

P68 A STUDY TO INVESTIGATE THE CLINICAL USE AND OUTCOMES OF EZPAP POSITIVE PRESSURE DEVICE

doi:10.1136/thoraxjnl-2011-201054c.68

S Elliott. *Medway Maritime Hospital, Gillingham, UK*

Introduction The EZPAP is a positive pressure hand held device that amplifies an input flow of either air or oxygen approximately four times and so positive pressure is maintained throughout the patients breathing cycle. This augmentation provides a larger flow and volume with less effort than an unsupported inspiration and PEP is provided on expiration. Studies have shown that it is easier to tolerate than Intermittent Positive Pressure Breathing (IPPB) and has greater effect in reversing atelectasis than incentive spirometry. Thus, can be used within physiotherapy to increase lung volume, clear secretions and improve gaseous exchange.

Objectives To measure clinical outcomes of the EZPAP in relation to increasing lung volume, sputum clearance and gaseous exchange.

Method Data were collected from 20 patients identified as suitable for EZPAP interventions and physiological observations pretreatment and posttreatment were recorded, additionally physiotherapists and patients were asked to comment on the treatment session.

Results Patients who demonstrated decreased lung volume showed an 82% increase of air entry on auscultation and a 72% increase in thoracic expansion, whereas audible crepitations on auscultation reduced by 45% and 12% of patients demonstrated a more effective cough to clear secretions. With respect to gas exchange, there was a 33% increase in SaO₂ and 12% of patients were weaned from oxygen post intervention. Additionally, this study yielded results to suggest that EZPAP also reduces the work of breathing with a mean decrease of respiratory rate of 3.5 breaths per minute. Both physiotherapists and patients found the device easy to use with a high level of compliance. Improvements in the patients were also rapid with an average of three sessions across 1.2 days.

Conclusions It can be concluded from this study that the EZPAP positive pressure device is an extremely versatile tool for the physiotherapist at a district general hospital in the management of all respiratory problems with a high level of patient compliance, ease of use and rapid clinical improvements.

Recommendations Further randomised control trials need to be undertaken utilising radiological examination and arterial blood gas sampling to avoid bias in physiological observation measurement.

P69 A STUDY OF THE PREVALENCE OF HYPOXAEMIA, HYPERCAPNIA, HYPEROXAEMIA AND ACIDOSIS IN HOSPITAL BLOOD GAS SPECIMENS (WITH CLINICAL OUTCOMES)

doi:10.1136/thoraxjnl-2011-201054c.69

F Simpson, B R O'Driscoll. *Salford Royal University Hospital, Salford, UK*

Introduction Some clinicians take an aggressive approach to supplemental oxygen therapy to avoid the dangers of hypoxaemia but many patients, especially those with COPD, are at risk from uncontrolled oxygen therapy. Furthermore, recent publications have suggested an independent association between hyperoxaemia and in-hospital mortality of ICU patients (de Jonge 2008, Kilgannon 2010).

Methods We studied a 1-year database of 29 587 hospital blood gas specimens including samples from A&E and ICU. Only the first adequate sample from each patient was analysed; (n=7956). Samples were grouped in saturation bands corresponding to the recommended target saturation ranges in the BTS Emergency Oxygen Guideline and saturation bands above, below and between these ranges (Abstract P69 table 1). A random sub-sample of 360 specimens was analysed in more detail for clinical outcomes and the prevalence of risk factors for type 2 respiratory failure.

Abstract P69 Table 1

| Saturation range | Number (%) | Percent hypercapnic | Respiratory acidosis | Metabolic acidosis |
|------------------|--------------------|---------------------|----------------------|--------------------|
| >98% | 2077 (26%) | 16% | 5% | 10% |
| 94–98% | 2530 (32%) | 16% | 5% | 8% |
| 92–94% | 634 (8%) | 22% | 5% | 8% |
| 88–92% | 744 (9%) | 25% | 7% | 8% |
| <88% | 1950 (24%) | 36% | 11% | 11% |
| Total | 7965 (100%) | 22% | 7% | 9% |

Results Excluding A&E cases, only 10% of blood gas samples demonstrated Type 1 respiratory failure with PO₂ <8 kPa (60 mm Hg) and normal CO₂ levels. Thirty per cent of first A&E samples had Type 1 respiratory failure. Of 7965 samples analysed, 22% were hypercapnic with PCO₂ >6 kPa (45 mm Hg) consistent with Type 2 respiratory failure and the oxygen saturation was above 92% in 54% of these hypercapnic patients. 22% of all samples were hyperoxaemic with PO₂>15 kPa (112 mm Hg) and 26% had saturation >98%. Within the sub-sample of 360 specimens there were 72 in-hospital deaths (20%). The lowest mortality was 8% in the 88–92% saturation range and the highest mortality was 39% in those with saturation <88%. Of 85 patients documented to be at risk of Type 2 respiratory failure, 62 (73%) had oxygen saturations greater than the 88–92% target range recommended in BTS Guidelines.

Conclusions Despite the introduction of the BTS Guidelines, hyperoxaemia is still a common finding in blood gas specimens in 2011. Type 2 respiratory failure is twice as common as Type 1 failure except for A&E samples but the majority of patients at risk of Type 2 respiratory failure had oxygen saturations above the recommended target range. These results demonstrate the need for a prospective study of the link between oxygen therapy and overall hospital mortality.

P70 DOES MEETING THE CLINICAL CRITERIA FOR THE SYSTEMIC INFLAMMATORY RESPONSE SYNDROME EQUATE TO BIOCHEMICAL INFLAMMATION FOLLOWING CARDIAC SURGERY?

doi:10.1136/thoraxjnl-2011-201054c.70

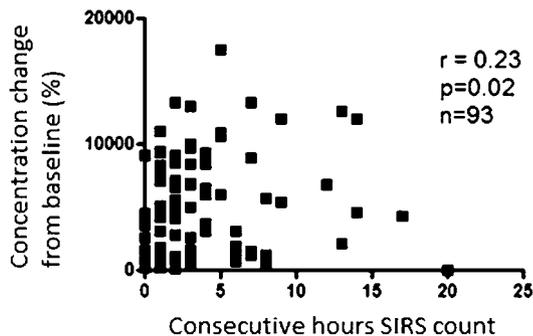
F M Conway, S E Gordon, G J Quinlan, T W Evans, N S MacCallum. *Unit of Critical Care, Biomedical Research Unit, Imperial College, Royal Brompton Hospital, London, UK*

Introduction and Objectives The systemic inflammatory response syndrome (SIRS) criteria were developed in part as entry criteria for clinical trials of generalised inflammation from various causes. Despite being commonly used to assess inflammation in cardiac surgery, no one has evaluated whether the clinical defining criteria for inflammation equate to biochemical inflammation in this patient population. Our aim was to investigate whether the SIRS criteria equate to established biochemical indices of inflammation following cardiac surgery.

Methods Retrospective analysis of prospectively collected data from an adult intensive care unit of a specialist cardiothoracic centre in the UK. 93 adult patients undergoing cardiac surgery admitted over a 34-month period between March 2004 and January 2007 were included. Patients were scored on the SIRS criteria from before to 72 h post-surgery. ELISAs were performed on archived plasma samples taken before surgery and at 4, 24, 48 and 72 h post-operatively to determine concentrations of IL-1 β , IL-1RA, IL-6, IL-8, IL-10, myeloperoxidase (MPO) and C reactive protein (CRP).

Results Significantly elevated levels of all inflammatory indices were detected post-operatively with the exception of IL-1 β . Patients meeting SIRS criteria demonstrated higher levels of IL-6, IL-1RA and CRP compared to those who did not meet the criteria. An absence or only weak correlation was found between SIRS and mass of biomarker.

Conclusions The clinical defining criteria for inflammation (SIRS criteria) do not equate to established biochemical indices of inflammation in cardiac surgery patients; hence the criteria alone should not be used to assess inflammation in this patient population.



Abstract P70 Figure 1 Correlation between consecutive number of hours in which patients scored ≤ 2 SIRS criteria and percentage change from baseline concentration of CRP. CRP was measured in plasma samples using ELISA. Data analysed using Spearman's rank correlation. r =correlation, SIRS=systemic inflammatory response syndrome.

P71 RELATIONSHIP BETWEEN QUADRICEPS RECTUS FEMORIS CROSS-SECTIONAL AREA AND HEALTH RELATED QUALITY OF LIFE IN PATIENTS FOLLOWING CRITICAL ILLNESS

doi:10.1136/thoraxjnl-2011-201054c.71

^{1,2}B Connolly, ¹J Moxham, ^{1,2}N Hart. ¹Department of Asthma, Allergy & Respiratory Science, Division of Asthma, Allergy and Lung Biology, King's College London, London, UK; ²Guy's & St Thomas' NHS Foundation Trust and King's College London, National Institute of Health Research Comprehensive Biomedical Research Centre, London, UK

Introduction Quadriceps rectus femoris cross-sectional area (RF_{CSA}) is considered a useful marker of quadriceps strength with a 20% reduction in RF_{CSA} observed in critically ill patients at 10 days after admission to the intensive care unit (ICU). This has clinical importance in patients following the acute critical illness episode as it is postulated that quadriceps muscle wasting reduces quadriceps muscle strength and as a consequence impairs physical activity and health-related quality of life (HRQL). We therefore hypothesised that RF_{CSA} would have a direct relationship with HRQL.

Method Patients were assessed within 48 h of discharge from the ICU to the ward as part of an ongoing multicentre randomised controlled trial. RF_{CSA} was determined using real-time B-mode ultrasonography using an 8MHz 5.6 cm linear transducer (PLM805, Toshiba Medical Systems Ltd, Crawley, UK) at a distance three-fifths from anterior superior iliac spine to the superior patellar border. HRQL was measured using the self-reported hospital anxiety and depression (HAD) scale and the short form-36 v2 (SF-36) questionnaire. Higher scores indicate better HRQL from the SF-36 questionnaire and lower scores indicate better HRQL from the HAD scale.

Results 17 post critical care patients were recruited. Mean age was 60.7±14.9 years with 64.7% (n=11) female. Mean body mass index (BMI) was 26.0±6.4 kg/m² and fat-free mass index (FFMI) was 16.8±3.9 kg/m². The correlations between RF_{CSA} and HRQL are shown in Abstract P71 table 1.

Abstract P71 Table 1 Relationships between RF_{CSA} and HRQL

| | r Value | p Value |
|----------|---------|---------|
| HAD | -0.6 | 0.01 |
| SF-36 PF | 0.24 | NS |
| SF-36 MF | 0.76 | 0.0005 |

p and r values derived from Spearman's correlation coefficient. HAD, Hospital Anxiety and Depression scale; HRQL, health related quality of life; RF_{CSA}, rectus femoris cross-sectional area; SF-36 MF, Short Form 36 Mental Functioning domain score; SF-36 PF, Short Form 36 Physical Functioning domain score.

Conclusion RF_{CSA} was correlated with HRQL, including HAD scale and the SF-36 mental functioning domain, but there was no relationship with the SF-36 physical function domain and RF_{CSA}. Although this was an unexpected finding, it reflects the limitations of the SF-36 physical function domain to separate those patients that have a marked reduction in independent physical activity following discharge from ICU. Further studies are required to assess the relationship between muscle wasting, strength, physical activity and quality of life in these patients following critical illness.

P72 RELATIONSHIP BETWEEN QUADRICEPS RECTUS FEMORIS ANATOMICAL CROSS-SECTIONAL AREA, PHYSIOLOGICAL CROSS-SECTIONAL AREA AND PENNATION ANGLE IN HEALTHY SUBJECTS

doi:10.1136/thoraxjnl-2011-201054c.72

^{1,2}B Connolly, ³A Lunt, ¹J Moxham, ^{1,2}N Hart. ¹Department of Asthma, Allergy & Respiratory Science, Division of Asthma, Allergy and Lung Biology, King's College London, London, UK; ²Guy's & St Thomas' NHS Foundation Trust and King's College London, National Institute of Health Research Comprehensive Biomedical Research Centre, London, UK; ³Department of Child Health, Division of Asthma, Allergy and Lung Biology, King's College London, London, UK

Introduction Although quadriceps rectus femoris anatomical cross-sectional area (RF_{ACSA}) has been shown to correlate with both volitional and non-volitional measures of quadriceps strength, this only incorporates the cross-sectional muscle mass and disregards the contribution of fibre orientation to the force generating capacity of the muscle. We therefore hypothesised that quadriceps rectus femoris physiological cross-sectional area (RF_{PCSA}), which incorporates both RF_{ACSA} and rectus femoris pennation angle (RF_{PA}) would demonstrate a stronger relationship with, and be more representative of, quadriceps strength.

Method 21 healthy adults were recruited, 9 of whom were males, median (IQR) age 31 (25–37) years. RF_{ACSA} and RF_{PA} were determined using real-time B-mode ultrasonography using an 8MHz 5.6 cm linear transducer (PLM805, Toshiba Medical Systems Ltd, Crawley, UK) at a point three-fifths distance from the anterior superior iliac spine to the superior patellar border. Values for RF_{PCSA} were calculated from RF_{ACSA} and RF_{PA}. QMVC was assessed using the technique of isometric maximum voluntary contraction and twitch tension (TwQ) following magnetic stimulation of the femoral nerve.

Results Males had significantly greater QMVC (55.2±7.1 kg vs 36.3±7.5 kg; $p < 0.0001$), TwQ (12.6±3.6 kg vs 7.4±2.5 kg; $p = 0.0002$), RF_{ACSA} (8.9±1.7 cm² vs 5.9±1.3 cm²; $p = 0.0001$) and RF_{PCSA} (8.8±1.7 cm² vs 5.8±1.2 cm²; $p = 0.0001$). There was no gender difference evident for RF_{PA} (10.3 (9.7–10.7)° vs 10.8 (9.8–12.1)°; $p = 0.4$) and percent muscle activation during QMVC (83.9±9.3% vs 86.9±9.8%; $p = 0.5$). Identical correlations between RF_{ACSA} and RF_{PCSA} and both QMVC and TwQ were observed ($r = 0.7$, $p = 0.001$). There were no significant correlations evident between RF_{PA} and anthropomorphic measures of age, height, weight, body-mass index, fat-free mass or thigh length.

Conclusion The pennation angle of the rectus femoris muscle was observed to be independent of anthropomorphic variables. Furthermore, and contrary to our original hypothesis, RF_{PCSA} did not demonstrate a stronger relationship with quadriceps strength than RF_{ACSA}. This is an important finding for the clinician as the additional step of measuring the pennation angle of the muscle adds a complexity to this simple bedside test that would reduce its widespread clinical applicability.