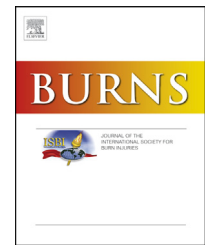


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Review

New-onset, postoperative tachyarrhythmias in critically ill surgical patients

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ARTICLE INFO

Article history:

Accepted 16 June 2017

Available online xxx

Keywords:

Burn patient

Atrial fibrillation

Arrhythmia

Tachyarrhythmia

Trauma

Surgical critical care

Critical care

ABSTRACT

Tachyarrhythmias in critically ill surgical patients can have varying effects, from minimal consequence to lifetime sequelae. Atrial fibrillation can be common in the post-operative period, often a result of fluctuations in volume status and electrolyte derangements. While there is extensive literature regarding the critically ill medical or cardiac patient, there is less focusing on the critically ill surgical or trauma patient. More specifically, there is minimal regarding tachyarrhythmias in burn patients. The latter population tends to have frequent and wide variations in volume status given initial resuscitation and after major excisions, concomitant with acute blood loss anemia, which can contribute to cardiac disturbances. A literature review was conducted to investigate the incidence and consequences of tachyarrhythmias in critically ill surgical and trauma patients, with a focus on the burn population. While some similarities and conclusions can be drawn between these surgical populations, further inquiry into the unique burn patient is necessary.

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<http://dx.doi.org/10.1016/j.burns.2017.06.012>

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1. Introduction

Cardiac rhythm disturbances, specifically tachyarrhythmias, are frequently encountered in critically ill patients. While the incidence or prevalence of cardiac rhythm abnormalities in patients after cardiac surgery [1-4] or with cardiac or pulmonary disease has been extensively described [5-23], there is a paucity of data regarding critically ill surgical patients. There is less information known in the trauma population and data in burned patients is lacking [24-29]. New onset of tachyarrhythmias is especially problematic in the surgical intensive care unit (ICU). The Framingham Heart Study found atrial fibrillation to be associated with a 1.5-fold increase in risk for death from all causes in men and a 1.9-fold increase in women [30].

While most episodes of postoperative atrial fibrillation tend to be self-limiting, they are often recurrent, and if persistent, associated with an increased risk of stroke or transient ischemic attack after 48h [31,32], other thromboembolic events and heart failure [33]. Whether an indicator of injury severity or an independent risk factor for death [30], the effect of tachyarrhythmias in critically ill patients can contribute to increased morbidity and mortality in some patients, and minimal residual consequence in others, with the impact dependent upon the patient's cardiac physiology and function [31,34].

Review of the available literature demonstrates the need for further research into these specific populations, especially with regard to expected consequences of new-onset tachyarrhythmias. The following keywords were utilized in the systematic review of the literature: burn patient, atrial fibrillation, arrhythmia, tachyarrhythmia, trauma, surgical critical care, critical care. While literature regarding medical critical care patients was also reviewed, the focus was primarily on critically ill surgical and trauma patients as a comparison to burn patients given inherent similarities.

2. Tachyarrhythmias in critically ill surgical patients

2.1. Incidence

The incidence of supraventricular tachycardias, specifically atrial fibrillation, may occur in as many as 30-40% of postoperative cardiac surgical patients, as well as in up to 4% of postoperative patients undergoing non-cardiac surgery [31,35,36]. Regarding the incidence of arrhythmias in a mixed ICU, Artucio and Pereira's epidemiologic study is the first to comment on the incidence of cardiac arrhythmias in critically ill patients [24]. This study found an overall prevalence of cardiac arrhythmias of 78% in their 2,820 consecutive patients, with 44% in multiply injured trauma patients. Atrial tachyarrhythmias had the highest prevalence overall (28%) with atrial fibrillation the most common atrial arrhythmia (52%) (Fig. 1).

In a similar review of postoperative surgical patients admitted to a surgical ICU, Knotzer et al. found an incidence of 14.9% of tachyarrhythmias out of 596 patients. Atrial fibrillation and atrial flutter were the most common, found in 54 of the 89 patients that developed tachyarrhythmias. While they do not comment on the specifics of the particular operative procedures, they mention that approximately two-thirds of their patients were admitted to the surgical ICU after major cardiothoracic and abdominal surgery [37]. In a retrospective review of 13,696 patients, Christians et al. found 51 patients with new-onset atrial fibrillation within 30 days of a non-cardiac, non-thoracic surgical procedure without chest trauma or concomitant pulmonary emboli, noting an incidence of 0.37% [38].

2.2. Causes

Atrial fibrillation is the most common tachyarrhythmia and the incidence increases with advancing age [39], doubling with each decade of adult life [40] and can be seen in 0.5-1.0% of the

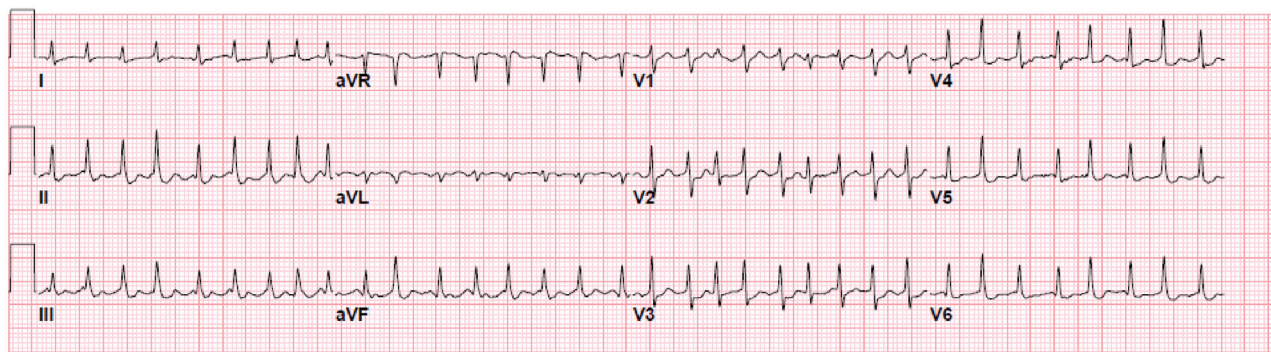


Fig. 1 – Atrial fibrillation with rapid ventricular response. Lack of p waves is characteristic of atrial fibrillation.

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