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ORIGINAL ARTICLE

Unplanned versus planned extubation in respiratory intensive care unit, predictors of outcome

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Abstract *Introduction:* The incidence of post-intensive care unit admission complications is high; some of these complications are inevitable and often leads to medical emergencies. Among these complications is the extubation failure whether resulted from planned extubation which is prepared and performed by the medical team or unplanned extubation (UE). Unplanned extubation (UE) is a real event in all ICUS worldwide and is considered as one of the major complications in mechanically ventilated patients. However, its impact on mortality, duration of mechanical ventilation (MV) as well as predictors of UE and need for reintubation had not been adequately defined.

Objective: To define the profile of the patients at risk of unplanned extubation and establish predictive criteria for extubation outcome.

Patients and methods: This study was carried out in the Respiratory Intensive Care Unit of Chest Department, Zagazig University Hospitals during the period from March 2010 to January 2011. Sixty-seven invasively mechanically ventilated patients who were admitted to the RICU were enrolled in the study. They were (47) males and (20) females with mean age (51.56 ± 6.28) years. Patients were admitted to the RICU because of one of the following diagnostic categories; acute exacerbation of chronic obstructive pulmonary disease (AECOPD) (41 patients), Pneumonia (6 patients), Bronchial asthma (2 patients), Pulmonary edema (5 patients), Bronchiectasis (6 patients), Systemic lupus erythematosus (1 patient), interstitial lung disease (ILD) (1 patient), Infected cystic lung (1 patient), Overlap syndrome (4 patients). Patients were classified into two groups according to the way of extubation: Group I: Unplanned extubation group (they were 27 patients who underwent UE either self inflicted (13 patients) or accidental extubation (14 patients) and Group II: Planned extubation group (they were 40 patients who fulfilled weaning criteria and tolerated 2-h

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spontaneous breathing trial through T-tube without signs of distress and followed by extubation after 24 h). On admission to ICU the following were carried out and recorded for all patients: Full medical history from the patient (if possible) or his relatives, history of previous intubation and/or ventilatory support and Presence of co morbidities, Full clinical examination, Plain chest and heart X-ray, Arterial blood gases, Routine laboratory investigations, Mechanical ventilation, Assessment of APACHE III score (acute physiology and chronic health evaluation score), Assessment of Glasgow Coma Score (GCS) and Assessment of sequential Organ failure score (SOFA). During ICU stay, assessment of the following parameters was done daily including: GCS, Evidence of agitation, Use of sedatives, Degree of sedation using Ramsay Sedation Scoring System, Presence of any physical restrains (Wrist restraints), Amount of endotracheal secretion, Assessment of the strength of the cough reflex by cough strength scale, Nine equivalents of nursing manpower use score (NEMS) to assess nursing workload and Arterial blood gases. If unplanned extubation occurred during anytime before weaning, the following were reported: Time of UE, Ventilation parameters at the time of UE (ventilatory mode, FIO₂tidal volume, rate, amount of pressure support and PEEP), Presence of agitation, use of physical restraints, Use of sedation, Last Ramsay score, Last cough strength scale, Last endotracheal secretion scale, GCS at time of extubation, SOFA score at time of extubation, Last NEMS score, Last ABG. If patient passed to weaning and tolerated SBT for 2 h the following tests were performed before extubation in addition to assessment of the same parameters reported among patients in the UE group including Assessment of swallowing by swallowing score, Minute ventilation recovery time, Dead space addition test (DSA), Cuff leak test. The Outcome of the studied patients as regards extubation was categorized into either extubation success or failure. Also the Outcome of the studied cases as regards mortality was classified into either survival or death.

Results: The results of this study revealed that the frequency of planned extubation represents 59.7% while unplanned extubation represents 40.3% of the studied subjects. There is no significant difference between planned and unplanned extubation as regards the cause of admission to ICU, ($P > 0.05$) with predominance of COPD exacerbation which represents 61.19% of the studied population. On starting MV there is an increased risk of unplanned extubation in a significant way with the presence of agitation (74.07%) and decreased the percentage of use of sedation (37.04%), use of physical restraints (77.78%) and lower Ramsay score value ($1.33 \pm .48$), (P value < 0.05). There is no significant difference as regards history of previous MV, NEMS score and type of respiratory failure between planned and unplanned extubation, (P value > 0.05). Successful extubation is significantly higher in the planned extubation group (75%) in comparison to the unplanned extubation group (18.52%) while extubation failure is significantly higher among the unplanned extubation group (81.48%) in comparison to (25%) in the planned extubation group, (P value < 0.05). Survival represents 92.5% in the planned extubation group and 59.26% in the unplanned extubation group with statistical significance. There is a significant increase in the risk of failed extubation among the unplanned extubation group with moderate and large amounts of E/T secretions (86.36%) and with extubation at the night shift (63.64%), (P value < 0.05). But there is no significant difference among failures or succeeders as regards use of physical restraints, presence of agitation and sedation. There is a significant increase in the risk of failed extubation in the unplanned extubation group with a longer duration of MV (7.32 ± 2.22) days, with increased PaCO₂ (54 ± 7.7) mmHg, with PaO₂/FIO₂ < 200 , with decreased GCS (11.36 ± 1.9) and lower cough strength scale ($1.7 \pm .7$), (P value < 0.05). On the other hand there is no significant difference between successful and failed extubation as regards PH value, Ramsay score, NEMS score and SOFA score, (P value > 0.05). The frequency of both ways of unplanned extubation in the studied subjects revealed that self inflicted extubation represents 48.15% while accidental extubation represents 51.85%. There is a significant increase in the duration of MV in self inflicted than in accidental extubation (6.07 ± 2.76 VS 3.35 ± 1.13 days), (P value < 0.05). There is an increased risk of self inflicted extubation with the use of physical restraints (92.31%) and presence of agitation (84.62%), (P value < 0.05). But there is no significant difference among them as regards time of extubation, Ramsay score, NEMS, GCS and use of sedation. Successful extubation is significantly higher in the self inflicted group (30.77%) in comparison to the accidental extubation group (7.14%), (P value < 0.05). Survival represents (61.54%) in the self inflicted group and (57.14%) in the accidental extubation group but without any significant difference, (P value > 0.05). Most of successful extubations among the planned extubation group have a mild amount of E/T secretions (86.67%) and without use of sedation (100%) with a significant difference where extubation failure is significantly higher in moderate and large amounts of E/T secretions, (60%), (P value < 0.05). All patients with planned extubation whether successful or failures have been extubated at the morning shift. On the other hand, there is no significant difference between succeeders and failures as regards use of physical restraints and presence of agitation. There is an increased risk of failed extubation among planned extubation with a longer duration of MV (7.6 ± 1.07 days), higher values of PaCO₂ (53 ± 1.76) mmHg and lower

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