CRITICAL CARE

COMMENTARY

Atrial fibrillation is not just an artefact in the ICU

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See related research by Meierhenrich *et al.*, http://ccforum.com/content/14/3/R108

Abstract

Atrial fibrillation (AF) is common in the intensive care unit (ICU) and is particularly frequent (46%) in septic shock patients. Inflammation favours AF in the general population, and there is a growing body of evidence that inflammation also plays a role in AF occurring after cardiac surgery but also in the general ICU. How such a finding could modify the therapeutic approach remains elusive. The impact of AF on mortality is not clearly demonstrated in the ICU, with AF reflecting essentially the severity of the underlying disease.

Atrial fibrillation (AF) onset in the intensive care unit (ICU) is attracting widespread attention because of its frequency and prognostic significance. In the previous issue of *Critical Care*, Meierhenrich and colleagues complete the description of new-onset AF in the ICU in a selected population of patients suffering from septic shock [1]. They found that 46% of their patients developed AF and this arrhythmia was significantly associated with increased ICU length of stay without affecting mortality. Interestingly, they reported a significant and continuous increase in C-reactive protein levels the days before the occurrence of AF, corroborating previous findings on the hypothesis of an inflammatory substrate in AF onset [2].

AF is the most significant arrhythmia in the ICU. The risk to develop AF in the ICU is largely superior to that of the general population but differs with regard to the type of ICU involved. Indeed, the risk is estimated to be 4% in the general population, from 4 to 9% in the general ICU and an incidence of 32% has been recently reported in a cardiac surgical ICU [3-9].

How could we explain such a difference? In fact, AF is considered both a cardiac disease and a noncardiac disease. Age, essential hypertension, ischaemic heart failure and valvular heart disease are well recognized as cardiac components of AF, and on the contrary inflammation, whatever its origin, is now considered an important noncardiac trigger [4]. In this context, it is not surprising that cardiac surgery generates a higher incidence of AF, and several data support this assumption. Effectively, in cardiac surgery the risk of AF is common in the first 3 postoperative days and a strength correlation has been found between various inflammatory parameters and postoperative arrhythmia [7,10]. In a prospective double-blind study, 236 patients undergoing elective heart surgery were randomized to receive placebo or dexamethasone after the induction of anaesthesia. Patients who received dexamethasone had significantly less new-onset AF in the 3 postoperative days (18.9% vs. 32.3%, $P = 0.027$) [11]. In a recent prospective, multicentre, double-blind study performed in cardiac surgery, hydrocortisone administered the day before and during the next 3 postoperative days significantly reduced the occurrence of AF (30% vs. 48%, $P = 0.004$) [12]. In the same way, it has been showed that nonsteroidal anti-inflammatory drugs administered in the postoperative course protected patients from AF [7]. Finally, in general ICU patients and in trauma patients requiring admission to the ICU, the presence of a systemic inflammatory response syndrome was found to be linked to the risk to develop AF [5,13].

We probably better understand why Meierhenrich and colleagues found a 46% incidence of AF in septic shock patients [1]. Septic shock is a severe systemic inflammatory disease, and the regular and significant increase in C-reactive protein before onset of AF is another factor highlighting the role of inflammation in the genesis of AF in the ICU. Nevertheless, we have to keep in mind that inflammation alone is probably insufficient to generate such a high AF incidence, and other contributing factors should not be underestimated such as catecholamine use, central venous catheter catheterization and/or fluid shifts [3,6,9,14]. Finally, it would be interesting to know whether, in the study by Meierhenrich and colleagues, patients received anti-inflammatory drugs, notably steroids and/or activated protein C, and whether those patients who did receive such therapy experienced less AF.

What is the impact of AF on mortality in ICU patients? This is an old debate, and Brathwaite and Weissmann

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already clearly discussed this dilemma in 1998 [3]. Most studies concerning AF in the ICU found that this arrhythmia increases ICU and hospital lengths of stay and/or mortality, but these patients were also the most severely ill [3,5,6,8,9]. In a prospective observational study conducted in trauma patients, AF was observed in the most severe patients and carried a higher mortality [13]. Nevertheless, the standardized mortality ratio was similar in patients who had AF and in patients who did not have AF, suggesting AF is rather a marker of severity without major impact on mortality [13]. Moreover, in a larger multicentre study performed in 26 European general ICUs, Annane and colleagues showed that, after adjustment and propensity score use, supraventricular arrhythmia did not increase the risk of hospital death [15]. Interestingly, in the study by Meierhenrich and colleagues the mortality in septic shock patients was not influenced by the presence of AF despite a higher Sequential Organ Failure Assessment score in AF patients [1].

AF is not just an artefact in the ICU, and the article of Meierhenrich and colleagues contributes to our better understanding of the mechanisms contributing to AF in the ICU. Nevertheless, the impact of such findings remains elusive from a therapeutic point of view.

Abbreviations

AF, atrial fibrillation; ICU, intensive care unit.

Competing interests

The authors declare that they have no competing interests.

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