



Correlation between Imaging Findings, Tumor Features, Prognosis and Surgical Approach in Ground Glass Opacities

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Editorial

With the advent of new radiologic equipments, especially Computed Tomography (CT), lung cancer can be detected in the early stages. On CT scans, early lung cancer is often displayed as Ground Glass Opacity (GGO). GGO is defined as a misty increase in lung attenuation without obscuring the underlying vascular markings. GGOs, often associated with adenocarcinoma, are characterized by a variable behavior, ranging from indolent to aggressive, often conditioned by solid component percentage. Indeed, GGOs can present as pure or combined with a solid component in a variable proportion. Moreover, most lung adenocarcinomas show heterogeneous histological patterns [1] with one predominant subtype and several minor components. These subtypes are classified as follows: Atypical Adenomatous Hyperplasia (AAH), Adenocarcinoma in Situ (AIS), Micro Invasive Adenocarcinoma (MIA), lepidic, papillary, micro papillary and solid.

As already showed by previous studies, radiologic pure-Ground Glass Opacity (GGO) or part-solid tumors with GGO components have usually a favorable prognosis in patients with early-stage non-small cell lung cancer [2]. Good prognosis is determined by slow tumor growth that in case of surgical resection is correlated with rare nodal involvement and local recurrences. However, aggressive behavior and poor prognosis have been reported also in patients treated for GGOs, implying that these kind of tumors, gathered together for their radiologic appearance, actually are heterogeneous and their treatment should be based on single case features. Probably, the most important point conditioning prognosis is that different pathologic subtypes are characterized by growing tissue invasiveness and therefore increasing aggressiveness. Hence, cases with predominant AAH, AIS and MIA are linked to a favorable prognosis, whereas predominant micro papillary or solid component often correlate with worse prognosis.

Based on these statements, several authors have suggested that surgical strategy for GGOs should be oriented by tumor characteristics. Aggressive type should be treated as solid tumor by anatomic surgical resection and lymphadenectomy and indolent types could be treated by sub lobar resection without lymphadenectomy [3,4]. However, pathologic subtypes are rarely defined before surgery because predominant histo type is rarely identified by Fine Needle Aspiration Biopsy (FNAB) specimen. So, the point is how to choose correct surgical approach?

Radiologic findings are usually the only information available in these patients at preoperative time. Based on these requirements, tumor size and GGO/solid component ratio have been identified as significant factors predicting prognosis and, according to National Comprehensive Cancer Network (NCCN) guidelines, nodules <2 cm and >50% ground glass appearance are the indication for sub lobar resection [5]. Recently, Sun et al. [6] have published a paper about correlation between CT findings and tumor characteristics in GGOs. In particular, they focused on pathologic subtypes and gene mutations. It is interesting that Authors managed to find significant correlations between CT and tumor histo type characteristics. They retrospectively divided patients in two groups based on (NCCN) radiologic criteria for sub lobar surgery and found that Group 1 (<2 cm and solid component <50%) correlated with non invasive predominant subtypes and lower Epidermal Growth Factor Receptor (EGFR) gene mutation. These findings support current surgical criteria, explaining why Group 1 cases usually have less aggressive behavior and better prognosis.

The second interesting point emerging from their results is that GGOs seem to change their

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Figure 1: Ground glass opacity of the left upper lobe.

characteristics with size and solid component increasing, implying a tumor development. This means that a wider surgical approach (lobectomy and nodal biopsy) should be supported not only for dimensional but also for biologic reasons. It is common opinion that in case of GGOs, surgical treatment should be tailored on tumor characteristics and many series have been already published confirming good prognosis of subanatomical resection in case of small (<2 cm) pure or partial pure GGOs. Whereas, further studies are needed about bigger tumors. In our opinion, future studies on GGOs behavior and surgical therapy will not be able to leave histologic features and gene mutations out of consideration.

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