Smoking Cessation and Thoracic Surgery

Joshua Goldblatt, Cardiothoracic Trainee (SET 1), Fiona Stanley Hospital
Epidemiology

- At time of diagnosis of lung cancer\(^1\):
  - 58% past smokers
  - 24-40% current smokers
  - 20% smoke at time of surgery, of which half of these continue to smoke postop
Perioperative Risk

- Postoperative complications are known to increase costs, worsen QOL and increase LOS\(^1,2\).
- Smoking at time of operation increases risk of postoperative pulmonary complications, LOS and morbidity\(^2\).
- Large retrospective study of 7,990 patients by Mason et al. in 2009 looked at perioperative outcomes based on smoking status\(^3\). Results included:
  - Increased risk of perioperative mortality in past or current smokers (1.5%) compared to never smokers (0.3%)
  - Risk of mortality declined as interval of smoking cessation increased
  - Increased risk of perioperative pulmonary complications in current or past smokers (5.7%) compared to never smokers (2.6%)
  - Risk of pulmonary complications declined as interval of smoking cessation increased
  - Interestingly showed no increase risk with late cessation prior to surgery
- A smaller prospective study of 462 patients by Lugg et al. in 2017 also evaluated perioperative risk\(^4\):
  - Increased risk of perioperative pulmonary complications in current smokers (22%) compared with never smokers (2%), \(p=0.004\)
  - Trend to reduced risk of pulmonary complications in ex-smokers (<6 weeks 10.9%, ≥6 weeks 11.8%)
When to Quit Preoperatively?

- Several studies have suggested that smoking cessation should be >4 weeks prior to surgery, with potentially increased risks of postoperative pulmonary complications <4 weeks\(^2\).
  - Nakagawa et al. in 2001 (288 patients)\(^5\): 53.4% (2-4 weeks) versus 34.7% (>4 weeks)
  - Vaporciyan et al. in 2002 (257 patients)\(^6\): 21.7% (<4 weeks) versus 9.2% (>4 weeks)

- However, these are small retrospective studies, and must way up risk of tumour progression and likelihood of successful smoking cessation.

- The large study by Mason et al. found no correlation between increased postoperative complications and short duration of smoking cessation.
Smoking and Wound Healing

- Smoking:
  - Decreases tissue oxygenation
  - Attenuates inflammatory healing response
  - Proliferative response impaired by reduced fibroblast migration and therefore downregulated collagen synthesis deposition
- Cessation of smoking restores tissue oxygenation and metabolism rapidly
- Inflammatory cell response reversed within 4 weeks
- Nicotine does not affect tissue microcirculation but appears to impair inflammation and stimulate proliferation
- RR 2.1 (95% CI 1.6-2.7) for wound complications in current smokers with no correlation with pack year history
Smoking Cessation and QOL

A prospective trial of 70 patients by Balduyck et al. in 2011 looked at the effect of smoking on QOL post thoracic resection. They found:

- Non-smokers returned to baseline QOL within 1 month of surgery.
- Recent ex-smokers reported decreased physical function during first 6 months and temporary increase in dyspnoea and fatigue in the first 3 months. However these returned to baseline.
- Current smokers did not return to baseline QOL in regards to physical functioning, role functioning and social functioning. At 12-months they reported increased dyspnoea compared with baseline. Also reported significantly more pain at 12-months compared with baseline.
Long-term Survival

- Higher risk at baseline of morbidity and mortality due to increased risk of CVA, IHD, COPD and other malignancies\(^2\).

- Long-term survival post lung cancer resection is improved by smoking cessation at the time of diagnosis prior to lung cancer resection:
  - Nia et al. evaluated 311 patients demonstrating improved prognosis in ex-smokers compared with patients who continued to smoke\(^8\).

- Parsons et al. in 2010 performed a meta-analysis looking at effect of smoking cessation on early-stage lung cancer\(^9\):
  - Continued smoking associated with significant increased risk of all-cause mortality: HR 2.94 (95% CI 1.15 to 7.54)
  - Recurrence in early stage NSCLC: HR 1.86 (95% CI 1.01-3.41)
Prehabilitation - Is it the new standard of care?

- Tarumi et al. performed retrospective study in 82 patients undergoing neoadjuvant CRTx prior to surgery\(^\text{10}\)
  - Admitted patients for mean 10 weeks prior to surgery
  - Included:
    - Relaxation
    - Respiratory training
    - Cough training
    - Lower extremity exercise
    - Smoking cessation
  - Significant increases in FVC, FEV1, particularly in current/former smokers and those with respiratory impairment
  - No control group
- Early evidence suggests that prehabilitation (including smoking cessation) can turn an inoperable patient due to poor lung function into an operative candidate
  - 8 inoperable patients underwent four weeks of prehabilitation, with no mortality and 25% morbidity rate\(^\text{11}\)
  - 11 inoperable patients underwent four weeks of prehabilitation with improvement of 2.8mL/kg/min of VO2 max and subsequent operation with 0% mortality and 72% rate of pulmonary complications\(^\text{12}\)
References