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Title: The use of respiratory functional imaging to get better understanding of lung resection surgery

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Body: Aim The aim of the present study was to get a better understanding of the impact of lung resection surgery (LRS) on the respiratory function using respiratory functional imaging (RFI). Method 7 patients underwent either a single (5/7) or double lobectomy (1/7), or a full pneumectomy (1/7). All patients underwent lung function tests and CT based RFI providing imaged Raw (iRaw), airway volume (iVaw) and internal flow distribution before and after surgery. Result LRS causes deformation of the airways (see figure), a significant drop in FEV1 ($p=0.02$), TCO ($p=0.02$) and VA ($p=0.02$) and an increase in Raw ($p=0.03$). RFI shows decreased airway volume (iVaw, $p=0.02$) and increased resistance (iRaw, $p=0.02$). Changes in both iVaw and iRaw did correlate with changes in FEV1 ($p=0.007$ and $p=0.02$). If iVaw, iRaw and lobar flow were recalculated after virtual resection, these data did correlate well with the observed postoperative data ($R^2=0.8, p<0.01$; $R^2=0.55, p<0.01$; $R^2=0.45, p<0.01$).

Conclusion RFI does provide insights in the influence of LRS on the postoperative airway volumes, resistances and internal flow redistribution and can be used to predict post-operative lung mechanics.