

Evidence Discussion (CH 5.2)

Pre-operative Assessment

Chest imaging is an important component of the pre-operative assessment of patients prior to undergoing lung resection (segmental resection, lobectomy, or pneumonectomy), lung volume reduction surgery (LVRS) or bronchoscopic lung volume reduction (BLVR) with endobronchial valve placement.

It is important to establish that a patient will tolerate one lung ventilation intraoperatively and have sufficient pulmonary reserve postoperatively prior to performing a lobectomy or pneumonectomy for lung cancer.(1) Postoperative lung function (FEV1) and diffusing capacity are predicted using preoperative pulmonary function tests, chest CT and either planar lung scintigraphy (ventilation/perfusion or perfusion imaging) or SPECT/CT.(1,2,3,4)

Chest CT is used to evaluate patients for LVRS. CT evidence of bilateral emphysema was part of the inclusion criteria for the National Emphysema Treatment Trial which compared LVRS with medical therapy for severe emphysema.(5) The craniocaudal distribution of emphysema on CT (upper lobe predominant or non-upper lobe predominant) had an impact on outcomes. The trial demonstrated improved survival, exercise capacity and quality of life in those with upper lobe predominant emphysema and baseline low exercise capacity. Low upper lung zone perfusion on scintigraphy was associated with a survival advantage with LVRS in patients with upper lobe predominant emphysema.(5,6)

Imaging findings play a key role in selecting patients and target lobes for BLVR.(7) The goal of treatment is to achieve complete occlusion of a diseased lobe with a one-way endobronchial valve which will lead to atelectasis of the lobe and reduced hyperinflation.(8) Visual assessment of a high resolution chest CT (HRCT) evaluates the degree and severity of emphysema, identifies target lobes and rules out conditions which would be a contraindication to BLVR, such as severe bronchiectasis or extensive fibrosis.(9) Quantitative analysis of HRCT provides a measurement of the amount of emphysema per lobe and a fissure completeness score, a surrogate for the presence or absence of interlobar collateral ventilation.(9,10) If the emphysema has a homogeneous distribution on CT, a perfusion scan should be done to help select a target lobe which has low perfusion compared to the ipsilateral untreated lobe.(10) Targeting lobes with the lowest perfusion may lead to better clinical outcomes by improving V/Q mismatch.(11) Perfusion can be assessed via planar V/Q scintigraphy, which gives general estimates of ventilation and perfusion to the upper, middle, and lower lung zones, or with SPECT-CT, which provides relative lobar perfusion data.(7)

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