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Original Article

Relationship between hospital volume and operative mortality for liver resection: Data from the Japanese Diagnosis Procedure Combination database

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Aim: The present study aimed to conduct a nationwide investigation on the relationship between hospital volume and outcomes following liver resection in Japan. We also discuss health policy implications of the results.

Methods: Using the Japanese Diagnosis Procedure Combination database, we identified 18 046 patients who underwent hepatic resection between July and December 2007–2009. Patients were subdivided into hospital-volume quartiles: very low- (<18/year), low- (18–35), high- (36–70) and very high-volume groups (>70). Multivariate logistic regression analysis for in-hospital mortality within 30 days of surgery was performed to analyze adjusted effects of various factors.

Results: Patients in the very high-volume group had a higher Charlson Comorbidity Index ($P < 0.001$) than those in the very low-volume group. Very low-volume hospitals were significantly less likely to perform extended lobectomy than very high-volume hospitals (5.4% vs 17.6%, $P < 0.001$). Crude in-hospital mortality within 30 days of surgery was 1.1% (0.6%, 0.8%, 1.9% and 3.0% for limited resection, segmentectomy, lobectomy and extended lobectomy, respectively). With reference to the very low-volume group, risk-adjusted odds ratios (95% confidence intervals) of low-, high- and very high-volume groups for overall mortality were 0.70 (0.48–1.02; $P = 0.060$), 0.52 (0.34–0.81; $P = 0.004$) and 0.16 (0.09–0.30; $P < 0.001$), respectively.

Conclusion: There is a linear trend between higher hospital volume and lower in-hospital mortality of liver resection in Japan, particularly for lobectomy and extended lobectomy. Based on these results, regionalization of lobectomy and extended lobectomy in high-volume centers could be effective for reducing postoperative mortality.

Key words: hospital volume, liver resection, operative mortality

INTRODUCTION

LIVER CANCER IS the fourth leading cause of cancer death in Japan; approximately 33 000 people died from liver cancer in 2009.[1] Liver resection is one of the major curative treatment options in the management of liver neoplasm. According to a national survey of primary liver cancer conducted from 2004 to 2005 at 544 medical institutions in Japan, 31.7%, 30.6% and 31.7% of 17 986 patients with hepatocellular carcinoma underwent surgery (liver resection or liver transplantation), local ablation therapy and transcatheter arterial embolization, respectively.[2]

There has been increasing evidence regarding the effect of hospital volume on postoperative mortality and morbidity following major oncologic surgery.[3–11] With regard to liver resection, several previous reports have demonstrated such a relation, but most of them

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