BSH Heart Failure Day for Revalidation and Training 2017

Presentation title: Case Presentation – cardio-oncology

Speaker: Mark Drury-Smith

Conflicts of interest: None
Case Presentation – Cardio-oncology

Mark Drury-Smith MB CHB MRCP
Cardiology SpR
University Hospital of Wales
• 27 year old female patient
• ALL diagnosed 1986 (age 4yrs)
• High dose anthracyclines (>250mg/m²) + mediastinal radiotherapy ➔ cure
• Follow-up in specialist “late effects” clinic (paediatric oncology)
• Summer 2009; age 27yrs
• I want a baby!

• Open access echo: Chemotherapy, ?LV function
Echo: 20 yrs post cancer therapy

Report

- Anterior wall hypokinesia
- Preserved LV function

enjoy!
Patient: some months later

Pregnant

- Progressive dyspnoea + orthopnoea: Last month of pregnancy
- Normal vaginal delivery at term

- Day 2 post delivery
- Admitted with decompensated heart failure
  - Tachypnoeic (20resp/min) & tachycardiac (110bpm) at rest
  - Peripherally cold and hypotensive (90/60mmHg)
  - Fluid overloaded: ↑JVP (10cm), pulmonary crepitations + S₃
Initial Investigations

**Haematology:** Hb (10.3), WCC/PLT: normal

**Biochemistry:** U/E, LFT, Glu, Tnl, CRP: normal
Acute Management

Forrester Classification

<table>
<thead>
<tr>
<th>COLD DRY</th>
<th>WARM DRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLD WET</td>
<td>WARM WET</td>
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</table>

- Good response to acute therapy
- 4-6l negative fluid balance
- Pulse: 100SR, BP: 90/60, chest clearer, $S_3$ remains
- Introduction of conventional medical therapy
  - Carvedilol (first), then Lisinopril
  - Oral Frusemide + Spironolactone

Fluids
- Diuretics
- Vasodilators
- Inotropes

Compensated
- Diuretics
- Vasodilators
Extra Investigations: early post delivery

Cardiomyopathy Investigations

- Biochem: normal
- Haematol: normal
- Virology: normal
- Angiogram: normal
- VQ scan: normal
- Pedigree: normal
- CMR: no LGE
Extra Investigations: early post delivery

- Severe LV systolic function
- EF 10%
- Significant mitral regurgitation
Early Management

Introduced to HF nursing service

• Weekly reviews to optimise medical therapy, community support, education
• No breast feeding

Progress at 4 months

• NYHA II
• Optimised medical therapy
  Carvedilol: 50mg bd
  Lisinopril: 20mg od
  Spironolactone: 25mg od
  Frusemide: 40mg bd
  Ivabradine: NO DATA (pre-SHIFT) ?an additional option (HR 90bpm)

Echo

• Improved systolic function; EF 20%

ECG

• Sinus rhythm
• 90bpm
• LBBB
• QRS: 158msec
**Device Therapy**

**ICD**
- Patient fulfilled the NICE guidelines for implantation of a biventricular defibrillator

**CRT**
- NYHA III/IV
- OMT
- Sinus rhythm
- Dyssynchrony
  - QRS >150 alone
  - QRS 120-149 & echo
dysynchrony that is confirmed by echocardiogram
- EF ≤35%

**NEJM 2005;352:225**
Current Device Therapy Guidance

**Implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure**

**Technology appraisal guidance (TA204)** Published date: 25 June 2004

**1 Guidance**

This guidance replaces NICE technology appraisal guidance 95. Issued in January 2004 and NICE technology appraisal guidance 120 Issued in May 2007.

### 1.1 Implantable cardioverter defibrillators (ICDs)

ICDs are recommended as options for:

- Treating people with previous serious ventricular arrhythmias, that is, people who, without a breakable cause:
  - have survived a cardiac arrest caused by either ventricular fibrillation (VF) or ventricular tachycardia or fibrillation or
  - have spontaneous sustained VT causing syncope or significant hemodynamic compromise or
  - have sustained VT with symptoms that are severe enough to warrant class IIc if the New York Heart Association (NYHA) functional classification of heart failure.

- Treating patients who:
  - have a familial cardiac condition with a high risk of sudden death, such as long QT syndrome, hypertrophic cardiomyopathy, Brugada syndrome or any arrhythmogenic right ventricular dysplasia or
  - have undergone surgical repair of congenital heart disease.

**1.2 Implantable cardioverter defibrillators (ICDs), cardiac resynchronisation therapy (CRT) with defibrillation (CRT-D), CRT, CRT with pacing (CRT-P): CRT-Ds are recommended as treatment options for people with heart failure who have left ventricular dysfunction with a left ventricular ejection fraction (LVEF) of 35% or less** (Table 1).

### Table 1. Treatment options with ICD or CRT for people with heart failure who have left ventricular dysfunction with an LVEF of 35% or less (according to NICE guidance, QRS duration and presence of LBBB)

<table>
<thead>
<tr>
<th>QRS Interval</th>
<th>NYHA class I</th>
<th>NYHA class II</th>
<th>NYHA class III</th>
<th>NYHA class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 120 milliseconds</td>
<td>ICD if there is a high risk of sudden cardiac death</td>
<td>ICD and CRT if not classically indicated</td>
<td>CRT-P</td>
<td>CRT-P</td>
</tr>
<tr>
<td>120–180 milliseconds without LBBB</td>
<td>ICD</td>
<td>ICD</td>
<td>CRT-D</td>
<td>CRT-P or CRT-D</td>
</tr>
<tr>
<td>120–180 milliseconds with LBBB</td>
<td>CRT-D</td>
<td>CRT-D</td>
<td>CRT-D</td>
<td>CRT-D</td>
</tr>
<tr>
<td>≤ 250 milliseconds with or without LBBB</td>
<td>CRT-D</td>
<td>CRT-D</td>
<td>CRT-D</td>
<td>CRT-D</td>
</tr>
</tbody>
</table>

**European Heart Journal Advance Access published June 8, 2016**

**2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure**

**The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)**

**Recommendations for implantable cardioverter-defibrillator in patients with heart failure**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary prevention</td>
<td>ICDs are recommended to reduce the risk of sudden death and all-cause mortality in patients who have recovered from a ventricular arrhythmia causing hemodynamic instability and who are expected to survive for &gt;1 year with good functional status.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Primary prevention</td>
<td>ICDs are recommended to reduce the risk of sudden death and all-cause mortality in patients with symptoms NYHA Class II–IV and an LVEF &lt;35% despite 12 months of OMT provided they are expected to survive substantially longer than one year with good functional status, and they have:</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>– HF (unless they have had a MI in the prior 45 days — see below).</td>
<td>E</td>
<td>B</td>
<td>151–157, 227</td>
</tr>
<tr>
<td>– DCM.</td>
<td>E</td>
<td>B</td>
<td>227</td>
</tr>
<tr>
<td>ICD implantation is not recommended within 40 days of an MI as implantation at this time does not improve prognosis.</td>
<td>E</td>
<td>A</td>
<td>158–159</td>
</tr>
<tr>
<td>ICD therapy is not recommended in NYHA Class IV with severe symptoms refractory to pharmacological therapy unless they are candidates for CRT’s ventricular assist device, or cardiac transplantation.</td>
<td>E</td>
<td>C</td>
<td>227–335, 336</td>
</tr>
<tr>
<td>Patients should be carefully evaluated by an experienced cardiologist before generator replacement, because management goals and the patient’s health and clinical status may have changed.</td>
<td>E</td>
<td>C</td>
<td>227–335, 336</td>
</tr>
<tr>
<td>A wearable ICD may be considered for patients with HF who are at risk of sudden cardiac death for a limited period or as a bridge to an implanted device.</td>
<td>E</td>
<td>C</td>
<td>227–335, 336</td>
</tr>
</tbody>
</table>

**Recommendations for cardiac resynchronisation therapy implantation in patients with heart failure**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref*</th>
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<tr>
<td>CRT is recommended for symptomatic patients with HF in sinus rhythm with a QRS duration &gt;120 ms and LBBB (QRS morphology and with LVEF &lt;35% despite OMT) in order to improve symptoms and reduce mortality and morbidity.</td>
<td>I</td>
<td>A</td>
<td>261–272</td>
</tr>
<tr>
<td>CRT should be considered for symptomatic patients with HF in sinus rhythm with a QRS duration &gt;120 ms and non-LBBB (QRS morphology and with LVEF &lt;35% despite OMT) in order to improve symptoms and reduce mortality and morbidity.</td>
<td>I</td>
<td>B</td>
<td>261–272</td>
</tr>
<tr>
<td>CRT is recommended for symptomatic patients with HF in sinus rhythm with a QRS duration of 130–149 ms and LBBB (QRS morphology and with LVEF &lt;35% despite OMT) in order to improve symptoms and reduce mortality and morbidity.</td>
<td>I</td>
<td>B</td>
<td>266, 337</td>
</tr>
<tr>
<td>CRT may be considered for patients with a QRS duration of 120–180 ms and non-LBBB (QRS morphology and with LVEF &lt;35% despite OMT) in order to improve symptoms and reduce mortality and morbidity.</td>
<td>I</td>
<td>B</td>
<td>266, 337</td>
</tr>
<tr>
<td>CRT rather than IV pacing is recommended for patients with HFREF regardless of NYHA class who have an indication for ventricular pacing and high degree AV block in order to reduce mortality. This includes patients with AF (see Section 3.1).</td>
<td>I</td>
<td>B</td>
<td>271–274</td>
</tr>
<tr>
<td>CRT should be considered for patients with LVEF &lt;50% in NYHA Class II–IV despite OMT in order to improve symptoms and reduce mortality and morbidity. If they are in AF and have a QRS duration &gt;120 ms provided a strategy to ensure biventricular capture is in place or the patient is expected to return to sinus rhythm.</td>
<td>I</td>
<td>B</td>
<td>271–274, 278–201</td>
</tr>
<tr>
<td>CRT with HFREF who have received a conventional pacemaker or an ICD and subsequently develop worsening HF despite CRT and who have a high proportion of IV pacing be considered for upgrade to CRT. This does not apply to patients with stable HF.</td>
<td>I</td>
<td>B</td>
<td>265, 293–295</td>
</tr>
<tr>
<td>CRT is contra-indicated in patients with a QRS duration &lt;120 ms.</td>
<td>I</td>
<td>B</td>
<td>265, 293–295</td>
</tr>
</tbody>
</table>

| CRT, cardioverter-defibrillator; HF, heart failure; ICD, implantable cardioverter-defibrillator; LBBB, left bundle branch block; NYHA, New York Heart Association; OMT, optimal medical therapy.
Biventricular defibrillator
Post biventricular defibrillator

- Improvement in patients symptoms
- No Orthopnoea or PND
- No longer peripheral oedema
- Improved exercise tolerance
Echo: 6 month post biventricular defibrillator

- Significant improvement in LV function (EF 40-45%)
- Improvement in MR
Echo: 1 year post biventricular defibrillator
Current Situation: 2017

• 34 years old now
• No symptoms of breathlessness, no PND/ orthopnoea/ ankle swelling.
• NYHA class II
• EF 45%
Current Situation: 2017

- Life-long medical and device therapy
- Surgical sterilisation
- Biventricular defibrillator approaching end of battery life.
2017

• Options..
  • ‘Change like for like’
  • ‘Downgrade’ biventricular ICD to pacemaker

• Patients wishes
  • ‘Changed like for like’
Learning/Discussion points

• Long-term surveillance of childhood cancer survivors
• Role of open access echo
• Counselling patients at time of pregnancy
• Mechanism of LVSD: peri-partum cardiomyopathy or pregnancy associated
• Does optimal medical therapy pre-device therapy include ivabradine
• What to do if EF >30% at time of device battery depletion and no ICD therapies
questions?