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# Effective Cytoreduction Can Be Achieved in Patients with Numerous Neuroendocrine Tumor Liver Metastases

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**BACKGROUND:** Cytoreductive surgery for neuroendocrine tumor liver metastases (NETLMs) improves survival and symptomatic control, however, patients often present with numerous, bilobar metastases and are therefore not considered for surgery. Acceptance of a lower target for cytoreduction (>70% vs. >90%) has expanded the number of surgical candidates, but the feasibility of achieving adequate cytoreduction in patients with many NETLMs remains uncertain. We compared patient outcomes based upon the number of lesions treated to better define the safety and efficacy of cytoreductive surgery for numerous NETLMs.

**METHODS:** A single institutional surgical database of 391 patients having surgery for gastroenteropancreatic neuroendocrine tumors (GEPNETs) was reviewed and patients undergoing hepatic cytoreductive procedures identified. Pre and postoperative images were reviewed to determine the number of NETLMs, liver tumor burden, and percent tumor debulked. Biochemical response and complications were compared between groups. Overall (OS) and progression-free survival (PFS) were compared using the number of lesions treated, percent tumor debulked, and additional clinicopathologic characteristics.

**RESULTS:** A total of 184 patients undergoing 188 hepatic cytoreductive procedures for NETLMs were identified. The median number of liver lesions

treated was 7 with a range of 1-67. Surgeries were stratified into three groups according to the number of metastases treated: 1-5, 6-10, and >10. Median OS and PFS were 89.4 and 22.5 months, respectively, and were not significantly different between these groups, nor were the rates of complications or biochemical response. Greater than 70% cytoreduction was associated with significantly improved OS compared to <70% cytoreduction (134 vs 37.6 months, $p< 0.01$).

**CONCLUSION:** In patients with GEPNETs and NETLMs, >70% cytoreduction was associated with improved OS and PFS and was reliably achieved with similar complication rates in patients undergoing cytoreduction of 1-5, 6-10, or >10 lesions. These data support an aggressive approach to patients with numerous NETLMs to achieve >70% cytoreduction.