Perioperative Arrhythmias and Outcome

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Based on expert opinion and observational data “symptomatic ventricular arrhythmias in the presence of underlying heart disease” have recently been defined as “a major predictor of increased perioperative cardiovascular risk (myocardial infarction, congestive heart failure or death)” and have been regarded as ominous as unstable coronary syndromes, decompensated congestive heart failure and severe valvular lesions [1].

Perioperative ventricular arrhythmias are considered to be the electrical manifestation of structural heart disease and/or transient imbalance [2-4].

Graded catecholamine surges with associated haemodynamic changes, ischaemia, fluid shifts, respiratory and metabolic alterations and perioperatively administered drugs may provoke arrhythmias particularly in a scarred, hypertrophied and dilated ventricle [2, 5-11].

Ventricular arrhythmias may compromise haemodynamics by an inappropriate heart rate with improper AV synchrony and ineffective contractions. In the setting of acute myocardial infarction or long QT syndrome premature ventricular contractions may trigger life threatening sustained ventricular tachyarrhythmias [2, 3, 12-14].

A satisfactory classification however, grading ventricular arrhythmias by frequency, appearance, haemodynamic impact and prognostic significance, currently does not exist [15].

Prevalence and frequency of perioperative ventricular arrhythmias vary with age, underlying cardiac disease, comorbidity, type of surgery, perioperative care and monitoring technique [2, 3, 16-21].

In a multicenter study Forrest et al. investigated 17,201 predominantly healthy patients (90,7% ASA physical status 1 and 2) to identify predictors of severe perioperative outcomes. Noncontinuous ECG monitoring revealed a 6,3% incidence of perioperative ventricular arrhythmias with only 0,6% needing significant treatment or cardiopulmonary resuscitation [22].

Whether or not there is an actual causative or only an associative relationship between arrhythmias and haemodynamic compromise can only be established by continuous Holter monitoring. Available anaesthesiologic literature is rare.
In men with definite or high risk for CAD scheduled for noncardiac surgery Mangano and his Mc Spi Group used continuous 3 days perioperative Holter ECG for evaluation of perioperative ischaemia and associations with in-hospital and two years adverse cardiac outcomes defined as cardiac death, nonfatal myocardial infarction, unstable angina, congestive heart failure, and ventricular tachycardia [23, 24].

They report an altogether 44% perioperative incidence of frequent or major ventricular arrhythmias (> 30 ventricular ectopic beats/min and or ventricular tachycardia) with postoperative ventricular tachycardia predominantly occurring in patients with an ejection fraction below 30% [25, 26]. Ventricular arrhythmias were asymptomatic, did not degenerate into sustained ventricular tachycardia or ventricular fibrillation and were neither associated with in-hospital nor two years adverse cardiac outcome [23-25].

Complex ventricular arrhythmias (multiform and repetitive ventricular ectopic beats) [27] have been associated with increasing hourly arrhythmia frequency [15].

Our group therefore investigated perioperative arrhythmia trend in patients already preoperatively presenting with repetitive ventricular arrhythmias in any form of cardiac disease (CAD, dilated cardiomyopathy or valvular lesions) (Fig. 1). The incidence of perioperative ventricular arrhythmias did not differ significantly between patients with good and adverse outcome (Table 1), nor was the incidence of perioperative ventricular arrhythmias predictive of progression to sustained tachyarrhythmias [28].

<table>
<thead>
<tr>
<th>Table 1. Frequency of ventricular arrhythmias with respect to outcome</th>
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<tr>
<td>Good outcome</td>
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<tr>
<td>Medians of PVB/hour</td>
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<td>Preoperative</td>
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<td>Postoperative</td>
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PVB, premature ventricular beat

These data stress the fact that perioperative ventricular arrhythmias rather reflect or occur in the presence of serious underlying cardiac disease which by itself increases the risk of surgery.

The findings of Frank et al. and Lee et al. further support this concept [19, 29].

Maintenance of normothermia by forced air warming significantly reduced the incidence of early postoperative ventricular tachycardia in patients with definite CAD or at risk for CAD undergoing abdominal, thoracic or vascular procedures [19].