 month MEP, participants had maintained exercise capacity and quality of life and were instructed to continue with un-supervised exercise without further follow-up. Four years later participants were invited to be reassessed with spirometry, two six-minute walk tests (6MWT), St George’s Respiratory Questionnaire (SGRQ) and the Health and Activity Survey (HAAS). Daily Physical Activity (PA) was also measured using the SenseWear Pro 3 armband.
Results: Seventy-four of the 48 (79%) who completed the MEP were reassessed at four years [mean (SD): age 70 (8); males 22; BMI 26 (6); smokers 14%]. Results compared to the end of the MEP [mean difference (95%CI)] showed a maintenance of SGRQ [2.5 (-4.4 to 9); p=0.43] with a decline in 6MWT [65m (-25 to -86) p<0.001] and PLV1% predicted [8 (% 4 to -12); p<0.001]. The HAAS showed that 64% reported performing regular exercise and 71% were physically active. For 22 participants (60%) who wore the armband the daily step count and time spent at or above a moderate level of physical activity (% 3 METS) was mean (SD) 5,522 steps (3,603) and 65 (62) minutes per day, respectively.
Conclusion: Four years following a PRP plus a 12-month MEP people with COPD had maintained quality of life but showed a significant decline in exercise capacity.

P489
Effect of aerobic exercise training on bronchial hyperresponsiveness, airway inflammation and health related quality of life in asthmatic patients: A pilot study
Andrezza Pinto 1, Felipe Mendes 2, Rosana Agodi 1
Background: Recent studies have shown that aerobic training (AT) have anti-inflammatory effect in asthmatics patients; however, there is a lack of studies addressing the effect of AT in bronchial hyperresponsiveness (BHR).
Objective: To evaluate the effects of AT on BHR, airway inflammation and health related quality of life in patients with moderate and severe asthma.
Methods: This prospective, randomized, single-blind and controlled study included 25 patients with controlled asthma (41.6±10.5yrs-old; FEV1=81.0±15.1% predicted), randomly divided into Control (CG=15) or Training groups (TG=10). Patients were studied between 2 medical consultations. Both groups performed educational program and placebo treatment, but only TG performed AT twice a week, during 3 months. BHR was assessed with histamine, airway inflammation by nitric oxide (eNO) levels and health related quality of life with AQLQ questionnaire. These endpoints were evaluated before and after treatment and patients did not modify medication. Two-way ANOVA test was used and a significance level of 5% was set (p<0.05).
Results: After AT program, only the TG showed a decrease in eNO values (from 36.0±10.2 to 25.9±10.7 ppb; p<0.05) and an improvement in AQLQ (from 4.5±1.58 to 5.7±1.09 score; p<0.05). In contrast, no change in BHR was observed in both groups (p>0.05).
Conclusion: Our results suggest that aerobic conditioning reduces airway inflammation and improves the quality of life in asthmatic patients but does not modify bronchial hyperresponsiveness.

P490
Differences between smokers who completed or dropped out of a program to increase daily physical activity
Malayra Peopong 1, Juliana Gomes Zabatiero 1, Demetria Koveliu 1, Leandro Cruz Maintanlo 2, Katia Group Souraetuto 1, Andrea Akemi Morita 1, Gianna Keltren Waldrich Biscla 1, Fabio Pita 1, 1Laboratórios de Pesquisa em Fisioterapia Pulsar (LFPF), Departamento de Fisioterapia, Universidade Estadual de Londrina (UEL), Londrina, PR, Brazil; 2Departmento de Fisioterapia, Universidade Estadual do Norte do Parauá, Jacarécezinho, PR, Brazil
Background: Initiatives to increase physical activity in daily life (PADL) of smokers are important, although interventions in this population are frequently characterized by high dropout rates.
Objectives: To investigate and compare the characteristics of smokers who completed or dropped out of a program to increase PADL.
Methods: 105 smokers with normal lung function started a 5-month program which aimed at increasing PADL, by using pedometers (DigiWalker SW-200 Ya-max) in order to achieve a target of 10000 steps/day. Participants responded to questionnaires concerning smoking history (cigarettes/day and pack-years index), quality of life (SF-36) and anxiety and depression symptoms (State-Trait Anxiety Inventory and Beck Depression Inventory, respectively). Lung function (spirometry) and functional exercise capacity (6-minute walking test) were also assessed, besides baseline PADL assessment with a pedometer for six days.
Results: When comparing smokers who completed the program (n=54; 27 male) with those who dropped out (n=51; 16 male), there were significant differences concerning age (51±7 vs 45±11 years; p<0.05; median [IQR]; pack-years (35 [19-47] vs 23 [13-40]); respectively, p<0.05), PADL (8746 [6509-11029] vs 7226 [4000-9120] steps/day; respective; p=0.01) and most SF-36 dimensions, especially physical function (90 [80-101] vs 85 [64-91]; respectively; p=0.005).
Conclusions: Smokers who dropped out of the program were younger, physically less active and with worse quality of life than those who completed it. In protocols aiming at increasing daily physical activity of smokers, strategies must be developed to avoid these target subjects to dropout.

P491
Inspiratory muscle training in obstructive sleep apnea syndrome
Hulya Arikan 1, Nurel Bellur 1, Hakan Caliskan 1, Melda Saglam 1, Naciye Vardar-Yagil 1, Ebru Calik 1, Deniz Inal-Incel 1, Sema Savci 2, Melike Yuce Ege 1, Hikmet Firal 1, Sadik Ardic 1, Department of Physiotherapy and Rehabilitation, Hacettepe Universiten, Faculty of Health Sciences, Ankara, Turkey; 2School of Physiotherapy and Rehabilitation, Dokuz Eylul University, Izmir, Turkey; 3Department of Chest Medicine and Sleep Center, Diskapili Vidirman Buyezyd Education and Research Hospital, Ankara, Turkey
Background: No information is known about the role of inspiratory muscle training in patients with obstructive sleep apnea syndrome (OSAS). The purpose of this study was to investigate the effects of inspiratory muscle training on respiratory muscle strength, polysomnographic results, snoring, and sleep quality in patients with OSAS.
Materials and methods: Twenty-seven OSAS patients were randomly assigned to one of two groups: 15 patients in the training group and 12 patients in the control group. The patients in training group underwent a 12-week inspiratory muscle training program (30-80% of their maximal inspiratory pressures, MIP) using a threshold loading device for 30 minutes per day, seven days per week. The patients in the control group underwent standard medical treatment. In all patients, respiratory muscle strength (MIP, maximal expiratory pressure, MEP) was determined. Polysomnography recordings, snoring (The Berlin Questionnaire), and quality of life (The Functional Outcome of Sleep Questionnaire, FOSQ) were also evaluated before and after the treatment.
Results: No significant differences were found between the two groups with regard to age, gender, and body mass index (p>0.05). After 12 weeks of inspiratory muscle training program, there were significant improvements in MIP, MEP, and total score of FOSQ compared with the control group (p<0.05). The presence of snoring, snoring frequency and severity decreased significantly after inspiratory muscle training (p<0.05).
Conclusions: Inspiratory muscle training ensures significant benefits in respiratory muscle strength, quality of life, and snoring for OSAS patients. It should be taken into consideration for the management of the patients.

P492
Effects of oropharyngeal exercises on antropometric measures and symptoms in patients with obstructive sleep apnea syndrome
Nurel Bellur 1, Hulya Arikan 1, Hakan Caliskan 1, Ebru Calik 1, Naciye Vardar-Yagil 1, Melda Saglam 1, Sema Savci 2, Deniz Inal-Incel 1, Melike Yuce Ege 1, Hikmet Firal 1, Sadik Ardic 1, Department of Physiotherapy and Rehabilitation, Hacettepe Universiten, Faculty of Health Sciences, Ankara, Turkey; 2School of Physiotherapy and Rehabilitation, Dokuz Eylul University, Izmir, Turkey; 3Department of Chest Medicine and Sleep Center, Diskapili Vidirman Buyezyd Education and Research Hospital, Ankara, Turkey
Background and aim: Upper airway muscle function plays a major role in the maintenance of upper airway patency and contributes to the obstructive sleep apnea syndrome (OSAS). The aim of this study was to determine the impact of oropharyngeal exercises on antropometric measures and symptoms in patients with OSAS.
Materials and methods: Twenty-six patients with OSAS were randomized to 3 months of a set of oropharyngeal exercises (n=14, 53.7±7.1 years), or control group as standard medical treatment (n=12, 47.3±7.3 years). Anthropometric measurements (neck and abdominal circumference) were measured. Snoring frequency (range 0–4), intensity (1–3), Epworth Daytime Sleepiness score (0–24) and Pittsburg Sleep Quality score (0–21) were determined, and full polysomnography were performed at baseline and at the end of the intervention.
Results: No significant difference was found in baseline characteristics between the groups (p>0.05). Body mass index and abdominal circumference did not change significantly over the study period (p>0.05). Patients undergoing oropharyngeal exercises had a significant decrease in neck circumference (-1.04±0.97 vs. 0.08±1.18 cm), snoring frequency (-2.3±0.7 vs. 1.1±0.3), snoring intensity (-3.2±1.1 vs. 0.3±0.0), daytime sleepiness (-6.2±4.8 vs. 0.2±4.1), sleep quality score (-4.6±3.6 vs. -1.5±1.3) as compared with the control group (p<0.05).

Poster Discussion Room C8 - 10:45 - 12:45
SUNDAY, SEPTEMBER 2ND 2012
Conclusions: Oropharyngeal exercises significantly reduce antropometric measurements and symptoms in patients with OSAS. They represent a promising treatment for OSAS.

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Physical activity promotes pulmonary recovery after cardiac surgery
Marcus Jonsson1, Elisabeth Westerdahl1,2,3, Department of Physiology, Örebro University Hospital, Örebro, Sweden; 2School of Health and Medical Sciences, Örebro University, Örebro, Sweden; 2Department of Medical Sciences, Uppsala University, Uppsala, Sweden

Introduction: It is well known that physical activity has substantial impact on general health and mortality. Benefits of physical activity have been reported for patients after cardiac surgery. Patients undergoing cardiac surgery have reduced lung function postoperatively and often suffer from postoperative pulmonary complications.

No studies have been published where the relationship between physical activity and lung function after cardiac surgery has been investigated.

Aim: To test the hypothesis that physical activity is positively correlated with pulmonary recovery, the relationship between postoperative self-reported physical activity and lung function, two months after cardiac surgery, was investigated.

Methods: In a prospective cohort study, a sample of 76 patients undergoing cardiac surgery between 2007 and 2009, was followed up two months after cardiac surgery. Physical activity level was quantified using a categorical question on physical activity at work and during leisure time. Lung function was measured by spirometry. The measurements were made preoperatively and 2 months postoperatively.

Result: Two months postoperatively the patients had increased their self-reported level of physical activity. Patients with a higher level of physical activity showed a significantly better recovery of lung function two months after cardiac surgery (VC 95% ± 11 vs 91% ± 7 (p=0.043) and FEV1 93% ± 8 vs 89% ± 6 (p=0.008)) compared to patients reporting low physical activity.

Conclusion: A higher level of physical activity, during the first two months after cardiac surgery is associated with a better recovery of lung function, compared to being less active or sedentary.

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Cardiac autonomic responses exercise-induced during inpatient cardiac rehabilitation in patients undergoing CABG and left ventricular function different
Renata G. Mendes1, Rodrigo P. Simões1, Fernando S.M. Costa 1, Camila B.F. Pantoni1, Luciana Di Thommao1, Sergio Luzza2, Olman Amaral-Neto3, Apaaguda M. Catala1, Ross Arena 1, Audrey Bonilha 1, Emanuele Pedron2,1, Cardiology Department, Irmandade Santa Casa Misericordia Hospital, 2Cardiology Department, Federal University of New Mexico, Albuquerque, NM, United States

Introduction: Patients undergoing coronary artery bypass graft (CABG) with reduced left ventricular function (LVF) are those who experience greater cardiac autonomic adaptation at rest after inpatient cardiac rehabilitation (CR). However, the acute cardiac autonomic response (CAR) during exercise remains to be investigated.

Aim: To assess whether physical exercises can evoke beneficial CAR in post-CABG patients with different LVF.

Methods: Forty-four patients, divided into LVF normal (LVFN, n=23) composed of patients with left ventricular ejection fraction (LVEF) ≥ 55% and LVF reduced group (LVFR, n=21) with LVEF = 35–54% were evaluated. CAR was assessed by heart rate variability (HRV) during extremity ROM exercises and ambulation on treadmill in random order.

Conclusion: A higher level of physical activity, during the first two months after cardiac surgery is associated with a better recovery of lung function, compared to being less active or sedentary.

P496

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Conclusion: A higher level of physical activity, during the first two months after cardiac surgery is associated with a better recovery of lung function, compared to being less active or sedentary.

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Respiratory muscle training is safe and effective in malnourished patients
Adriana Lounesi, Murakami Fernanda, Carol Fagundins, Carvalho Celso.

Respiratory Therapy, School of Medicine of University of Sao Paulo, SP, Brazil

Malnutrition is prevalent in 50% of hospitalized patients worldwide and causes systemic damage, including the respiratory system and muscles and leading to increased predisposition to infections and respiratory muscle weakness. The safety and effectiveness of respiratory muscle training in this population is poorly studied.

Objectives: To assess the effects of specific respiratory muscle training in malnourished patients.

Methods: This prospective, randomized and controlled study enrolled 29 malnourished patients with no previous pulmonary disease (BMI<20Kg/m² and serum albumin<3.5g/dL). Patients were randomly divided into 3 groups: sham training (CG, n=10), inspiratory (ITG, n=10) and expiratory (ETG, n=9) training. The intensity of ITG and ETG training was at 30% of maximal inspiratory or expiratory pressure (respectively, MIP and MEP). Training sessions were conducted daily in the afternoon for 30 minutes (3 sessions of 10 min, during 7 days) using the threshold ITM® or MEP®. All patients received the same nutritional support. Maximal inspiratory pressures and lung function was evaluated before and after the protocols. The evaluator was blinded to patient’s group. Two way repeated measures ANOVA and post hoc Newman-Keuls test were performed and significance level was set at 5%.

Results: All groups were similar in gender, age, BMI and serum albumin. No patient demonstrated any signs of respiratory distress. After training period, there was increase in MIP in the ITG (59.9±25.8 x 107.9±52.6cmH2O; p=0.02) and MEP in the ETG (46.5±12.9 x 81.1±23.2cmH2O; p=0.01) compared to CG.

Conclusion: The respiratory muscle training is safe in malnourished patients and promotes a specific increase in the trained muscle.
SUNDAY, SEPTEMBER 2ND 2012

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Feasibility of neuromuscular electrical stimulation (NMES) on the intensive care unit (ICU): Preliminary results
Johan Segers¹, Greet Hermans ², Frans Bruyninckx ³, Geert Meyfroidt ⁴, Daniel Langer ¹, Rik Gosselink ¹.
¹Rehabilitation Sciences, KU Leuven, Leuven, Belgium; ²General Internal Medicine - Medical ICU, UZ Leuven, Belgium; ³Physical Medicine and Rehabilitation, UZ Leuven, Belgium; ⁴Intensive Care Medicine, UZ Leuven, Belgium

Background: Survivors of critical illness often have a prolonged ICU stay. To attenuate their reduction in muscle mass and muscle strength, NMES might be useful. Aim was to study feasibility and safety of NMES in ICU.

Methods: Patients with expected prolonged stay in ICU of 5 additional days (judged on day 3) without neurological disease were included. They received daily bilateral quadriceps NMES sessions of 25 minutes. Main outcome was to produce contraction of quadriceps. Patients with contraction in 75-100% of sessions were considered responders. Patient characteristics and stimulation parameters were compared between responders and non-responders. Safety was judged by cardiovascular and respiratory responses.

Results:
Table 1. Feasibility of NMES

<table>
<thead>
<tr>
<th>Responders, N=17 (50%)</th>
<th>Non-responders, N=17 (50%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>56.6 (±10.8)</td>
<td>63.2 (±11.1)</td>
</tr>
<tr>
<td>BMI</td>
<td>25.3 (±4.2)</td>
<td>25.1 (±6.1)</td>
</tr>
<tr>
<td>Barthel-index (0-20; premorbid)</td>
<td>17.1 (±3.5)</td>
<td>18.3 (±2.3)</td>
</tr>
<tr>
<td>APACHE II</td>
<td>22.5 (±8.1)</td>
<td>27.5 (±6.9)</td>
</tr>
<tr>
<td>Glasgow coma scale</td>
<td>7.0 (±2.7)</td>
<td>8.4 (±3.4)</td>
</tr>
<tr>
<td>5 questions for adequacy</td>
<td>1.5 (±1.5)</td>
<td>2.3 (±1.6)</td>
</tr>
<tr>
<td>Oedema</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Placing of electrodes*</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Intensity (mA)</td>
<td>64.9 (±8.9)</td>
<td>66.1 (±13.7)</td>
</tr>
</tbody>
</table>

*Different from standardised position due to catheters.

Table 2. Safety of NMES

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>90.1 (±13.2)</td>
<td>91.2 (±15.3)</td>
<td>0.230</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>131.4 (±14.8)</td>
<td>132 (±13.4)</td>
<td>0.733</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>65.4 (±7.1)</td>
<td>65.0 (±7.9)</td>
<td>0.598</td>
</tr>
<tr>
<td>Sätturation</td>
<td>96.5 (±2.8)</td>
<td>96.5 (±2.8)</td>
<td>0.957</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>20.7 (±4.7)</td>
<td>20.1 (±4.4)</td>
<td>0.271</td>
</tr>
</tbody>
</table>

Conclusion: In this small sample a trend is observed for age, APACHE II and edema to influence efficacy of NMES. NMES is a safe intervention in ICU.

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Physiotherapy led weaning plans reduce the number of days patients require non-invasive ventilation (NIV)
Stephanie Harlow¹, Amber Lane¹, Paul Murray ².
¹Physiotherapy Department, Ashford and St Peter’s Hospitals NHS Foundation Trust (ASPH), Chertsey, Surrey, United Kingdom; ²Respiratory Department, Ashford and St Peter’s Hospitals NHS Foundation Trust, Chertsey, Surrey, United Kingdom

Background: Respiratory physiotherapists at ASPH assess, monitor and wean patients requiring NIV. In May 2009, as a result of previous NIV audit data, a physiotherapy led weaning proforma was implemented to improve successful weaning rates.

Aims and objectives: The aim of the investigation was to establish if physiotherapy led weaning plans reduced the number of days patients spent on NIV.

Methods: Data were collected prospectively from 255 consecutive patients requiring NIV over a two year period from May 2009 to April 2011 using a locally adapted version of the BTS NIV data collection tool. Number of days on NIV were collected from patients nursing notes. 84 patients had physiotherapy led weaning plans and were included in the analysis (t-test).

Results: 33% (n=84) of patients had a physiotherapy led weaning plan. The impact of physiotherapy led weaning plans is summarised.

Table 1. Impact of physiotherapy led weaning plans on time on NIV

<table>
<thead>
<tr>
<th>Patients with a physiotherapy weaning plan (n=84)</th>
<th>Patients without a physiotherapy weaning plan (n=171)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of days on NIV (range)</td>
<td>3.0 (1-9)</td>
<td>8.6 (1-17)</td>
</tr>
</tbody>
</table>

Conclusion: Physiotherapy led weaning plans reduce the length of time patients remain on NIV. A possible explanation could be faster optimisation in the first 24 hours facilitating a shortened weaning time. Further investigation is required to establish if earlier physiotherapy input can impact on NIV outcome.

Thanks to Tina Thomas for data entry.