Rehabilitation for Operated Lung Cancer (ROC)

M. Abdelaziz, A. Bradley, P. Agostini, MS. Kalkat, E. Bishay, RS. Steyn, PB. Rajesh, B. Naidu

Regional department of Thoracic surgery
Birmingham Heartlands Hospital
Heart of England NHS Foundation Trust (HEFT)
Rehabilitation in lung cancer surgery

- 4 studies preop rehabilitation
- 2 ▲ exercise capacity
- 2 ▲ postop predicted lung function (COPD)

2-4 weeks of peripheral (± inspiratory) muscle training,

No improvement in clinical outcomes
COPD Rehabilitation Programme

- Improve their function and exercise capacity
- Reduce complications
- Enhance recovery from exacerbations.

Prevalence of COPD in lung cancer

73 % men & 53 % women

Lung cancer resection - irreversible exacerbation?
Postoperative Pulmonary Complications (PPC) are common but so what?

<table>
<thead>
<tr>
<th></th>
<th>PPC group (n=77)</th>
<th>Non- PPC (n=325)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mortality</strong></td>
<td>11.7% (9)</td>
<td>0.9% (3)</td>
</tr>
<tr>
<td><strong>ITU admission</strong></td>
<td>19.5% (15)</td>
<td>2.5% (8)</td>
</tr>
<tr>
<td><strong>LOS (days) median (95%CI)</strong></td>
<td>12 (11.8-20.4)</td>
<td>5 (5.6-6.1)</td>
</tr>
<tr>
<td><strong>HDU (95%CI)</strong></td>
<td>4 (3.7-5.5)</td>
<td>2 (1.8-2.1)</td>
</tr>
</tbody>
</table>

* = P < 0.001

Agostini et al. Thorax. 2010 (BHH data)
## Independent Risk Factors for PPC

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 75</td>
<td>2.3</td>
<td>1.2-4.2</td>
</tr>
<tr>
<td>ASA ≥ 3</td>
<td>2.9</td>
<td>1.5-5.7</td>
</tr>
<tr>
<td>Current smoking</td>
<td>2.3</td>
<td>1.2-4.2</td>
</tr>
<tr>
<td>COPD</td>
<td>5.9</td>
<td>3.2-10.9</td>
</tr>
<tr>
<td>Reduced mobility</td>
<td>2.1</td>
<td>1.2-3.8</td>
</tr>
</tbody>
</table>

Agostini et al. Thorax. 2010 (BHH data)
Risk assessment for surgery

- Post-operative cardiac event
  - ACC/AHA* risk stratification
  - +/- cardiology review
  - *see text

- Peri-operative death
  - Thoracoscore Appendix 3

- Post-operative dyspnoea
  - Dynamic lung volumes, transfer factor
  - +/- split function testing

Address any potentially modifiable risk factors & reassess

Does the patient accept the risk in each category +/- potential impact on lifestyle?

- No
  - Exclude surgery from multi-modality management

- Yes
  - Offer surgery as part of multi-modality management
A programme identifying potential surgical candidates several weeks before surgery, optimising their physical status, preparing them for the inpatient journey and supporting their recovery after surgery.
Pilot

- Enriched Cohort study
- April 2010 - December 2011
- 2 of 10 referring hospitals sites
- The rest are controls
- Pragmatic – surgery not delayed
- Local Adaptation
- Complex (bundle) Intervention
Main elements of ROC

Pulmonary Rehabilitation

Smoking Cessation

Patient Self management and Education

Nutritional Intervention
Patient identified in the multi disciplinary meeting as potential surgical candidate for curative lung resection pending final investigations

- Written and verbal information given by Lung Cancer Nurse Specialist/Respiratory Consultant
- Dietary assessment and advice, referral if needed
- Smoking cessation—identify and direct to relevant service
- Patient attends Rehabilitation sessions twice a week until surgery (surgery is not delayed)
- Self management Education programme

Method
Outcomes

Primary:

- PPC
- Length of stay (+HDU/ITU)
- Re-admission rate

Secondary:

- Exercise capacity
- Pulmonary function
- Smoking cessation
- Nutrition assessment (BMI)
- Quality of Life
Recruitment up to date

- 32 intervention and 148 non-intervention patients
- 3 drop out
  - 2 disease related
  - 1 non disease drop out
- 6 (1-13) preoperative rehabilitation sessions attended
- 7 (4-10) preoperative education sessions attended
## Demographics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention (n=29)</th>
<th>Non Intervention (n=138)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age*</td>
<td>69 ± 6</td>
<td>65 ± 12</td>
</tr>
<tr>
<td>Mild COPD</td>
<td>38%</td>
<td>37%</td>
</tr>
<tr>
<td>Severe COPD</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>34%</td>
<td>36%</td>
</tr>
<tr>
<td>BMI</td>
<td>27 ± 5</td>
<td>28 ± 4</td>
</tr>
<tr>
<td>Current smokers</td>
<td>17%</td>
<td>18%</td>
</tr>
<tr>
<td>ECOG ≥3</td>
<td>16%</td>
<td>18%</td>
</tr>
<tr>
<td>ASA≥3</td>
<td>33%</td>
<td>35%</td>
</tr>
<tr>
<td>Thoracoscore</td>
<td>2.5%</td>
<td>2.6%</td>
</tr>
</tbody>
</table>
Types of surgery

- Pneumonectomy
- Sleeve
- Bi Lobectomy
- Lobectomy
- Segment/Wedge
- Exploratory

- Intervention
- Non intervention
**Primary outcomes**

<table>
<thead>
<tr>
<th>*p&lt;0.005</th>
<th>Intervention (n=29)</th>
<th>Non-Intervention (n=138)</th>
</tr>
</thead>
<tbody>
<tr>
<td>* PPC Rate</td>
<td>7%</td>
<td>18%</td>
</tr>
<tr>
<td>*Readmission rate</td>
<td>8%</td>
<td>15%</td>
</tr>
<tr>
<td>ITU admission rate</td>
<td>3 % (1)</td>
<td>2% (3)</td>
</tr>
<tr>
<td>HDU median LOS</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Median Hospital LOS</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
6 minutes walk distance

Average distance increase for all patients is **60.9 (20-195) meters**
Pulmonary function

16% average increase in FEV1 pre operatively

Pre-rehab

Pre-op
QOL: Function scores

Preop
6 weeks postop
5 months postop

Global health status/QoL
Physical Function
Role Function
Emotional Function
Cognitive Function
Social Function
Lung cancer specific symptom scores

- LC Dyspnoea
- LC Coughing
- LC Haemoptysis
- LC Sore mouth
- LC Dysphagia
- LC Periph. neuropathy
- LC Alopecia
- LC Pain in chest
- LC Pain in arm
- LC Pain other

Preop
6 weeks postop
5 months postop
Where do we go from here?

A Rehabilitation programme for operated lung cancer

Is viable

Early Results are promising

Multi centre RCT
Acknowledgement

Research Nurse
Amy Bradley

Lung cancer nurses
Lynn Reaper
Denise Silvey
Jayne Parker
Chris Jordan

Physiotherapists
Louisa Stonehewer
Elaine Bevan-Smith
Paula Agostini
Helen Beadle
Stuart Lightfoot
Anita Clarke
Rebecca Jenkins
Johanna Harvey
Libby Brace

Smoking cessation nurse
Claire Gallagher-Tinsley

Steering Group
Richard Steyn
Paul Aveyard
Sally Singh
Andrew Woolley
Rahul Mukherjee
Kate Duffield
County Bernie

Macmillan Dietician
Amanda Irwin

Other
Amanda Parsons
James Gillies
## Rehabilitation in lung cancer surgery

<table>
<thead>
<tr>
<th>Author, date, Study type</th>
<th>Patient Group/ Intervention</th>
<th>Outcomes</th>
<th>Key Results</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jones et al (2007)</strong> Cancer Feasibility study</td>
<td>N=20 Surgeons discretion 3 wk cycle (x5/wk)</td>
<td>Exercise capacity 13/20</td>
<td>V02 max ↑ 2.4ml/kg/mt (1.0-3.8; p=0.002) 6MWT test i ↑ 40mts (16-64; p=0.003)</td>
<td>Selection criteria not clear The reason for drop out in patients not stated</td>
</tr>
<tr>
<td><strong>Bobbio et al (2008)</strong> EJCTS Feasibility study</td>
<td>N=12 COPD (V02max &lt;15) 4wk IMT(IS)+PMT(x5/wk)</td>
<td>Exercise capacity 11/12</td>
<td>V02 max ↑ 2.8ml/kg/mt 13.5 ±1.3 vs 16.3±1.9 p&lt; 0.001</td>
<td>PPC rate is 8/11 (73%) Delayed surgery</td>
</tr>
<tr>
<td><strong>Sekine et al (2005)</strong> JapCTVS Historic case control</td>
<td>N= 22 (05) vs 60 (95-99) COPD 2 wk IMT(IS)+5000 steps (x5wk)</td>
<td>PPO FEV1 LOS</td>
<td>Actual : predicted FEV1 was better in rehab (p=0.047) 29±9 vs 21±7 days</td>
<td>LOS long in both groups Historic controls</td>
</tr>
<tr>
<td><strong>Weiner et al (1997), JTCV , Prospective RCT</strong></td>
<td>N=32 COPD 2 wk IMT (IS) (x6/wk) Post op 3/12</td>
<td>PPC rate PPO FEV1 at 3/12</td>
<td>2/17 vs 2/15. Lob +570ml vs -70mls Pneumo +680ml vs -110mls</td>
<td>No difference in PPC rate</td>
</tr>
</tbody>
</table>
Melbourne Group Scale (MGS)

- 4 of 8 factors indicate PPC.

<table>
<thead>
<tr>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest x-ray atelectasis /infiltration</td>
</tr>
<tr>
<td>Purulent sputum</td>
</tr>
<tr>
<td>Physician diagnosis of pneumonia/chest infection</td>
</tr>
<tr>
<td>Temperature &gt;38°C</td>
</tr>
<tr>
<td>Oxygen saturation &lt;90% on air</td>
</tr>
<tr>
<td>Positive signs on sputum microbiology</td>
</tr>
<tr>
<td>White cell count &gt;11.2 units</td>
</tr>
<tr>
<td>Readmission/prolonged stay ITU/HDU</td>
</tr>
</tbody>
</table>