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Time-Dependent Recurrence Risk and Prognostic Factors After Hepatic Resection for Neuroendocrine Liver Metastases

Kyoji Ito, MD, PhD[1], Mikel Madi, MD[1], Yoshikuni Kawaguchi, MD, PhD, MPH, MMA[2], Elena Panettieri, MD[3], Adriana Gamboa, MD[1], Timothy E. Newhook, MD[1], Yun Shin Chun, MD[1], Hop S. Tran Cao, MD[1], Ching-Wei D. Tzeng, MD[1], Kiyoshi Hasegawa, MD, PhD[2], Felice Giuliante, MD, PhD[3], Jean-Nicolas Vauthey, MD[1], Jessica E. Maxwell, MD, MBA[1]

[1]Department of Surgical Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA; [2]Hepato-Biliary-Pancreatic Surgery Division, Department of Surgery, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan; [3]Hepatobiliary Surgery Unit, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Università Cattolica del Sacro Cuore, Rome, 00168, Italy

BACKGROUND

Neuroendocrine liver metastases (NELM) frequently recur after hepatic resection; however, the temporal dynamics of recurrence risk remain poorly understood. We sought to identify time-dependent recurrence risk and prognostic factors to allow us to optimize our postoperative surveillance strategy.

METHODS

In this international multicenter study, 329 patients who underwent initial complete treatment by hepatic resection with or without ablation for NELM during 1995–2024 at three hepatobiliary centers were analyzed. Recurrence-free survival and overall survival were estimated using Kaplan–Meier methods. Time-varying risks of recurrence and death were assessed with kernel-smoothed hazard estimates. Prognostic factors were evaluated using univariable and multivariable Cox regression analyses.

RESULTS

The risk of recurrence was highest immediately after surgery and declined over time yet did not reach zero 10 years after resection. Multivariable analysis identified pancreatic primary tumor (hazard ratio [HR] 1.92), multiple liver metastases (HR 1.80), maximum liver tumor diameter >5 cm (HR 1.64), and neuroendocrine carcinoma (HR 2.57) as independent predictors of recurrence (Table 1). Conditional analysis demonstrated that beyond 2 years of recurrence-free survival, only pancreatic primary tumor remained a significant risk factor (Table 1). Based on time-dependent prognostic factors, we propose a risk-adapted surveillance strategy: Patients with pancreatic primary tumors should undergo imaging every 3–4 months during the first 4 years and then transition to imaging every 6–12 months, with follow-up extending beyond 10 years. Patients with

multiple metastases, maximum tumor diameter >5 cm, or neuroendocrine carcinoma should undergo imaging every 3–4 months during the first 2 years and then transition to imaging every 6–12 months, with follow-up extending beyond 10 years.

CONCLUSIONS

The risk of recurrence and the prognostic factors for recurrence after NELM resection change over time. A tailored surveillance approach may meaningfully reduce unnecessary imaging, radiation exposure, and travel burden for lower-risk patients while improving the likelihood of timely detection and intervention in patients at higher risk.

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