***Original Article***

# Colorectal Cancer with Resectable Liver Metastases: Surgical Resection, Radiofrequency Ablation, or Stereotactic Body Radiotherapy: Clinical Outcomes of Different Treatment Modalities

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***Key Words***
Colorectal cancer with liver metastasis;
Liver resection;
Radiofrequency ablation;
Stereotactic body radiotherapy

***Abbreviations***
CLM: colorectal cancer with liver metastasis;
RFA: radiofrequency ablation;
SBRT: stereotactic body radiotherapy;
CI: 95% confidence interval

***Purpose.*** Management of patients with synchronous colorectal cancer with liver metastases (CLM) should be individually tailored. We aimed to identify differences in clinical outcomes among different treatment modalities for the treatment of resectable synchronous CLM.
***Methods.*** Between 2008 and 2014, 75 patients were diagnosed with resectable synchronous CLM and underwent colorectal resection at the Chi-Mei Medical Center. Among these patients, 52 patients underwent a simultaneous liver resection; 14 patients underwent radiofrequency ablation (RFA); and 9 patients underwent stereotactic body radiotherapy (SBRT) for liver metastases. We compared the clinicopathologic characteristics, posttreatment complications, marginal recurrence, and prognosis patients treated with different modalities.
***Results.*** There was no difference in gender, comorbidity, primary tumor size/location, or number of liver metastases among the 3 groups. The mean age was older in the SBRT group ($p = 0.0431$), and the preoperative CEA level was lower in the RFA group ($p = 0.0292$). Although there was no difference in the complication rate or marginal recurrence rate among these groups, the liver resection group had a higher complication rate and lower marginal recurrence rate. The liver resection group had a longer disease-free duration (14.94 ± 11.72 months, $p = 0.0035$) and better 2-year probability of disease-free survival (34.07%, $p = 0.0004$) compared with the RFA and SBRT groups. Using univariate and multivariate Cox proportional hazard regression analyses, the CLM treatment type was an independent prognostic factor of disease-free survival.
***Conclusions.*** Outcomes with RFA and SBRT in CLM have included higher local marginal recurrence rates. If feasible, resection of liver metastases is the best treatment choice. Furthermore, as compared with the outcomes in the SBRT group, use of RFA had good outcomes; as such, this treatment should be considered for select patients. SBRT should be considered a palliative treatment now.
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Colorectal cancer is one of the most frequent cancers in Western society. Treatment of colorectal cancer with liver metastases (CLM) is an important clinical issue as there are nearly a million newly diagnosed cases and nearly a half million deaths reported worldwide.[1] This cancer has the second highest incidence in Taiwan with 14,965 new cases in 2012 and 5603 deaths in 2014.[2] The liver is the most common site of distal metastatic disease in patients with colorectal cancer. CLM develops in about 50% of patients with colorectal cancer.[3,4] The median survival of untreated CLM is approximately 6 months.[5] Select patients who are administered combination regimens with a complete metastasectomy experienced improved 5-year survival rates. Therefore, management of patients with CLM is a therapeutic challenge for surgeons and oncologists.

Therapeutic modalities for liver metastases can be divided into surgical resection, non-resection ablation techniques, and regional or systemic chemotherapy. Management of CLM has changed significantly during the past decade. The improvement of operative management, better knowledge of liver hypertrophy, and advancement of surgical skills have led to increased safety in liver resection.[6] New knowledge as concentration on minimizing blood loss and maintaining appropriate functional remnant liver volume would contribute to improved results. To date, liver resection for CLM is associated with a 5-year survival rate of 24-58% and low postoperative morbidity and mortality rates.[7] Liver resection is a potentially curative treatment for patients with CLM. However, only 5-10% of all patients with CLM are initial candidates for a potentially curative resection.[8,9] In patients with initially resectable CLM, older patients, patients with more comorbidities, or patients who had multimodality treatments such as radiofrequency ablation (RFA),[10,11] cryotherapy,[12] and stereotactic body radiotherapy (SBRT),[13,14] an alterative treatment has been developed. The present study was performed to determine whether there were differences in outcomes among surgical resection, RFA, and SBRT for the treatment of resectable CLM at Chi-Mei Hospital.

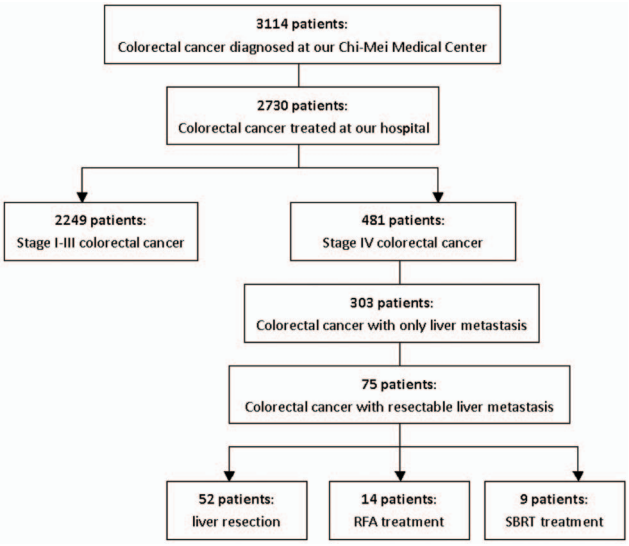


**Fig. 1.** Study flow diagram.

## Methods

Between Jan 2008 and Dec 2014, 3114 patients were diagnosed with colorectal cancer at the Chi-Mei Medical Center, and 2730 patients underwent treatment at our hospital. Among 481 patients with stage IV colorectal cancer, 303 patients were diagnosed with colorectal cancer with only liver metastases. The diagnosis of liver metastasis was based on imaging studies such as ultrasonography and enhanced CT with/without needle biopsy. Needle aspiration biopsy was performed before treatment in only those patients with atypical hepatic mass enhancement. Liver metastases were defined as synchronous whenever they were diagnosed before colorectal resection. Resectability was defined by experienced hepatobiliary surgeons and a radiologist as the ability to immediately achieve complete resection (R0) with an adequate future remnant liver. The estimated liver volume following hepatic resection would be > 20% of the total estimated liver volume. If the patients with liver cirrhosis would receive liver resection, the treatment options was according to BCLC guideline or Japanese guideline as HCC. The safety limit for the liver parenchymal resection rate was estimated using ICG-$R_{15}$ and Makuuchi criteria to select patients for hepatectomy. Patients with refractory ascites or a total bilirubin of > 2.0 mg/dL would not be suitable for liver resection. Hepatobiliary surgeons determined the ap-

propriate surgical procedure.[15,16] Finally, only 75 patients were identified with resectable synchronous liver metastases and enrolled in our study (Fig. 1). All underwent a colectomy or proctectomy for primary colorectal cancer. Among them, 52 patients underwent a simultaneous liver resection; 14 patients underwent RFA; and 9 patients underwent SBRT for synchronous liver metastasis in our hospital. RFA for colorectal cancer with liver metastasis was administered using sono-guidance and CT localization. It was performed with local anesthesia including fentanyl and Dormicum for conscious sedation and analgesia. A 2.5-4.0 cm exposed cool-tip ablation needle was inserted into a nodule. The tumor was ablated, and the final temperature was around 60 °C to 70 °C. After RFA, we arranged a dynamic CT study to demonstrate tumor coverage. The needle tract was also ablated. Contraindications to RFA included bile duct or major vessel invasion, child class C liver cirrhosis or active intra-abdominal infection, tumor size of > 5 cm, and proximity to vital structures such as vessels or adjacent organs. SBRT for colorectal cancer with liver metastasis was performed according to the following: liver tumor number of < 3, maximum diameter or total tumor diameter of < 6 cm, liver enzymes < 3 times the upper normal limit, total bilirubin of < 3 mg/dL, albumin of > 2.5 g/dL, and normal PT/APTT or INR unless on anticoagulant; patients with ascites were excluded. Normal liver volume was at least 700 cc. All patients who underwent SBRT were treated using a dose range from 48 Gy to 60 Gy in 3 fractions. It was administered using an alternate day (QOD) regimen and was usually completed in 1 week. These patients were allowed to have chemotherapy 14 days before or after SBRT. Contrast enhanced CT studies were performed every 3 months after resection, with RFA or SBRT to evaluate intra-hepatic, marginal, or extrahepatic recurrence. In patients who underwent RFA or SBRT, the local therapeutic effects were evaluated using additional contrast enhanced CT imaging 1 month after RFA or SBRT. By definition, marginal recurrence was new-onset liver metastases from a previous resection, RFA, or SBRT area. Surgical mortality was defined as death within 30 days after surgery or before discharge from the hospital. End of follow-up was December 31, 2015. Clinicopathologic characteristics, posttreatment complications, marginal recurrence, and prognosis in different treatment modalities were analyzed.

## Statistical Analysis

We recorded all data using a standard data form and analyzed the data using SAS 9.4 (SAS Institute Inc, Cary, NC, USA). Continuous variables are presented as means with standard deviation or medians with interquartile range (IQR), and categorical variables are summarized as frequencies with percentage. For comparing differences among these 3 groups, analysis of variance (ANOVA) or Kruskal-Wallis test was used for continuous variables, and Pearson's chi-squared test or Fisher's exact test was used for categorical variables. Overall survival and disease-free survival were measured from the time of diagnosis with CRC until death from any cause or disease recurrence using the Cox proportional regression model. The Kaplan-Meier method was used to describe the survival curves with the log-rank test for comparing differences among the 3 groups. The Kaplan-Meier curves were plotted using STATA (version 12; Stata Corp, College Station, TX). Statistical significance was considered with a $p$ of < 0.05.

## Results

### Patients and clinical data

A total of 75 patients were treated for synchronous CLM (Table 1). There were 47 men and 28 women, with a median age of 63.11 ± 11.53 years (range, 35-87 years). The primary colorectal cancer was located within the rectum in 6 patients (8%), sigmoid in 25 patients (33.3%), descending colon in 25 patients (33.3%), transverse colon in 5 patients (6.7%), and ascending colon in 14 patients (18.7%). A total of 52 patients underwent a simultaneous resection of primary colorectal cancer and liver metastasis; 14 patients underwent RFA; and 9 patients underwent SBRT. There

**Table 1.** Clinicopathologic characteristics of patients with colorectal cancer and liver metastases

| | Resection (n = 52) | RFA (n = 14) | SBRT (n = 9) | *p*-value |
|---|---|---|---|---|
| Mean age (yrs) | 61.54 ± 11.66 | 63.29 ± 9.32 | 71.89 ± 10.86 | 0.0431*[d] |
| Gender, n (%) | | | | 0.1626 |
| Male | 32 (61.54) | 7 (50) | 8 (88.89) | |
| Female | 20 (38.46) | 7 (50) | 1 (11.11) | |
| Comorbidity | | | | |
| Hypertension | 26 (50.00) | 5 (35.71) | 2 (22.22) | 0.2432 [e] |
| DM | 12 (23.08) | 2 (14.29) | 1 (11.11) | 0.7355 [e] |
| ESRD | 0 | 0 | 0 | --- |
| Liver cirrhosis | 1 (1.92) | 1 (7.14) | 1 (11.11) | 0.2211 [e] |
| CEA level[a] (ng/mL) | 16.90 (4.15-41.10) | 3.35 (1.70-6.40) | 15.35 (4.25-44.00) | 0.0292* [f] |
| Tumor size[b] (cm) | 2.50 (1.95-4.00) | 2.2 (1.4-2.4) | 3.5 (2.6-4.0) | 0.0617 [f] |
| LOS (length of hospital stay, days) | 13.92 ± 10.49 | 12.64 ± 5.09 | 15.33 ± 6.52 | 0.7939 |
| Location of primary CRC | | | | 0.2278 [e] |
| Ascending, n (%) | 13 (25.00) | 1 (7.14) | 0 (0) | |
| Transverse (Rt), n (%) | 4 (7.69) | 1 (7.14) | 0 (0) | |
| Descending, n (%) | 17 (32.69) | 3 (21.43) | 5 (55.56) | |
| Sigmoid, n (%) | 13 (25.00) | 8 (57.14) | 4 (44.44) | |
| Rectum, n (%) | 5 (9.62) | 1 (7.14) | 0 (0) | |
| Number of liver metastasis | | | | |
| Solitary, n (%) | 27 (51.92) | 10 (71.43) | 4 (44.44) | 0.7145 [e] |
| Multiple, n (%) | | | | |
| One lobe | 15 (28.85) | 3 (21.43) | 3 (33.33) | |
| Bilateral lobes | 10 (19.23) | 1 (7.14) | 2 (22.22) | |
| Solitary, n (%) | 27 (51.92) | 10 (71.43) | 47 (44.44) | |
| 2-4, n (%) | 23 (44.23) | 4 (28.57) | 5 (55.56) | 0.6734 [e] |
| ≥ 5, n (%) | 2 (3.85) | 0 (0.00) | 0 (0.00) | |
| Complications[c], n (%) | 10 (19.23) | 1 (7.14) | 0 (0) | 0.3444[e] |
| Adjuvant Chemotherapy, n (%) | 49 (94.23) | 14 (100) | 6 (66.67) | 0.0336* [e] |
| T | | | | 1.0000 [e] |
| T1 | 1 (1.92) | 0 (0) | 0 (0) | |
| T2 | 3 (5.77) | 0 (0) | 0 (0) | |
| T3 | 39 (75) | 12 (85.71) | 8 (88.89) | |
| T4 | | | | |
| T4a | 6 (11.54) | 2 (14.29) | 0 (0) | |
| T4b | 3 (5.77) | 0 (0) | 1 (11.11) | |
| N | | | | 0.3966 [e] |
| 0 | 10 (19.23) | 1 (7.14) | 2 (22.22) | |
| 1a | 4 (7.69) | 3 (21.43) | 0 (0) | |
| 1b | 13 (25) | 1 (7.14) | 4 (44.44) | |
| 1c | 1 (1.92) | 1 (7.14) | 0 (0) | |
| 2a | 14 (26.92) | 4 (28.57) | 1 (11.11) | |
| Mortality, n (%) | 0 (0) | 0 (0) | 0 (0) | - |

* Statistically significant.

[a] Median CEA level at diagnosis of liver metastases. [b] Median size of main tumor. [c] Posttreatment (resection, RFA, SBRT) complications. [d] One-way ANOVA test. [e] Fisher exact test. [f] Kruskal-Wallis test.

was a similar distribution in gender, comorbidity, primary tumor size/location, and number of liver metastases among these patient groups. The mean age was older in the SBRT group ($p = 0.0431$), and the

preoperative CEA level was lower in the RFA group ($p = 0.0292$). Although there was no difference in the complication rate, the liver resection group had a higher complication rate compared with the other 2 groups ($p = 0.3444$). In the resection group, 4 patients experienced a wound infection; 2 patients experienced mild bile leakage (cutting margin); 2 patients experienced postoperative ileus (one also experienced an anastomotic leakage); 1 patient experienced pneumonia; and 1 other patient had postoperative arrhythmia and vocal cord injury–induced hoarseness. Fortunately, all patients were administered conservative treatment. One patient who underwent RFA experienced a subcapsular hematoma and was also treated using conservative management. A preventive stoma was used among the 3 groups: 12 patients received a preventive stoma in the resection group, while 4 patients in the RFA group and 3 patients in the SBRT group received one. No patient who underwent a simultaneous resection of primary colorectal cancer and liver metastasis experienced a postoperative hepatic failure. No surgical mortality occurred among these 3 groups. The SBRT group had a significantly lower percentage of postoperative adjuvant chemotherapy ($p = 0.0336$). The hospital stay among the 3 groups was similar, and no significant difference existed ($p = 0.7939$).

### Recurrence and survival

No difference in median follow-up was observed among the 3 groups ($p = 0.1635$). Although no difference in marginal recurrence was noted among 3 groups ($p = 0.1814$), some differences in tumor marginal recurrence patterns were observed. Marginal recurrence occurred most often post-SBRT (44.44%) and post-RFA (42.86%) than postresection (23.08%). The disease-free interval was longer in the resection group than the RFA and SBRT groups ($p = 0.0035$, Table 2). The 3-year probability of overall survival was higher in the resection and RFA groups (55.06 % and 69.23%, respectively) than the SBRT group (25.00%) ($p = 0.0840$, Fig. 2). As shown in Fig. 3, the 2-year probability of disease-free survival in the resection group (34.07%) was significantly higher than that of the RFA (21.43%) and SBRT groups (11.11%) ($p = 0.0004$). The 3-year cancer-specific survival was significantly higher in the resection and RFA groups (56.82% and 76.00%, respectively) than the SBRT group (25.00%) ($p = 0.0409$, Fig. 4).

Using univariate and multivariate Cox proportional hazards regression analyses for disease-free survival and cancer-specific survival, the CLM treatment type was an independent prognostic factor for disease-free survival (Table 3). No independent prognostic factors were identified for cancer-specific survival (Table 4).

## Discussion

Management of patients with primary colorectal cancer and synchronous liver metastases is difficult. Colorectal resection, liver resection, and chemotherapy must be integrated appropriately. Treatment cannot be standardized and must be individually tailored to optimize disease control and long-term results. Management of CLM has significantly changed in recent years, with improvements in overall outcomes. In the past, the prognosis of patients who do not undergo

**Table 2.** Recurrence and survival

| | Resection (n = 52) | RFA (n = 14) | SBRT (n = 9) | *p*-value |
|---|---|---|---|---|
| Median follow-up (months, IQR) * | 27.5 (19-45) | 37.5 (12-58) | 20 (8-25) | 0.1635 [f] |
| Marginal liver recurrence | 12 (23.08) | 6 (42.86) | 4 (44.44) | 0.1814 [e] |
| Overall survival (months) | 28.19 ± 15.2 | 31.55 ± 24.82 | 17.74 ± 12.43 | 0.1567 [d] |
| Disease-free survival (months) | 14.94 ± 11.72 | 7.93 ± 4.46 | 4.00 ± 3.16 | 0.0035* [d] |
| Cancer-specific survival (months) | 26.04 ± 13.06 | 18.25 ± 26.59 | 12.17 ± 8.68 | 0.0992 |

* IQR, interquartile range; IQR = Q1-Q3, where Q1 = 25th percentile and Q3 = 75th percentile.
[d] One-way ANOVA test. [e] Fisher exact test. [f] Kruskal-Wallis test.

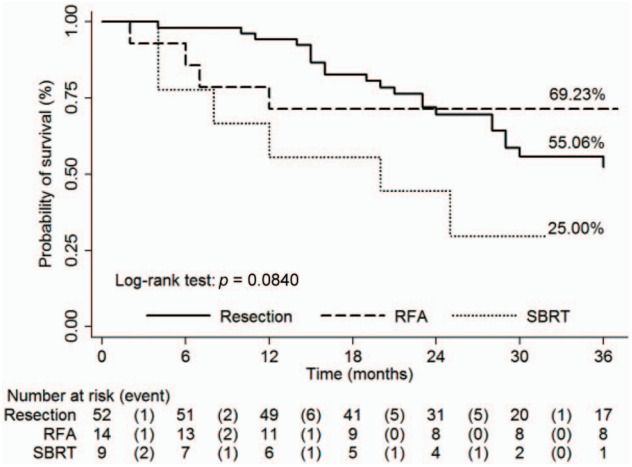


**Fig. 2.** Kaplan-Meier estimates of overall survival in patients with CLM.

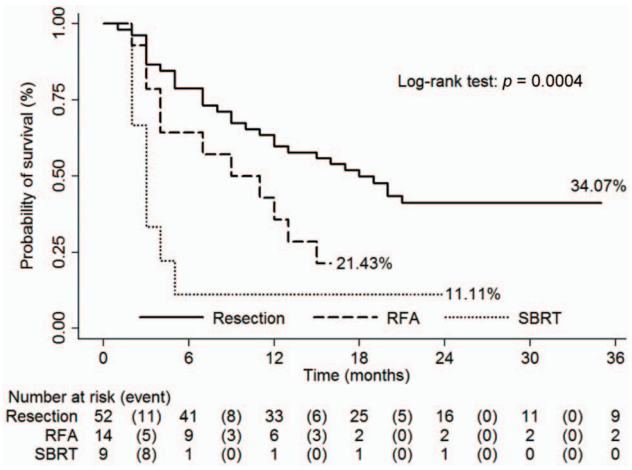


**Fig. 3.** Kaplan-Meier estimates of disease-free survival in patients with CLM.

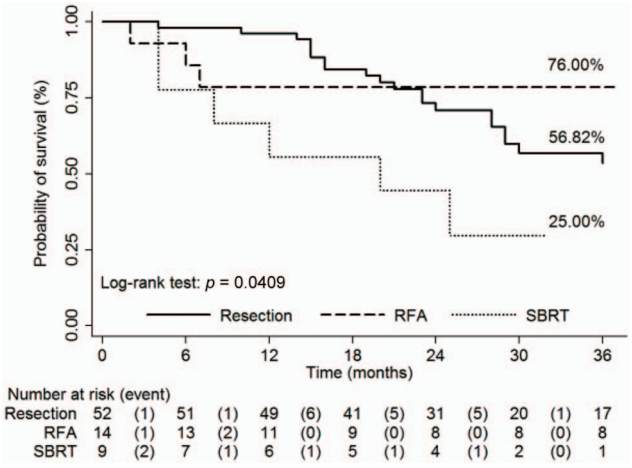


**Fig. 4.** Kaplan-Meier estimates of cancer-specific survival in patients with CLM.

**Table 3.** Significant predictive factors for disease-free survival in a Cox proportional hazards analysis of 75 patients with CLM

| Variables | HR | 95% CI | *p*-value |
|---|---|---|---|
| Type of CLM treatment | | | |
| Resection | 1.00 | reference | |
| RFA | 2.23 | 1.04-4.78 | 0.0390 |
| SBRT | 4.19 | 1.74-10.09 | 0.0014 |
| Number of liver metastases | | | |
| Solitary | 1.00 | reference | |
| One lobe | 1.69 | 0.87-3.27 | 0.1217 |
| Bilateral lobes | 1.92 | 0.88-4.18 | 0.1001 |
| Solitary | 1.00 | reference | |
| 2-4 | 1.83 | 0.99-3.32 | 0.0506 |
| ≥ 5 | 0.88 | 0.12-6.72 | 0.9053 |
| Tumor size[a] (cm) | | | |
| ≤ 3 cm | 1.00 | reference | |
| > 3 cm | 1.05 | 0.53-2.06 | 0.8873 |

[a] Median size of main tumor.

**Table 4.** Significant predictive factors for cancer-specific survival in a Cox proportional hazards analysis of 75 patients with CLM

| Variables | HR | 95% CI | *p*-value |
|---|---|---|---|
| Type of CLM treatment | | | |
| Resection | 1.00 | reference | |
| RFA | 0.66 | 0.23-1.92 | 0.4450 |
| SBRT | 1.96 | 0.76-5.11 | 0.1665 |
| Number of liver metastases | | | |
| Solitary | 1.00 | reference | |
| One lobe | 1.86 | 0.86-4.02 | 0.1170 |
| Bilateral lobes | 2.19 | 0.90-5.32 | 0.0833 |
| Solitary | 1.00 | reference | |
| 2-4 | 1.81 | 0.92-3.55 | 0.0846 |
| ≥ 5 | 1.08 | 0.14-8.31 | 0.9399 |
| Tumor size[a] (cm) | | | |
| ≤ 3 cm | 1.00 | reference | |
| > 3 cm | 1.03 | 0.49-2.15 | 0.9429 |

treatment for CLM is unusually poor, with a median survival of 6 months; 2-year survival was unusual, and 5-year survival was extremely rare.[5] To date, although the majority of patients are not candidates for hepatic resection, curative treatment of CLM may play a role in improving outcomes and increase resectability with the use of chemotherapy.[6,7,17] Surgical resection remains the only treatment associated with long-term survival in patients with CLM, with a

40% survival at 5 years and almost 25% of patients demonstrating a postoperative survival duration of < 10 years in specialized centers.[18,19] An important issue with which a hepatobiliary surgeon deals in CLM is to decide what to resect first, the liver metastasis, the primary colorectal cancer, or even simultaneous surgical resection of both. Advantages of a one-stage procedure could be a lower financial cost and shorter total hospital stay; disadvantages include more stress for patients who undergo major surgery and a higher complication rate. Advantages of the staged procedure include no cumulative stress from the risks of simultaneous liver and bowel resections, but twice that the total cost of hospitalization and difficult decision when to receive surgery are disadvantages. In our study, there was no difference in hospital stay, complication rate, or surgical mortality among the liver resection, RFA, and SBRT groups. Patients with postoperative complications were managed with conservative treatment. Anastomotic leakage is one postoperative complication; a preventive stoma could decrease the incidence rate. Among the 3 groups, the preventive stoma had a similar proportion.

Significant advances including improved surgical technique and intensive care support have changed outcomes for patients with CLM. Further, advancements in chemotherapeutic regimens and target therapy agents have significantly impacted the number of patients suitable for surgical resection of metastases.[7,17] Neoadjuvant chemotherapy including oxaliplatin and/or irinotecan has led to higher resection rates (up to 38%) for unresectable CLM.[20,21] Based on more recent data from a randomized phase II multicenter study (the CELIM study) of unresectable CLM, R0 resection rates after neoadjuvant chemotherapy are 38% with cetuximab plus FOLFOX6 and 30% with cetuximab plus FOLFIRI.[22]

In addition, alternative local control treatments such as RFA and SBRT may have good control and can be offered to patients unable to tolerate or unwilling to undergo liver resection.[14,23-25] Many centers use a percutaneous technique in an outpatient setting, often for hepatocellular carcinoma, and percutaneous RFA has also been performed for colorectal metastases.[24,26-28] However, some have suggested that RFA will never prove to be as effective as initially hoped, especially in CLM,[29] and have indicated that RFA was associated with a higher recurrence and shorter disease-free survival. Local recurrence rates after RFA have been reported to range from 9% to 39%.[30-32] SBRT still has a good local effect for a primary tumor in CLM. However, RFA and SBRT are performed for older patients, patients with inadequate liver remnants or anatomical difficulties precluding liver resection, and patients who refused surgery because of risk of perioperative morbidity and mortality. In our study, postoperative adjuvant chemotherapy also demonstrated a lower rate in the SBRT group than in the other 2 groups because of patients' relative poor clinical condition or older age.

Cardenes et al. showed that patients with liver metastases have median and 2-year overall survival rates of 20.5 months and 30%, respectively.[25] Our study showed that median and 2-year overall survival rates were 20 months and 44.44%, respectively. Our present study showed that the marginal recurrence rate was higher in the RFA and SBRT groups than the liver resection group, although no difference was noted ($p = 0.1814$). Further, disease-free survival was found to be superior in the liver resection group, and the CLM treatment type was an independent prognostic factor. Aggressive resection of liver metastasis provided better disease-free control in this study. The liver resection group had better 2-year disease-free survival; as for calculating the 3-year cancer-specific survival, RFA was higher in the liver resection group (Fig. 4). We believe that because repeat percutaneous RFA is a feasible method for the local control of new liver metastases, it resulted in better 3-year cancer-specific survival. According to the definition of cancer-specific survival, living patients with or without recurrent liver metastases posttreatment would be included in the follow-up. Therefore, it is likely that the liver resection group would experience superior results if we extended the follow-up period to more than 5 years. Based on our current evidence, RFA could improve short-term local control of liver metastases.

This was a retrospective study performed using data collected from the database at our colorectal cancer center. Selection biases for retrospective study

could not be avoided. Among the liver resection, RFA, and SBRT groups, distribution differences existed in patient ages. The mean age of the SBRT group was older than that of the other 2 groups, and this could have resulted in a lower percentage of adjuvant chemotherapy. Older age and a lower adjuvant chemotherapy percentage would have an adverse effect on disease-free and cancer-specific survival. Selection biases and unmatched case-control were the first limitations of this study. Although there was no difference in median follow-up among the 3 treatment modalities, another limitation of our study was the small number of cases in the RFA and SBRT groups. Therefore, we could not identify whether the number of liver metastases (solitary, 2-4, or ≥ 5) affect the treatment choice for liver metastases and prognosis. Until now, to our knowledge, there have not been any randomized controlled trials comparing surgical resection with RFA for CLM. Most retrospective nonrandomized studies including the present study have demonstrated worse outcomes for RFA and SBRT. Therefore, liver resection, if feasible, is the best treatment choice. Although outcomes with RFA were worse than those of the resection group, RFA still had value for some select patients over SBRT. The SBRT treatment was still a role as palliative treatment now, especially at patients with high operative risk.

## Conclusion

In summary, management of CLM continues to evolve as modern chemotherapeutic options and improved surgical techniques have translated into better outcomes. Technologies in the form of RFA and SBRT can be alternative tools for achieving local control. Outcomes for ablation of CLMs have included high local recurrence rates; thus, ablation could be a useful technique in appropriately selected patients. Although liver resection for CLM has a higher complication rate and longer hospital stay, it still has a benefit on disease-free survival. Complete resection of liver metastases, if feasible, is the best treatment choice, and the use of RFA and SBRT must still be considered promising, but with unproven outcomes.

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**原　著**

# 大腸直腸癌併可切除的肝轉移：使用手術切除、燒灼術、放射治療等三種的治療方式分析臨床的預後結果

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**目的**　大腸癌同時合併可切除的肝轉移應該被獨立出來討論，多種的治療模式可延長病人的存活及降低復發機率。為了研究此類病患臨床治療預後的比較，我們從一個單一機構提出回顧性的研究。

**方法**　蒐集從 2008 年 1 月至 2014 年 12 月診斷為大腸直腸癌同時合併可切除的肝轉移的患者。在切除完大腸直腸癌後，藉由三種不同的治療處理肝轉移，來分析比較各自的術後併發症，局部復發，及預後結果。

**結果**　總共有 75 名大腸直腸癌同時合併可切除的肝轉移病患，其中包含 47 例男性，28 例女性，他們的平均年齡為 63.11 ± 11.53 歲 (範圍：35-87 歲)。有 52 位病患接受肝切除手術，有 14 位病患接受肝腫瘤燒灼術，另有 9 位病患接受放射治療。在這三個不同治療方式中，以接受放射治療的族群平均年紀較大。在治療後的併發症及局部復發率，這三組並無統計學上顯著差異，但是手術切除有稍微較高的處置後併發症及較低的局部復發率。在無疾病復發狀態分析上，手術切除組別有較長時間的無疾病復發狀態，且在兩年追蹤下的無疾病復發是明顯優於電燒灼術及放射治療族群 ($p$ 值 = 0.0004)。在多變異分析下，肝轉移的治療模式是唯一的預後因子。在與癌症相關的存活時間上，手術切除與電燒灼術是明顯優於放射治療，而手術切除和電燒灼術雖沒有明顯統計上差異，但手術切除仍有較長的癌症相關存活時間。

**結論**　手術切除仍是大腸直腸癌併可切除肝轉移病患的首選。電燒灼術有較優於放射治療的臨床結果，因此電燒灼術可以在特定病患作為治療，比方說不適合手術治療或全身麻醉的病患。放射治療目前僅使用於狀況更差患者，用來作為緩和性治療為主。

**關鍵詞**　大腸直腸癌併肝轉移、肝切除術、電燒灼術、放射治療。