Chronic Obstructive Pulmonary Disease

Improving the outcomes

South Link Health residential weekend
November 2008

COPD in New Zealand

- COPD is ranked 2nd in men and 5th in women with regards to its health impact
- COPD is the 4th leading cause of death after cancer, heart disease and stroke
- Is estimated to cost up to $192m in direct health care costs each year

Mr ES 45 year old Caucasian

Presenting Complaints:
Dyspnoea 3 months
Cough

Past Medical History:
Nil of note – seldom attends practice
No regular medications

Personal History:
Builder - active.
Smoker – 20/day since 16 years old.

**COPD Severity**
- **GOLD Classification by Spirometry**

<table>
<thead>
<tr>
<th>Stage</th>
<th>FEV₁/FVC</th>
<th>FEV₁ (%pred)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Mild</td>
<td>&lt; 0.70</td>
<td>≥ 80%</td>
</tr>
<tr>
<td>II. Moderate</td>
<td>&lt; 0.70</td>
<td>≥ 50% &lt; 80%</td>
</tr>
<tr>
<td>III. Severe</td>
<td>&lt; 0.70</td>
<td>≥ 30% &lt; 50%</td>
</tr>
<tr>
<td>IV. Very severe</td>
<td>&lt; 0.70</td>
<td>&lt; 30% or &lt; 50% plus chronic respiratory failure</td>
</tr>
</tbody>
</table>

Flow Volume Loop

[Diagram showing Flow Volume Loop]

- Maximum expiratory flow (PEF)
- Expiratory
- Flow (L/sec)
- TLC
- FVC
- RV
- Inspiratory
- Volume (L)
Mr ES 45 year old Caucasian

Presenting Complaints:
Dyspnoea / 3 months
Cough

Past Medical History:
Nil of note – seldom attends practice
No regular medications

Personal History:
Builder - active.
Smoker – 20/day since 16 years old.

NZ Guidelines for Smoking Cessation
A – Ask about smoking
B – Provide Brief Advice to stop smoking
C – Provide evidence-based Cessation support

Cessation Support
1. Multi-session support
   • Quitline (www.quit.org.nz or 0800 778 778)
   • Local smoking cessation service
2. Medication
   • Nicotine replacement therapy
   • Bupropion
   • Varenicline
   • Nortriptyline
Mrs CB 65 year old Caucasian

Presenting Complaints:
Progressive breathlessness over past one year, now struggles to get to mail box. Little benefit from inhaler. Has lost approx. 5 kg in weight.

Past Medical History:
Nil of note. Currently on Combivent PRN.

Personal History:

Treatment by Stage of Disease

Inhaled corticosteroids in COPD

4 large, parallel group, placebo controlled studies published:
- Copenhagen City Lung Study Vestbo et al Lancet 1999;353:1819-23
- ISOLDE Burge et al BMJ 2000;320:1297-303

ICS in COPD studies: baseline data

<table>
<thead>
<tr>
<th></th>
<th>CCLS</th>
<th>EUROSCOP</th>
<th>ISOLDE</th>
<th>LHS2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking history</td>
<td>76% current</td>
<td>100% current</td>
<td>48% current</td>
<td>96% current</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>2.37</td>
<td>2.54</td>
<td>1.40</td>
<td>2.13</td>
</tr>
<tr>
<td>% pred</td>
<td>86%</td>
<td>77%</td>
<td>50%</td>
<td>64%</td>
</tr>
<tr>
<td>I</td>
<td>Budesonide 400 μg bid</td>
<td>Budesonide 400 μg bid</td>
<td>Fluticasone 500 μg bid</td>
<td>Triamcinolone 600 μg bid</td>
</tr>
<tr>
<td>Duration</td>
<td>3 years</td>
<td>3 years</td>
<td>3 years</td>
<td>3 years</td>
</tr>
</tbody>
</table>

ICS in COPD studies: results

<table>
<thead>
<tr>
<th></th>
<th>ΔFEV1</th>
<th>Exacerbations</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCLS</td>
<td>-46 ml/year (NS)</td>
<td>Tot. 155 vs 161 (NS)</td>
<td>Reduced both groups (NS)</td>
</tr>
<tr>
<td>EUROSCOP</td>
<td>-57 ml/year (NS)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>ISOLDE</td>
<td>-50 ml/year (NS)</td>
<td>25% ↓ exacerb. rate</td>
<td>Slower ↓ health status</td>
</tr>
<tr>
<td>LHS2</td>
<td>-44 ml/year (NS)</td>
<td>↓ exacerb.</td>
<td>Reduced symptoms</td>
</tr>
</tbody>
</table>
TORCH study

Aim:
- Assess effect of LABA + inhaled steroids on survival in COPD

Methods:
- 6112 COPD patients, FEV₁ <60% pred, studied over 3 years
- Salmeterol 50 µg + Fluticasone 500 µg bid, placebo, salmeterol alone, fluticasone alone


TORCH study - results

Health Status

Adjusted Mean Change in Total Score (units)

Weeks


UPLIFT study

Aim:
- Assess long-term benefits of tiotropium in COPD

Methods:
- 5993 COPD patients, FEV₁ <70% pred, studied over 4 years
- Tiotropium 18 µg daily or placebo (+ usual meds)
- Examine rate of decline in FEV₁
- Quality of life, exacerbations of COPD, mortality


UPLIFT study - results

Before Bronchodilation

After Bronchodilation

Mrs CB  65 year old Caucasian

Presenting Complaints:
Progressive breathlessness over past one year, now struggles to get to mail-box.
Little benefit from inhaler. Has lost approx. 5 kg in weight.

Update:
Now on Ventolin, tiotropium, fluticasone, salmeterol, + 2 weeks’ prednisone.
Unable to leave house. Becoming depressed.

Pulmonary Rehabilitation

- Aim is to prevent deconditioning and allow patient to cope with his/her disease
- Multi-disciplinary input - physiotherapist, respiratory educator, physician, social worker, occupational therapist, dietitian, pharmacist
- Can improve quality of life, exercise performance
- Does NOT improve lung function

**UPLIFT study - results**

![Graph showing improvement in SGRO Total Score](image)

**UPLIFT study - results**

![Graph showing probability of exacerbation](image)

**UPLIFT study - results**

![Graph showing death from any cause](image)
Pulmonary Rehabilitation

- Lacasse et al. Lancet 1996
- Meta-analysis of 14 RCT
- Severe COPD patients in respiratory rehabilitation for minimum of 4 weeks
- Beneficial effect of respiratory rehabilitation on exercise capacity and health-related quality of life

Medical Research Council - Lancet 1981

- 87 patients with severe COPD
  - hypoxaemia + CO₂ retention, cor pulmonale
  - Oxygen therapy (15 hours/day) or none (control)
  - 5 year survival
    - 19/42 oxygen group died
    - 30/45 control group died
  - Improved wellbeing
Nocturnal Oxygen Therapy Trial
- Annals Int Med 1980

- 203 patients with hypoxaemic COPD
- 12 hour nocturnal O₂ vs 24 hour (continuous) O₂
- Mean follow-up 19.3 months
- Mortality in 12 hour O₂ group 1.94 times continuous

Guidelines for Oxygen Therapy

- Currently recommended one of the following criteria should be met for LTOT in patients with COPD:
  - \( \text{PaO}_2 < 7.3 \text{ kPa} \) (55 mmHg)
  - \( \text{PaO}_2 < 7.8 \text{ kPa} \) (59 mmHg) with polycythaemia, pulmonary hypertension or clinical evidence of cor pulmonale
- Disease should be stable. Improvement in hypoxaemia may occur in approximately 30% of patients when followed for three months after an exacerbation of COPD
Chronic hypoxia
Pulmonary vasoconstriction
Pulmonary hypertension
Cor pulmonale
Death
Muscularization
Intimal hyperplasia
Fibrosis
Obliteration
Oedema

Pulmonary Hypertension in COPD

I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Cor pulmonale - management:

- Oxygen
- Diuretics
  - Frusemide
  - Spironolactone
- Aminophylline
- Anticoagulation
- Venesection – PCV ≥ 0.55
- Digoxin, Ca²⁺ antagonists, vasodilators – role controversial

Noninvasive Positive Pressure Ventilation in COPD

- Alternative to invasive mechanical ventilation in management of respiratory failure
  - Avoidance of local trauma from endotracheal intubation
  - Reduced risk of infection
- Reduced mortality and other complications with NPPV compared with control groups in acute exacerbations of COPD

Noninvasive Positive Pressure Ventilation in COPD

- Indications:
  - Moderate to severe respiratory distress
  - Respiratory rate >25 breaths/min
  - pH<7.35 and PaCO₂ >45 mmHg (>6 kPa)
- Contraindications:
  - Respiratory arrest
  - Unable to protect airway
  - Agitated or uncooperative
  - Medically unstable (hypotensive shock, arrhythmias)
Lung Volume Reduction Surgery

- Surgical procedure aimed to alleviate symptoms in selected patients with advanced emphysema
- Resection of diffusely emphysematous lung tissue
  - aim to reduce lung volume by 20-30%
- Mortality rate between 5-9%


- Improvements in exercise capacity and quality of life
- No reduction in mortality during average 29 months follow-up

- Mechanisms of efficacy:
  - improved elastic recoil to enhance radial traction on airways
  - improved efficiency of diaphragmatic and chest wall mechanical function

LVRS – Patient Selection

- Benefit if predominant upper lobe emphysema and low exercise capacity
- Patients with non-upper lobe emphysema and high exercise capacity at increased risk of death
- Also high risk if:
  - FEV1 ≤ 20% predicted
  - Homogeneous emphysema or DLco ≤20% predicted

Benefit if predominant upper lobe emphysema and low exercise capacity