La Sindrome cardiorenale nel paziente critico

Lo scompenso cardiaco nel paziente post-cardiochirurgico

F.L. Lorini

lunedì 1 gennaio 2001
AHF is a critical inability of the myocardium to maintain a cardiac output sufficient to meet the demands of the peripheral circulation.
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- with or without previous cardiac disease.
- systolic or diastolic dysfunction
- abnormalities in cardiac rhythm
- pre-load and after-load mismatch
AHF is a critical inability of the myocardium to maintain a cardiac output sufficient to meet the demands of the peripheral circulation.

It is often life threatening and requires urgent treatment.
Acute Exacerbations May Contribute to the Progression of the Disease

With each event, hemodynamic alterations and myocardial damage contribute to progressive ventricular dysfunction.

From Gheorghiade. Am J Cardiol 2005 (modified)

lunedì 1 gennaio 2001
Complications in Cardiac Surgery

- Circulatory I: 12
- Stroke: 4
- Lung: 3
- Kidney: 5
- Bleeding: 11
- Sepsis: 18

lunedì 1 gennaio 2001
Clinical review: Practical recommendations on the management of perioperative heart failure in cardiac surgery.

- Cardiac surgery normal: 81%
- Cardiac surgery failure: 19%

Acute cardiovascular dysfunction occurs perioperatively in more than 20% of cardiosurgical patients, yet current acute cardiovascular dysfunction in the perioperative period remains poorly defined. Indicators of major perioperative risk include unstable clinical signs, unexplained hypotension, new onset arrhythmias, and haemodynamic instability. Clinical risk factors include comorbidity and older patient age, typically 80 years. Preoperative B-type natriuretic peptide levels are an additional risk stratification factor. Aggressively preserving sufficient blood at the time of aortic clamping is highly recommended. A ventricular assist device should be considered before end organ dysfunction occurs.

The aim of monitoring is early detection and assessment of mechanisms of perioperative cardiovascular dysfunction. Ideally, volume status should be assessed by 'dynamic' measurement of haemodynamic parameters. The decision to wean, post cardiotomy, should be based on time of occurrence (precardiotomy, failure to wean, post cardiotomy) and haemodynamic severity of the patient's condition (crash and burn, deteriorating fast, stable). The combination: low-to-moderate doses of dobutamine and epinephrine, milrinone or levosimendan. In vasoplegic states, consider inotropes, vasopressors and extracorporeal membrane oxygenation as solutions. In treating myocardial dysfunction, consider the following options, either alone or in conjunction with high blood pressure (hypertensive HF), left/right/biventricular congestive HF, sometimes in conjunction with high blood pressure (hypertensive HF).

Conclusion: A structured approach to monitoring and decision making. This paper outlines potential recommendations and discusses the need for large surveys and studies to assess the optimal protocol(s). The aim of monitoring is early detection and assessment of mechanisms of perioperative cardiovascular dysfunction. Ideally, volume status should be assessed by 'dynamic' measurement of haemodynamic parameters. The decision to wean, post cardiotomy, should be based on time of occurrence (precardiotomy, failure to wean, post cardiotomy) and haemodynamic severity of the patient's condition (crash and burn, deteriorating fast, stable). The combination: low-to-moderate doses of dobutamine and epinephrine, milrinone or levosimendan. In vasoplegic states, consider inotropes, vasopressors and extracorporeal membrane oxygenation as solutions. In treating myocardial dysfunction, consider the following options, either alone or in conjunction with high blood pressure (hypertensive HF), left/right/biventricular congestive HF, sometimes in conjunction with high blood pressure (hypertensive HF).
Clinical Profiles According to ESC Guidelines

Italian Survey on Acute Heart Failure
Clinical Profiles According to ESC Guidelines

Italian Survey on Acute Heart Failure

In Hospital Death

- Hypertensive HF: 3.2%
- Cardiogenic shock: 25.4%
- Pulmonary edema: 6.8%
- Acute decompensated HF: 5.1%

lunedì 1 gennaio 2001
Clinical Profiles According to ESC Guidelines

Italian Survey on Acute Heart Failure

In Hospital Death

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hypertensive HF</td>
<td>3.2%</td>
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<tr>
<td>Cardiogenic shock</td>
<td>25.4%</td>
</tr>
<tr>
<td>Pulmonary edema</td>
<td>6.8%</td>
</tr>
<tr>
<td>Acute decompensated HF</td>
<td>5.1%</td>
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</table>

6 Months Death

<table>
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<tr>
<th>Condition</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hypertensive HF</td>
<td>12.0%</td>
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<tr>
<td>Cardiogenic shock</td>
<td>43.0%</td>
</tr>
<tr>
<td>Pulmonary edema</td>
<td>22.0%</td>
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<tr>
<td>Acute decompensated HF</td>
<td>23.0%</td>
</tr>
</tbody>
</table>

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Clinical review: Practical recommendations on the management of perioperative heart failure in cardiac surgery

Figure 1. Kaplan Meier curves showing survival rates of ICU patients with different acute heart failure (HF) syndromes over time, starting at the day of ICU admission. The small vertical lines indicate the time points when patients had their last follow-up. The survival curves between the groups are significantly different (log rank $P < 0.001$). Data were derived from [10].
Hemodynamic variables during acute HF

Systemic vascular resistance index (Dyne/m²)

Cotter et al: Eur J Heart Fail, 2003
Diagnosis of different clinical syndromes
Diagnosis of different clinical syndromes

Acute CHF
Diagnosis of different clinical syndromes

Acute CHF

Cardiogenic shock
Diagnosis of different clinical syndromes

Acute CHF

- Pulmonary edema
- Cardiogenic shock
Diagnosis of different clinical syndromes

Acute CHF

Pulmonary edema

Cardiogenic shock

RV failure
Diagnosis of different clinical syndromes

Acute CHF

- Pulmonary edema
- RV failure
- Cardiogenic shock
- High output failure
Diagnosis of different clinical syndromes

- Acute CHF
  - Pulmonary edema
  - RV failure
  - Hypertensive AHF
  - Cardiogenic shock
  - High output failure
INSUFFICIENZA VASCOLARE O CARDIACA?

1. Insorgenza acuta, conservata FE
2. Insorgenza meno acuta, Fe depressa
3. Insuff. cardiaca + ipoperfusione

lunedì 1 gennaio 2001
Danno miocardico

- bioumorale: tnf-endotelio-peptidi
- meccanico-adattamento
LIVELLI DI CITOCHINE E GRAVITA’ DELLO SCOMPENSO

Aukrust P; Am J Cardiol 1999; 83: 376-382

lunedì 1 gennaio 2001
Livelli di citochine e gravità dello scompenso

TNF

<table>
<thead>
<tr>
<th></th>
<th>AO</th>
<th>CS</th>
<th>ICD</th>
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<tbody>
<tr>
<td>NYHA II</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>NYHA III</td>
<td>12</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>NYHA IV</td>
<td>18</td>
<td>16</td>
<td>15</td>
</tr>
</tbody>
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IL-10 pg/ml

TNFα/IL-10 ratio

Bonaduce D, Am Hearth J 2000;

lunedì 1 gennaio 2001
LIVELLI DI CITOCHINE E GRAVITÀ' DELLO SCOMPenSO

IL-10 pg/ml

Controls  NYHA II  NYHA III  NYHA IV
1,0  3,0  3,2  5,1

TNFα/IL-10 ratio

Controls  NYHA II  NYHA III  NYHA IV
10  23  25  31

TGFβ1/IL-10 ratio

Controls  NYHA II  NYHA III  NYHA IV
41  32  25  14

Bonaduce D, Am Hearth J 2000;
Kirklin and colleagues found that plasma C3a levels measured 3 h post-CPB could predict the occurrence of complications.

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lunedì 1 gennaio 2001
VASODILATAZIONE ARTERIOSA DOPO INFUSIONE DI L-NMMA

Belardinelli R. J Cardiol 2001; 81:1-8

lunedì 1 gennaio 2001
DISFUNZIONE ENDOTELIALE NELLO SCOMPENSO

Belardinelli R. Int J Cardiol 2001; 81:1-8
PRINCIPALI MECCANISMI DETERMINANTI DELLA FORZA DI CONTRAZIONE DEL MIOCARDIO
The management strategy

Drugs

Fluid Balance

O2

Surgery/Devices
Cellular architecture: the sarcomere at

- **Z disk**
- **M line**

**Thin filament:**
- **ACTIN**

**Thick filament:**
- **MYOSIN**

**Active tension**

**Passive tension**

TITIN — Passive tension
The variation in isometric tension with sarcomere length in muscle fibers

Tension peak at 2.2 µm of length

Tension peak at 2.2 µm of length
RELAZIONE VELOCITÀ DI ACCORCIAMENTO CARICO DI UN MUSCOLO PAILLARE

Braunwald E, Mechanism of contraction 2nd Edition 1976

lunedì 1 gennaio 2001
EFFETTI DELLA NORADRENALINA (NE) SULLA RELAZIONE F/V NEL MUSCOLO PAPILLARE

Braunwald E, Mechanism of contraction 2nd Edition 1976
RELAZIONE TRA CONSUMO MIOCARDICO DI O2 ED ENERGIA MECCANICA PRODOTTA

GIBBS CL, Am J Physiol 1985;249:H199-06

lunedì 1 gennaio 2001
RELAZIONE TRA CONSUMO MIOCARDICO DI O₂ ED ENERGIA MECCANICA PRODOTTA

GIBBS CL, Am J Physiol 1985;249:H199-06

lunedì 1 gennaio 2001
EFFETTI EMODINAMICI INDOTTI DALL’ESPANSIONE ACUTA DI VOLUME

VOLPE M, CIRCULATION 1995;92:2511-18

CARDIOMIOPATIA DILATATIVA IN CLASSE NYHA I-II

SOGGETTI NORMALI

lunedì 1 gennaio 2001
SIGNIFICATO PROGNOSTICO DELLE CATECOLAMINE CARDIACHE

Kaye DM J Am Coll Cardiol 1995; 26:1257-63
Role of oxygen debt in the development of organ failure sepsis, and death in high-risk surgical patients

WC Shoemaker, PL Appel and HB Kram

*Chest* 1992;102;208-215
DOI 10.1378/chest.102.1.208
Complications in Cardiac Surgery

Circulatory I: 12
Stroke: 4
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lunedì 1 gennaio 2001
Buckberg G.
“Congestive heart failure: treat the disease, not the symptoms – return to normalcy”

J Thorac Cardiovasc Surg 2001;121:628-37