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Novel Image-guided Surgery of Gallbladder Cancer by Indocyanine Green Fluorescence Navigation

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Abstract
Background: There has been a debate as to the extent of hepatic resection for T2 gallbladder cancer. While some surgeons advocate resection of the segments 4a and 5, gallbladder bed resection is also performed by others. A fluorescent imaging technique with selective injection of indocyanine green can provide real-time anatomic guidance within the operative field for hepatobiliary surgery. This study was performed to evaluate the usefulness of fluorescent navigation surgery for gallbladder cancer.
Methods: Four patients underwent fluorescent navigation surgery for gallbladder cancer. As a source of fluorescence, indocyanine green was injected into the cystic artery. The liver surface was observed with a photodynamic eye and the perfusion area of indocyanine green was resected en bloc. All patients underwent lymph node dissection.
Results: The patients comprised two men and two women with a mean age of 72 years. The mean operation time was 439.8 minutes, the mean blood loss was 504.5 ml, and the mean postoperative hospital stay was 16.5 days. The pathological tumor depth was T1b in one patient, T2 in two, and T3 in one. Lymph node metastasis was present in one patient. A negative surgical margin was obtained in all patients. The disease recurred in lymph nodes in the node-positive patient and the remaining three patients are alive with no evidence of disease to date.
Conclusions: Navigation surgery utilizing ICG fluorescence angiography via the gallbladder artery may provide a clue to the optimal areas of en bloc hepatic resection for T2
gallbladder cancer.
Key words: fluorescence navigation surgery, gallbladder cancer, ICG