

Parenchymal-sparing hepatectomy for deep-placed colorectal liver metastases

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Background. The feasibility of parenchymal-sparing hepatectomy has yet to be assessed based on the tumor location, which affects the choice of treatment in patients with colorectal liver metastases.

Methods. Sixty-three patients underwent first curative hepatectomy for deep-placed colorectal liver metastases whose center was located >30 mm from the liver surface. Operative outcomes were compared among patients who underwent parenchymal-sparing hepatectomy or major hepatectomy (≥ 3 segments).

Results. Parenchymal-sparing hepatectomy and major hepatectomy were performed for deep-placed colorectal liver metastases in 40 (63%) and 23 (37%) patients, respectively. Resection time was longer in the parenchymal-sparing hepatectomy than in the major hepatectomy group (57 vs 39 minutes) ($P = .02$) and cut-surface area was wider (120 vs 86 cm²) ($P < .01$). Resected volume was smaller in the parenchymal-sparing hepatectomy than in the major hepatectomy group (251 vs 560 g) ($P < .01$). No differences were found between the 2 groups for total operation time (306 vs 328 minutes), amount of blood loss (516 vs 400 mL), rate of major complications (10% vs 13%), and positive operative margins (5% vs 4%). Overall, recurrence-free, and liver recurrence-free survivals did not differ between the 2 groups. Direct major hepatectomy without portal venous embolization could not have been performed in 40% of the parenchymal-sparing hepatectomy group (16/40) because of the small liver remnant volume.

Conclusion. Parenchymal-sparing hepatectomy for deep-placed colorectal liver metastases was performed safely without compromising oncologic radicality. Parenchymal-sparing hepatectomy can increase the number of patients eligible for an operation by halving the resection volume and by increasing the chance of direct operative treatment in patients with ill-located colorectal liver metastases. (Surgery 2016;■■■■.)

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TREATMENT STRATEGY for colorectal liver metastases (CRLMs) has evolved during the last 2 decades. Sequential increase in the use of liver resection and advancements in medical therapy have improved survival in patients with CRLMs profoundly. However, the number of patients with CRLMs eligible for an operation remains 25%, even with recent advances in multidisciplinary approaches.¹ Thus, a current issue in the treatment of CRLMs is how to expand incorporation of surgery aiming at cure of the disease.

Refining the definition of technical resectability is an essential key to increasing patients eligible for

an operation. Several strategies were developed to promote extensive hepatectomy by increasing the future liver remnant (FLR): portal vein embolization (PVE), 2-stage hepatectomy, and more recently Associating Liver Partition and Portal vein Ligation for Staged hepatectomy. However, the drawback of this multistep approach is that some patients do not complete radical operations due to failure of the procedures or tumor progression during the waiting time.²⁻⁴ Additionally, when deep-located CRLMs exist bilaterally in the liver, extensive hepatectomy needs to be combined with ablation therapy, the radicality of which has not yet been established.⁵⁻⁸

Parenchymal-sparing hepatectomy (PSH) can play an important role in expanding operative indication to CRLMs. A growing number of series reveal the technical and oncologic benefits of PSH in comparison with major hepatectomy (MH).⁹⁻¹⁶ However, no study to date has addressed the feasibility of PSH based on the tumor location that causes great concern for surgeons to decide

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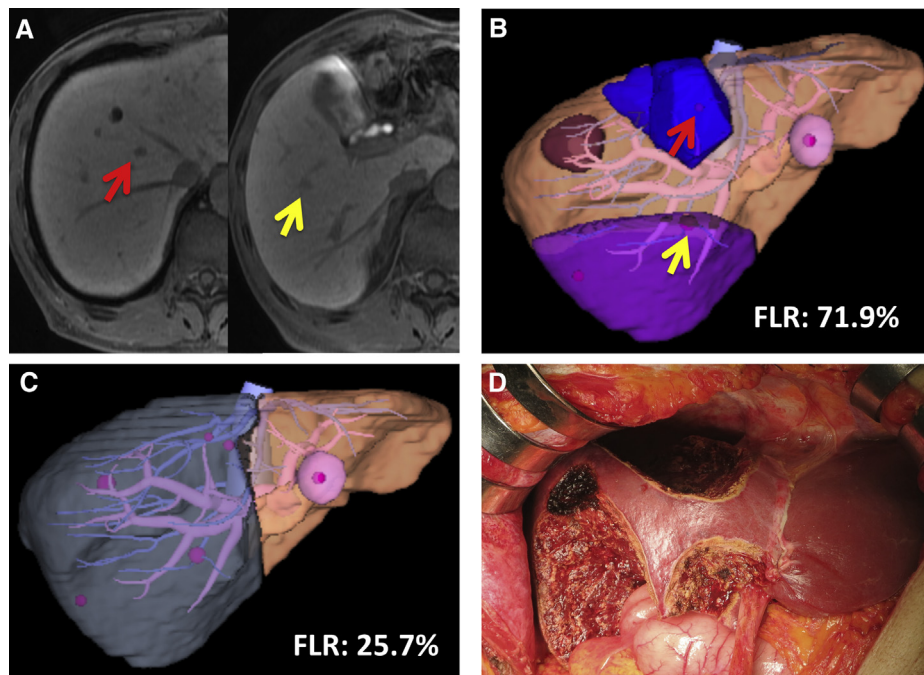


Fig 1. PSH for deep-placed CRLMs. The patient had 2 deep-placed CRLMs (segment 8 to 1 [red arrow] and segment 6 [yellow arrow]) (A). Estimated future liver remnant (FLR) after PSH and right hepatectomy was 71.9% (B) and 25.7% (C), respectively. (D) Wedge resections were performed for this patient with an operation time of 380 minutes and blood loss of 610 mL. The patient was discharged on postoperative day 17 without any major complications. (Color version of this figure is available online.)

procedures. Although PSH can be applied easily to palpable CRLMs at the liver surface, in patients undergoing PSH for deep-placed CRLMs, technical complexity for removing impalpable tumors and oncologic safety to dig out tumors with closer margin need to be clarified.

In our institution, PSH has been performed as a standard procedure for CRLMs, while MH is applied only to patients who have CRLMs close to the major Glissonian sheath to achieve R0 resection. The aim of this study was to assess the technical and oncologic feasibility of PSH for deep-placed CRLMs by comparing the operative outcomes to those after MH.

METHODS

Patient selection. The Institutional Review Board of the Cancer Institute Hospital approved this study protocol (2015-1090). A prospectively maintained database in the Department of Hepato-Biliary-Pancreatic Surgery was reviewed for 510 patients who underwent hepatectomy for CRLMs between January 2005 and December 2013. We identified patients who had deep-placed CRLMs whose center was located >30 mm from the liver surface. We limited our study to patients who had CRLMs <30 mm in size, to exclude

palpable CRLMs and cases for which MH was inevitable to remove large tumors. The following exclusion criteria were applied: (1) no curative operation and (2) history of previous hepatectomy. MH was defined as resection of ≥ 3 segments, and other procedures were classified as PSH.

Indications for hepatectomy of CRLMs. Hepatectomy was indicated for cases in which all tumors could be removed with clear margins, leaving FLR >30% of the total liver volume. In our institution, PSH was the standard procedure regardless of the number or size of CRLMs (Fig 1). MH was indicated only when CRLMs were close to major Glissonian pedicles and R0 resection was not feasible (Fig 2). The extent of hepatectomy was decided according to the result of the indocyanine green retention test that was performed routinely before an operation. MH was not applied when indocyanine green retention rate at 15 minutes was over 20%.¹⁷ In patients who had CRLMs invading the hepatic veins, PSH was the first choice of procedure, given that the tumors did not invade major Glissonian pedicles, and the hepatic veins were sacrificed or reconstructed according to the estimated congestive area.

Routine use of preoperative chemotherapy was not adopted until 2010. After 2010, preoperative

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