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Title: Histological analysis of compensatory lung growth effects in emphysematous rats after bilobectomy

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Body: Experimentally, lobectomy (LBX) is used to mimic lung volume reduction surgery (LVRS), one of the surgical approaches performed in emphysematous patients waiting for lung transplantation. This study aimed to investigate the structural changes that occur in lungs after LBX. We used 95 Wistar rats divided into four groups: saline+sham LBX (SS); saline+LBX (SX); elastase+sham LBX (ES); and elastase+LBX (EX). Forty-two days after instillation with porcine pancreatic elastase (5UI/100g) or saline solution animals underwent sham surgery or right bilobectomy (middle and cardiac lobes). Animals were killed at two, four or sixteen weeks after LBX and histological analysis were performed in lung sections. All elastase-treated animals showed typical destruction of lung parenchyma architecture with an increased mean linear intercept (Lm) which was recovered in EX compared to ES ($p < 0.002$). Elastic fibers proportion decreased in ES compared to EX ($p < 0.014$), and the collagen fibers increased in elastase groups versus saline groups ($p < 0.015$). The alveolar surface density was increased in ES compared to other groups ($p < 0.001$). The total volume of the respiratory region and total volume of the respiratory tissue were increased in SS, SX and EX versus ES ($p < 0.05$), and the total volume of respiratory airspace was decreased in SS ($p < 0.05$). We conclude that LBX causes an increase in the total volume of respiratory airspace in operated animals (SX and EX), and a 2-fold increase in the total volume of respiratory tissue and respiratory region of elastase-treated animals (EX). These data suggest that the compensatory lung growth after LBX is accompanied by significant recovery in lung architecture.