Original Article

The Outcome of Different Initial Treatments for Colorectal Cancer with Synchronous Liver Metastasis: One Institution's Experience

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Key Words
Colorectal cancer;
Neoplasm metastasis;
Colectomy;
Hepatectomy;
Chemotherapy

Purpose. This retrospective study evaluated the outcome of patients with colorectal cancer and synchronous liver metastasis after they received different initial methods of treatment.

Methods. Between 2008 and 2012, 273 patients were diagnosed with colorectal cancer with synchronous liver metastasis at Chi-Mei Medical Center. After excluding patients with peritoneal carcinomatosis or extrahepatic metastasis, 150 patients were enrolled in the study. Of the 150 patients, 40 were treated with colectomy, 15 with synchronous colectomy and hepatectomy, 63 received chemotherapy as their initial treatment; and 32 received palliative care only. We then compared the clinicopathologic characteristics and prognosis of each treatment group.

Result. Patients receiving chemotherapy and palliative treatment only eventually had significantly higher ratios of stoma creation compared to patients who were treated with surgery (colectomy and synchrous colectomy and hepatectomy) ($p = 0.0002$). Compared with the chemotherapy group, a significantly higher percentage of patients in the surgery group (colectomy, synchronus colectomy and hepatectomy) achieved cures (30% and 100% vs. 1.59%; $p < 0.0001$). Although the surgery group (colectomy and synchronus colectomy and hepatectomy) had better cancer-specific survival rates than did those in the chemotherapy and palliative therapy only groups, there was no statistical significance between the colectomy group and the synchronous colectomy and hepatectomy group ($p = 0.487$). After curative treatment of liver metastases was achieved, there were no statistical differences in disease-free and cancer-specific survival among the three treatment groups.

Conclusions. Synchronous colectomy and hepatectomy is safe as an initial treatment for carefully selected patients with colorectal cancer and liver metastases. This approach can avoid tumor-related complications and provides better cancer-specific survival. For patients treated first with chemotherapy, the response of liver metastases to chemotherapy during the first year will determine the final prognosis.

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In Taiwan, colorectal cancer (CRC) is the most common cancer and the third most frequent cause of cancer-related deaths. In 2016, CRC accounted for an estimated 5722 deaths in Taiwan.[1] Twenty-five percent of CRC patients have clinically detectable liver metastases at the initial diagnosis, and approximately 50% develop liver metastases during the course of their disease.[2] Although a cure is possible for a subgroup of these patients, the reported five-year relative survival rate is still only 35%.[3] To date, National Comprehensive Cancer Network (NCCN) guidelines suggest optional initial therapy (neoadjuvant chemotherapy, synchronous colectomy and hepatectomy or colectomy, and then staged hepatectomy after chemotherapy for CRC patients with resectable liver metastases. On the other hand, the generally suggested treatment approach for patients with CRC with unresectable liver metastases has been systemic chemotherapy, and colectomy is only recommended when CRC is symptomatic (bleeding, perforation or obstruction).[4,5] One report found that palliative resection of the primary tumor improves survival among patients with incurable CRC with synchronous liver metastasis (CLM).[6]

We designed a study to evaluate the outcome of four different initial approaches for treating patients with CRC and synchronous liver metastasis.

Methods

Between January 2008 and December 2012, 1919 patients were diagnosed with CRC at Chi Mei Medical Center. Among them, 273 patients were diagnosed as having CLM, and their cases were retrospectively reviewed. Among the group of 273 patients, 123 were excluded from the study due to extrahepatic metastasis or after peritoneal seeding was found. A final group of 150 patients with CLM were enrolled in the study (Fig. 1).

The diagnosis of liver metastasis was based on the results of imaging studies such as ultrasonography and enhanced computed tomography, or CT, with/without needle biopsy. Needle aspiration biopsy was performed before treatment only in patients with atypical hepatic mass enhancement. Synchronous liver metastases were defined as they were initially diagnosed, before further management was determined.

The resectability of CLM is determined by the technical ability to remove all visible metastases while at the same time preserving an adequate amount of liver tissue with an adequate vascular supply and biliary drainage. Since 1997, a weekly colorectal multidisciplinary team (MDT) meeting has been held at Chi-Mei Hospital, during which cases of all newly diagnosed patients are discussed. Between January 2008 and December 2012, among 150 enrolled patients, 40 received colectomy as initial treatment due to symptomatic CRC; 15 received synchronous colectomy and hepatectomy (SCH); 63 initially received chemotherapy; and 32 received palliative treatment only. Curative treatment was defined when no residual liver metastasis or extrahepatic metastasis were seen on contrast-enhanced CT performed 3 months after a patient underwent colectomy and hepatectomy or another therapeutic modality for liver metastasis, such as radiofrequency ablation (RFA). The follow-up period ended on December 31, 2015. For each case, the clinicopathologic characteristics, outcome of treat-

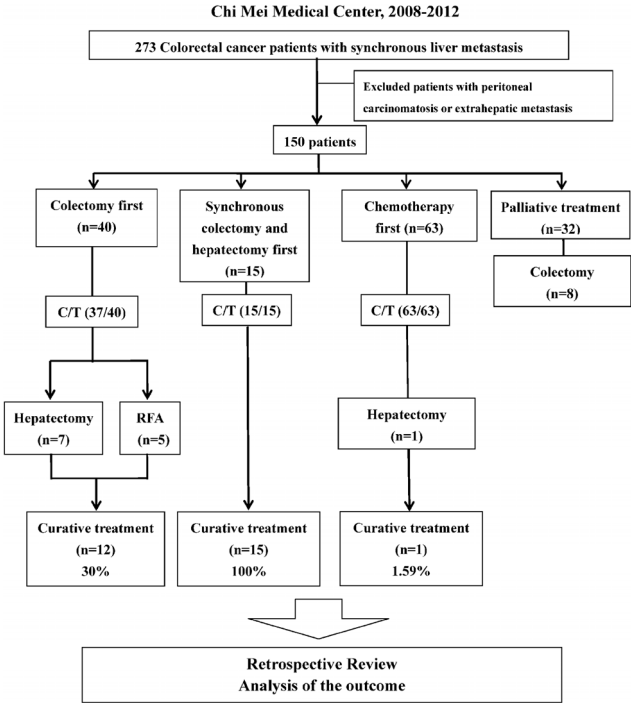


Fig. 1. Diagram of the study design.

ment, and prognosis by different initial treatment modality were then analyzed.

Statistical analysis

The continuous variables were performed by means with standard deviation with analysis of variance (ANOVA) to compare the differences between the four treatment groups. The categorical variables were presented as frequency with percentage using Pearson's chi-square test or Fisher's exact test to examine the differences. The survival curves were presented using the Kaplan-Meier method, with the log-rank test for comparing the differences between the three treatment groups. All data were analyzed using SAS 9.4 (SAS Institute Inc., Cary, NC, USA). The Kaplan-Meier curves were plotted using STATA (version 12; Stata Corp., College Station, TX). The statistical significance was set as $p < 0.05$.

Results

Patients and clinical data

A total of 150 patients were enrolled in this study, including 92 men and 58 women, with a median age of 68 ± 13.63 yr (range: 34 to 94 yr). The primary CRC was located within the rectum in 28 patients (18.7%), within the left side of the colon in 89 patients (59.3%), and within the right side of the colon in 33 patients (22%). A total of 40 patients underwent colectomy as initial treatment; 15 patients received synchronous colectomy and hepatectomy (SCH); 63 patients underwent chemotherapy first; and 32 patients received palliative treatment only. There was a similar distribution among the groups by gender, number of comorbidities, tumor histology, interval from diagnosis to treatment, and ratio of adjuvant therapy (Table 1). The mean age was greater among the palliative treatment group ($p < 0.0001$). In addition, tumors were more often located at the rectum among patients in the chemotherapy group (28.57%; $p = 0.0301$). Pre-treatment carcinoembryonic antigen (CEA) levels and the number of liver metastasis were both lower among the SCH treatment group ($p = 0.0063$ and $p < 0.0001$, respectively).

Complications from surgery, the number of days in the intensive care unit, hospitalization days, and the interval from operation to chemotherapy were similar between the colectomy group and the SCH group (Table 2). Notably, in the chemotherapy and palliative

Table 1. Demographic profiles of patients with colorectal cancer with liver metastases

	Colectomy (n = 40)	SCH (n = 15)	Chemotherapy (n = 63)	Palliative care (n = 32)	*p*-value
Age (yr)	61.53 ± 14.30	60.47±8.31	63.25 ± 11.62	79.75 ± 9.14	< 0.0001
Sex					0.4640
Male	27 (67.50%)	10 (66.67%)	39 (61.90%)	16 (50.00%)	
Female	13 (32.50%)	5 (33.33%)	24 (38.10%)	16 (50.00%)	
Number of morbidities	0.88 ± 1.18	0.80 ± 0.77	0.97 ± 1.08	1.50 ± 1.16	0.0625
CEA (ng/mL)	221.22 ± 569.81	78.39 ± 143.78	969.41 ± 1770.73	1626.30 ± 3071.1	0.0063
Tumor location					0.0301
Right side	10 (25.00%)	6 (40.00%)	7 (11.11%)	10 (31.25%)	
Left side	24 (60.00%)	7 (46.67%)	38 (60.32%)	20 (62.50%)	
Rectum	6 (15.00%)	2 (13.33%)	18 (28.57%)	2 (6.25%)	
Tumor pathology					0.316
Adenocarcinoma	39 (97.50%)	15 (100%)	63 (100%)	26 (100%)*	
Mucinous	1 (2.50%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	
Number of liver metastases					< 0.0001
= 3/< 3	20 (50.00%)	14 (93.33%)	11 (17.46%)	10 (31.25%)	
> 3	20 (50.00%)	1 (6.67%)	52 (82.54%)	22(68.75%)	
Interval from diagnosis to treatment (days)	20.45 ± 23.46	19.60 ± 14.20	25.37 ± 18.23	N/A	0.1047
Adjuvant chemotherapy	37 (92.50%)	15 (100%)	63 (100%)	N/A	0.107
Adjuvant radiotherapy	2 (5.00%)	0 (0.00%)	9 (14.29%)	N/A	0.175
Adjuvant target therapy	4 (10.00%)	0 (0.00%)	6 (9.52%)	N/A	0.657

* 6 of 32 patients in the palliative care group refused further examination, and thus no biopsy was performed.

care groups, there was a significantly higher percentage of stoma creation compared to the surgery group ($p = 0.0002$). Nearly 40% of patients would go on to experience tumor complications requiring a stoma for stool diversion. In the colectomy group, only 3 patients did not receive adjuvant chemotherapy after surgery in our hospital. Two patients died from pneumonia-related septic shock before they received chemotherapy, and 1 patient developed severe liver function impairment.

Chemotherapy response rates (complete response + partial response vs stable disease + progressive response) of CLM were similar between the colectomy and chemotherapy groups ($p = 0.9021$; Table 2). Cancer-specific survival according to the chemotherapy response of CLM is shown in Table 3. Under disease control (complete response + partial response), the colectomy group had better 3-year cancer-specific survival rates compared to rates in the chemotherapy group (76.92% vs. 10%, respectively; $p = 0.0002$; Table 3).

In our series, 12 of 40 patients (30%) in the colectomy group achieved cures after receiving chemotherapy. Seven of these patients were treated with hepatectomy, and 5 received RFA as curative treatment (Figure 1). Only 1 patient (1.59%) in the chemotherapy group eventually achieved curative treatment by colectomy following hepatectomy. Overall, a higher percentage of the colectomy treatment group achieved curative treatment than did those in the chemotherapy group (30% vs. 1.59%, respectively; $p < 0.0001$; Table 2).

Cancer-specific survival and disease-free survival

Cancer-specific survival rates were similar be-

Table 3. Cancer-specific survival according to chemotherapy response of CLM

	Colectomy (n = 37)	Chemotherapy (n = 59)	*p*-value
One-year follow-up			
CR+PR	100% (13/13)	75% (15/20)	0.1310
SD+PD	75% (18/24)	33.33% (13/39)	0.0013
Two-year follow-up			
CR+PR	84.62% (11/13)	30% (6/20)	0.0039
SD+PD	29.17% (7/24)	5.13% (2/39)	0.0211
Three-year follow-up			
CR+PR	76.92% (10/13)	10% (2/20)	0.0002
SD+PD	8.33% (2/24)	5.13% (2/39)	0.6318
All follow-up periods			
CR+PR	38.46% (5/13)	0% (0/20)	0.0054
SD+PD	8.33% (2/24)	0% (0/39)	0.1413

CR: complete response, PR: partial response, SD: stable disease, PD: progressive disease.

Table 2. Outcome of patients with colorectal cancer with liver metastases

	Colectomy (n = 40)	SCH (n = 15)	Chemotherapy (n = 63)	Palliative (n = 32)	*p*-value
Stoma	4 (10.00%)	0 (0.00%)	25 (39.68%)	14 (43.75%)	0.0002
Operation complications	4 (10.00%)	2 (13.33%)	N/A	N/A	0.6595
ICU stay (days)	3 (7.69%)	2 (13.33%)	N/A	N/A	0.6099
Hospital stay (days)	12.51 ± 5.80	16.86 ± 14.30	N/A	N/A	0.2872
Interval from operation to chemotherapy (days)	42.94 ± 41.26	58.86 ± 48.19	N/A	N/A	0.2560
Chemotherapy response rate of liver metastases*		N/A		N/A	0.9021
CR + PR	35.14% (13/37**)		33.90% (20/59***)		
SD + PD	64.86% (24/37)		66.10% (39/59)		
Tumor complication	N/A	N/A			< 0.0001
Obstruction			5 (7.94%)	17 (53.13%)	
Bleeding			4 (6.35%)	2 (6.25%)	
Perforation			1 (1.59%)	1 (3.13%)	
Curative treatment (RFA/hepatectomy)	12 (30.00%)	15 (100%)	1 (1.59%)	N/A	< 0.0001

* CR: complete response; PR: partial response; SD: stable disease; PD: progressive disease.

** 3 patients in the colectomy treatment group didn't complete chemotherapy due to other disease (2 had septic shock and 1 had severe liver impairment).

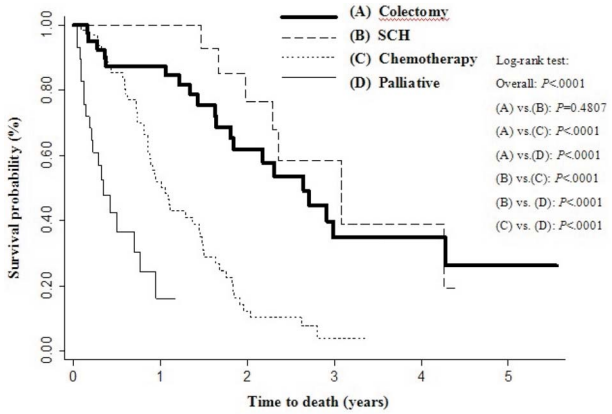
*** 4 patients in the chemotherapy group complete chemotherapy in another hospital.

tween the colectomy group and the SCH group (p = 0.48; Fig. 2). However, the colectomy group and the SCH group had better cancer-specific 3-year survival rates (37.5% and 58.4%, respectively) compared to the chemotherapy group (3.1%) ($p < 0.0001$ and $p < 0.0001$, respectively) and the palliative group (0%) ($p < 0.0001$ and $p < 0.0001$, respectively). Nevertheless, disease-free survival and cancer-specific survival rates were similar in the three treatment groups when curative treatment of liver metastases was achieved (p = 0.5421; p = 0.4307) (Fig. 3 and Fig. 4).

Discussion

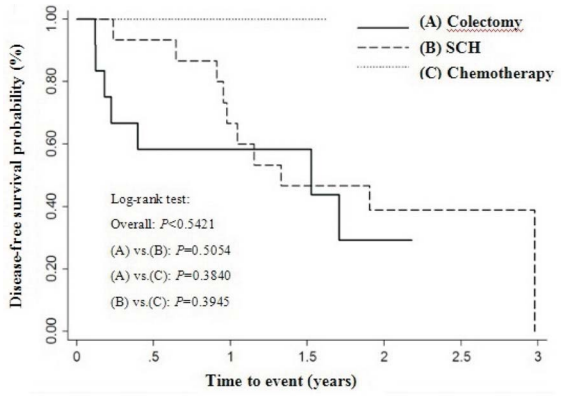
In the past, the prognosis of patients with CRC with liver metastases was usually poor. There was a median survival of 6 months; 2-year survival was unusual; and 5-year survival was extremely rare.[7] Today liver resection is the only available treatment that offers the chance of long-term survival in patients with metastastic colorectal cancer.[8-12] However, the resectability rate of metastases at the time of diagnosis is low, which accounts for the small proportion of patients who may benefit from surgery. To date, although the majority of patients are not candidates for hepatic resection, chemotherapy and target therapy increase the resectability of liver metastasis and the curative treatment rate, improving the outcome of CLM.[7,13,14]

Advantages of treatment with SCH include lower cost of care and shorter total hospital stays, but this approach has also been considered to produce prohibitive rates of morbidity and mortality. In particular, for patients requiring major liver resection, some studies have reported increased morbidity and mortality rates.[15,16] The advantage of using colectomy first (staged



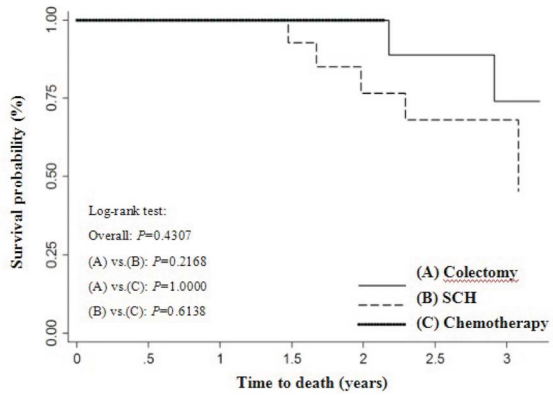
	Colectomy (n=40)	SCH (n=15)	Chemotherapy (n=63)	Palliative (n=32)
1-year survival	87.4%	100%	53.8%	16.9%
2-year survival	62.8%	78.4%	16.1%	0%
3-year survival	37.5%	58.4%	3.1%	0%

Fig. 2. Kaplan-Meier estimates of cancer-specific survival for patients with CLM.



	Colectomy (n=12)	SCH (n=15)	Chemotherapy (n=1)
1-year disease-free survival	58.5%	66.6%	100%
2-year disease-free survival	33.3%	40%	100%

Fig. 3. Kaplan-Meier estimates of disease-free survival for CLM patients after curative treatment was achieved.



	Colectomy (n=12)	SCH (n=15)	Chemotherapy (n=1)
1-year survival	100%	100%	100%
2-year survival	100%	80%	100%
3-year survival	75%	73.3%	100%

Fig. 4. Kaplan-Meier estimates of cancer-specific survival for CLM patients after curative treatment was achieved.

operation) is that there is no accumulated stress from simultaneous liver and bowel resections. And, the disadvantages are that being admitted to the hospital twice for surgery leads to higher hospitalization costs, and it is often difficult to determine the ideal time for the second surgery. The advantage of using chemotherapy first is that patients can immediately gain systemic cancer control.

In our study, no surgical deaths occurred in either the colectomy group or the SCH group. In addition, there was no significant statistical difference in operative complications, length of ICU stay, length of hospital stay, and interval from operation to chemotherapy between the colectomy group and the SCH group. Silberhumer's study reported the same results, and concluded that simultaneous resection of rectal primaries and liver metastases is a safe procedure in carefully selected patients being treated at high-volume institutions; this was true even if major liver resections were required.[17] However, most centers still recommend a staged surgical approach with removal of the primary cancer first, followed by liver resection after adjuvant chemotherapy has been given.[18,19] In our study, 50% of CLM patients in the colectomy treatment group had fewer than 3 liver metastases. However, these patients didn't receive synchronous liver metastasectomy (Table 1).

We believe the number of SCH in CLM patients could grow dramatically in recent years due to maturity of the surgical technique and improved intensive care support. The definition of the resectability of CLMs is evolving, and still being challenged. Successful resectability is mainly defined by the ability to perform a curative hepatectomy, resecting all lesions while leaving at least 30% of non-tumor liver parenchyma intact. In the past, factors defining resectability included the number and size of metastases, the distribution of metastases throughout the liver, and the anatomic relationship to major vascular structures.

Current data have precipitated a shift in the definition of resectability, from criteria based on the characteristics of the metastatic disease (e.g., number, size) to new criteria based upon whether a macroscopically and microscopically complete, or R0, resection of the liver lesion, as well as any extrahepatic disease, can be performed. In addition, decisions about resectability are contingent upon whether an adequate liver remnant will remain after surgery. This notion of resectability represents a paradigm shift. Instead of resectability being defined by what is removed, decisions concerning resectability now center around what will remain after resection, with a particular focus on the lack of residual disease as well as the volume and function of the residual liver. In this new paradigm, resectability is defined by four main criteria. (1) The disease needs to be completely resected. An R0 resection of both the intra- and extrahepatic disease sites must be feasible. (2) At least two adjacent liver segments need to be spared. (3) Vascular inflow and outflow, as well as biliary drainage to the remaining segments, must be preserved. (4) Finally, the volume of the liver remaining after resection (i.e., the future liver remnant) must be adequate. This usually means at least 20% of the total estimated liver volume for normal parenchyma, 30% to 60% if the liver is injured by chemotherapy, steatosis, or hepatitis, or 40% to 70% in the presence of cirrhosis, depending on the degree of underlying hepatic dysfunction.[20,21] Now the new definition of resectability is "pragmatic" rather than "dogmatic". Limiting the removal of all visible metastases while preserving an adequate future liver remnant volume (FLRV) with its corresponding vascular supply and biliary drainage is now being challenged by combining liver partition and portal vein ligation for staged hepatectomy (ALPPS). The new surgical technique could effectively increase the FLRV and prevent liver failure after hepatectomies in CLM patients.[22] However, due to reports of high morbidity and mortality with this approach, careful patient selection is essential.[23,24]

Although the chemotherapy group and palliative care group had similar percentages of stoma creation, it's worth noting that about 15% of patients in the chemotherapy group went on to experience tumor-related complications, such as total colon lumen obstruction, bleeding, and perforation during treatment. The surgery group (colectomy, SCH) was spared these complications because their primary tumors were resected (Table 2).

For most patients with metastatic CRC, treatment

is palliative rather than curative. The goals of systemic treatment in these patients are to prolong survival and to help them maintain quality of life for as long as possible. However, a small proportion of patients with metastatic CRC (e.g., those whose metastases are confined to the liver) can be converted to a potentially curable state through surgical resection of the metastases after systemic therapy. For these patients, the goal of systemic treatment is to shrink the metastases.[25] A number of different drugs have significant antitumor activity in metastatic CRC, including the systemic drugs 5-fluorouracil (5-FU), irinotecan, oxaliplatin, bevacizumab, cetuximab, and panitumumab, and the oral drug capecitabine. Different combinations of these drugs, such as the FOLFOX regimen (leucovorin, 5-FU, and oxaliplatin), the FOLFIRI regimen (leucovorin, 5-FU, and irinotecan) and the XELOX regimen (oxaliplatin and capecitabine), with or without a monoclonal antibody, have been shown to improve outcomes in metastatic CRC.[26-32]

In our recent study, 33.9% of patients in a chemotherapy group responded positively to chemotherapy (Table 2). First-year cancer-specific survival of the chemotherapy group was 53.8%; the survival rate then decreased dramatically, to 16.1% in the second year, and to 3.1% in the third year (Figure 2). It reflected the fact that the response of liver metastases to chemotherapy in the first year determined the CLM patient's outcome, since only one patient in the chemotherapy first group eventually achieved curative treatment. The curative treatment rate of the chemotherapy group was extremely low in our study. Several factors can be used to explain this result. First, in the chemotherapy group, up to 80% of patients had more than 3 liver metastatic lesions. Severe liver metastases would result in poor response to chemotherapy. The second factor was that fewer patients had target therapy (for example, bevacizumab or cetuximab) as first-line treatment in our series. Before 2012, bevacizumab hadn't been approved as first-line therapy for stage IV colorectal cancer by Taiwan's national health insurance system. In a study by Loupakis, overall survival of CLM patients was significantly better when chemotherapy was combined with bevacizumab (31.0 vs. 25.8 months; $p = 0.05$).[33] Today, bevacizumab + FOLFIRI chemotherapy is the first-line chemotherapy for CLM patients in Taiwan. We think that the response rate and respectability of liver metastasis will significantly improve after use of target therapy as first-line therapy for metastatic CRC. In order to help CLM patients achieve the best possible prognosis, we must provide aggressive treatment that goes beyond Taiwan's national health insurance regulations. The third factor was there were no regular monitoring and follow-up of CLM patients' chemotherapy response during the monthly MDT meeting. Although all newly diagnosed CRC patients and patients with newly diagnosed liver metastasis after primary tumor resection were discussed during the MDT meeting, we didn't regularly discuss chemotherapeutic response and/or the results of CLM patients with initially unresectable tumors. If the colorectal surgeon or medical oncologist is not familiar with the timing, indications, and technique of liver metastasectomy surgery, the patient will miss a golden time for treatment. Fourth, due to limitations of past definitions of liver resectability and less common use of intraoperative RFA, there was less curative treatment in the chemotherapy group. The new definition of resectability is shifted to achieve R0 resection, preserve two contiguous liver segments, and assure an adequate future liver remnant that is greater than 30%. For patients with extensive disease, downsizing chemotherapy, portal vein embolization, resection + RFA, two-stage hepatectomy, tri-segmentectomy, ALLPS may provide possibility of curative treatment. With teamwork stimulated by the regular MDT meeting and the support of experienced hepatobiliary surgeon, we believe curative treatment in CLM patients could improve in the future.

Study limitations

Our study had some limitations. First, this was a retrospective study of cases collected from our hospital's colorectal cancer database, and thus selection biases could not be avoided. For example, among the four groups, there was a distribution difference in patient age. The mean age in the palliative group was older than in the 3 other groups, and older age could

have an adverse effect on cancer-specific survival. Second, the significant difference in numbers of liver metastases can influence the rate of successful liver resection and long-term survival. Third, the number of patients in our series was small. Although disease-free and cancer-specific survival had no significant statistical difference in the 3 treatment groups when curative treatment of liver metastases was achieved, we couldn't confirm this conclusion due to the small study population. Selection biases, unmatched case-control design, and the small study population were limitations of this study.

Conclusions

Initial treatment with synchronous colectomy and hepatectomy is safe for carefully selected CLM patients. Initial treatment could avoid tumor-related complications and provide better cancer-specific survival. For patients who have chemotherapy first, the chemotherapeutic response of liver metastases in the first year will determine the final prognosis.

Abbreviations

CRC, colorectal cancer; CLM, colorectal cancer with liver metastasis; SCH, synchronous colectomy and hepatectomy; RFA, radiofrequency ablation; FLRV, future liver remnant volume; ALPPS, associating liver partition and portal vein ligation for staged hepatectomy; MDT, multidisciplinary team; CR, complete response; PR, partial response; SD, stable disease; PD, progressive disease; NCCN, The National Comprehensive Cancer Network.

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原　著

分析以不同的起始方式治療大腸直腸癌併肝轉移的預後

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目的　該回顧性研究目的，是要分析大腸癌同時合併肝轉移接受不同起始治療方式的預後。

方法　從 2008 年 1 月至 2012 年 12 月，在奇美醫學中心有 273 位被診斷為大腸直腸癌同時合併肝轉移的患者，排除肝臟外轉移以及腹膜轉移後，最後有 150 名患者列入本研究。依照不同起始治療方式分成 4 組，分別有 40 名病人起始治療為先切除原發大腸癌；15 名病人起始治療為同時手術切除大腸癌與肝臟轉移；63 名病人起始治療為化學治療；32 名病人接受緩解性治療。我們分析比較各組的臨床病理特徵及其治療結果。

結果　化學治療組和緩解性治療組比起手術組 (包括先切除原發大腸癌組和同時切除大腸癌與肝臟轉移組) 有比較高的機率接受腸造口手術。手術治療組 (先切除原發大腸癌組和同時切除大腸癌與肝臟轉移組) 比化學治療組在統計學上有較高的機率能達到根治性治療 (30%，100% 比 1.59%，p 值 < 0.0001)。雖然手術組 (先切除原發大腸癌組和同時切除大腸癌與肝臟轉移組) 比化學治療組和緩解性治療組具有更好的癌症相關生存率，但在先切除原發大腸癌組和同時切除大腸癌與肝臟轉移組之間相比，並達統計學上差異 (p = 0.487)。達到肝轉移治癒性治療後，這三組在無疾病和癌症特異性生存率上並沒統計學上差異。

結論　在小心篩選病人的情況下，手術切除 (同時切除原發大腸癌與肝轉移) 是安全的，且可以避免腫瘤相關併發症，提供更好的癌症相關生存率。 對於先接受化療的病人，第一年肝轉移對化療的反應決定了最終預後。

關鍵詞　大腸直腸癌、腫瘤轉移、大腸切除、肝臟切除、化學治療。