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ANATOMICAL SEGMENTECTOMY FOR PURE GGO: WHEN AND HOW

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Background: A pure ground glass opacity (GGO) typically represents a non-invasive adenocarcinoma for which sublobar resection is reported to be curative in most cases.

Indication: We typically follow the nodules several times with high-resolution computed tomography (HRCT) scans to monitor lesion growth prior to resection. For peripherally located pure GGOs < 2cm, we perform wedge resection whenever feasible (we aim for at least the tumor diameter, ideally 2 cm as a surgical margin). Segmentectomy is reserved for cases when wedge resection has resulted in an insufficient surgical margin or when wedge resection would not provide an adequate surgical margin (in such cases, segmentectomy is planned from the outset).

Procedures: Minimally invasive approaches such as video-assisted thoracic surgery (VATS) or robotic-assisted thoracic surgery (RATS) are basically employed. We also use 3D reconstructed CT images to help identify segmental anatomy and plan surgery. First, the target pulmonary artery, vein, and bronchus are resected. The bronchus is sometimes identified both bronchoscopically and surgically. The hilum is denuded. Indocyanine green (ICG) is administered systemically to delineate the intersegmental plane unless contraindicated. The illuminated intersegmental plane is marked with cautery and transected with endostaplers. The inflation-deflation line may be used at the surgeon's discretion. The surgical margin is confirmed in the resected specimen.

Results: In our institution, 40 patients with pure GGO < 2.0 cm underwent pulmonary resection between 2017-2023. The median size was 1.2 cm (IQR 1.0, 1.5). Among them, 22 (55%) underwent wedge resection, 15 (37.5%) underwent segmentectomy, and 3 (7.5%) underwent lobectomy (two middle lobes for central lesion, one right upper lobe for three lesions including central one). All segmentectomies were preoperatively planned to achieve a sufficient surgical margin, and there were no intraoperative conversions to lobectomy. Twelve patients underwent segmentectomy via VATS, one via RATS and two via mini-thoracotomy. The median operative time was 146 minutes (IQR 95, 192) and the median blood loss was 4 g (IQR 1, 10). The median

surgical margin was 2.0 cm (IQR 2, 2.5). One patient experienced a grade 4 postoperative myocardial infarction; the remainder had no complications. Pathologically (TNM version 8), 8 were Tis, 4 were T1mi, 2 were T1a, and 1 was T1b. All of them had complete resection status. No additional surgery was performed. All are alive without recurrence with a median follow-up of 4.0 (IQR 1.9, 5.1) years.

Conclusions: Segmentectomy is a viable option to cure pure GGO when wedge resection would not provide sufficient margin. 405/500 words