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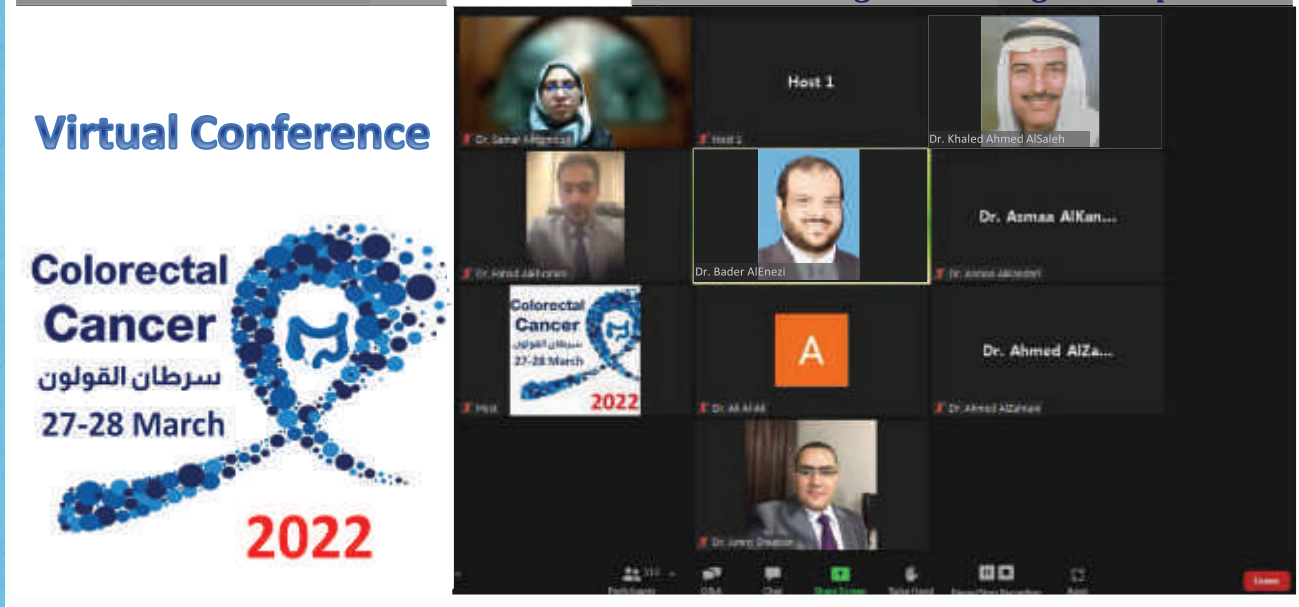

The Official Journal of the Gulf Federation For Cancer Control

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Original Article

Outcomes of Laparoscopic Combined Surgery for Colorectal Cancer with Synchronous Liver Metastases: A Prospective Comparative Study.

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Summary

Aim: Combined surgery for colorectal cancer with synchronous liver metastases (CRCSLM) is addressed to selected patients. Technically, by conventional surgery this simultaneous approach raises a problem of adequate access. The purpose of this study is to assess the feasibility and safety of the laparoscopic approach in combined surgery.

Methods: From August 2016 to January 2020 a monocentric prospective comparative study was conducted. Short and long-term outcomes of simultaneous laparoscopic surgery (SLS) were evaluated. Short–term outcomes of SLS were compared to those of laparoscopic colorectal surgery alone (LCRS).

Results: Forty patients were included in each arm. In SLS group, the median age was 62.5 years. Hybrid surgery was performed for 60% of patients, down staging laparoscopic surgery for 22.5% of patients and totally laparoscopic surgery for 10% of patients. The conversion rate was 7.5%. Mean operating time was 323 minutes. Overall morbidity rate was 27.5%. Multivariate analysis showed that anemia ($p = 0.046$) and number of liver resections ($p = 0.018$) were independent factors of morbidity. Ninety–five percent of colorectal resections were R0, 90% of liver resections were R0. The mean length of hospital stay was 5.1 ± 2.58 days. The recurrence rate was 22.5%. Median disease–free survival was 27 months. There was no difference in short–term outcomes between the two arms except for operating time which was longer in SLS arm ($p < 0.0005$).

Conclusion: Laparoscopy is feasible in combined surgery in selected patients. Minor liver resection may be associated with laparoscopic colorectal surgery without increasing morbidity.

Keywords: Laparoscopy, synchronous liver metastases, simultaneous resection, liver resection, portal vein ligation, colorectal cancer.

Introduction

Colorectal cancer (CRC) is the third most common cancer in the world and the second leading cause of cancer deaths[(1)]. Survival is determined by the tumor stage with a 5–year survival rate of 90.3% for stage I and only 12.5% for stage IV[(2)]. Liver is the most frequent site of CRC metastases. Ten to 25% of patients have hepatic metastases at their initial presentation[(3)]. Resection surgery is the only potentially curative treatment with a 5–year survival which varies from 35 to 58%[(3)].

The clinical presentation of patients with synchronous liver metastases is variable and depends on the location of the primary tumor (colon or rectum), its stage and the extent of the metastatic disease, therefore the management differs from a presentation to another.

The therapeutic strategy for patients with CRCSLM is still debated. To date, the optimal time for surgical resection of synchronous liver metastases has not been well defined and remains controversial. Several studies, including the meta–analysis by J. Chen[(4),] have concluded that the simultaneous resection was safe and effective oncologically. Synchronous resections have the advantage of requiring only one procedure to treat the two tumor

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sites, a shorter hospital stay and operating time compared to the combined results of sequential resections[4]. This procedure also decreases the psychological stress of patients which do not have to wait with a residual cancer for the second intervention[5].

This simultaneous surgery seems interesting for selected patients who do not require major hepatic resection and carrying an uncomplicated colorectal primary tumor[6].

By focusing on technical aspects, combined surgery raises a problem of adequate access, since we have to operate on two distinct and distant tumor sites. Combined conventional surgery requires large incisions with the risk of short or long–term complications. In order to overcome this difficulty in adequate and optimal exposure, the laparoscopic approach to one or both tumor sites could facilitate this simultaneous approach. Laparoscopy has been validated for colorectal cancer surgery as reported by large randomized trials[7] and has been accepted as an alternative to the conventional approach. Laparoscopic resection of hepatic metastases from CRC is also associated with lower postoperative morbidity than classic surgery with the same oncological results[8], minor resections are currently considered as standard practice[9], laparoscopy for Liver resection has become an established technique[10]. The potential advantages of this laparoscopic simultaneous approach are the possibility of performing a radical operation with small incisions, improving recovery and cost reduction, as well as the reduction of the length of hospital stay and the faster referral of patients to adjuvant treatment[11]. In addition, laparoscopy by reducing postoperative adhesions would allow an easier approach in the case of rehepatectomy for a recurrence.

In order to assess the feasibility and safety of the laparoscopic approach in combined surgery for CRCSLM, we conducted a prospective and comparative study comparing this new approach to laparoscopic colorectal surgery alone.

Material and methods

Patient selection:

From August 2016 to January 2020, all patients treated in our department for CRCSLM eligible for combined surgery were included in the experimental arm named simultaneous laparoscopic surgery (SLS).

During the same period, patients operated laparoscopically for colorectal cancer alone were included in the laparoscopic colorectal surgery arm (LCRS).

Preoperative assessment:

Patients were evaluated clinically in consultation, additional examinations for diagnostic and extension assessment were carried out systematically, a low endoscopy with tumor biopsy, a pelvic MRI in the case of a rectal tumor, a triphasic computed tomography (CT) scan which specified the topography, the number, the volume, the vascular closeness of liver metastases and the state of the liver parenchyma. The future liver remnant (FLR) volume was calculated if necessary. This CT scan was supplemented by diffusion–weighted magnetic resonance imaging for detection and characterization, especially for small lesions.

A total colonoscopy was performed to avoid missing synchronous lesions. In case of a stenosing tumor, a CT colonography was performed. The CEA (Carcinoembryonic antigen) tumor markers were assayed. The RAS gene (KRAS and NRAS) mutation status was determined.

Therapeutic strategy:

Patients of SLS arm were candidates for combined surgery, the laparoscopic approach of at least one tumor site was scheduled.

Different therapeutic modalities were discussed in a multidisciplinary team meeting (MTM), depending on the location of the primary tumor (colon, rectum), the resectable (class I) or potentially resectable (class II) character of liver metastases, their number, their location (anterior or posterior segments) and their bilobar or unilobar character. The order and the interval between the different therapeutic modalities (chemotherapy, radiotherapy and surgery) were specified.

Patients of LCRS arm were scheduled for laparoscopic colorectal surgery alone regardless of whether or not their cancer was metastatic.

The laparoscopic approach in combined surgery could take many forms; the “all laparoscopic˝ approach where the resection of the primary tumor and hepatic metastasis was done by pure laparoscopy, the “hybrid approach” which is a combination of laparoscopy and laparotomy in the surgery of two tumor sites and finally laparoscopic ˝down staging˝ surgery with or without portal vein ligation as part of staged hepatectomy for patients who presented multiple bilobar metastases.

Surgical technique: The operating procedure was divided into three stages; the first step was a laparoscopic abdominal exploration to eliminate peritoneal carcinosis, the second step was represented by laparoscopic colorectal resection, followed by a third step, hepatic time, performed either laparoscopically or by open surgery through a

short midline incision, a right subcostal incision or a "J" shaped laparotomy. In the case where a laparoscopic resection of the hepatic metastasis was carried out, the extraction of the two specimens (colorectal and hepatic) was done by a Pfannenstiel incision. In the case where the hepatic resection was made by laparotomy, the colorectal specimen was extracted through the abdominal incision chosen for the hepatic resection. In the particular case of laparoscopic ″down staging″ surgery, colorectal resection was performed first, before portal vein ligation or hepatic resection, specimens in this case were extracted by a Pfannenstiel incision.

Study design: An analysis of the short and long–term outcomes of the simultaneous laparoscopic approach was performed. A comparative analysis of the peroperative and postoperative outcomes of the two arms of the study was carried out.

Evaluation:

Main endpoints were postoperative 30–day morbidity and mortality. Perioperative adverse events were assessed using the Oslo classification[12] for intraoperative incidents and the Clavien–Dindo classification[13–14] for postoperative complications. For the detail of postoperative complications and their gradation, we used the Japan Clinical Oncology Group classification (JCOG)[15].

Secondary endpoints were conversion rate, quality of resection on pathological criteria, quality of postoperative recovery and long–term outcomes (recurrence rate and survival rates at 3 years).

Statistical analysis:

We performed a descriptive statistical analysis with study of the frequency, mean and median of the different variables. We performed a univariate and a multivariate analysis. For the multivariate analysis, a Cox regression model including the different covariates of interest was used. We carried out tests to compare the qualitative variables; chi–squared test and Fischer test (in the case of theoretical sample less than 5) as well as a comparison test of quantitative variables (Student's t test to compare means). The survival curves were estimated by the Kaplan–Meier method and compared with the log–rank test. A p value <0.05 was considered to be statistically significant. Data processing and analysis was done using IBM SPSS statistics version 25 software.

Results

Experimental arm SLS:

Patient characteristics: We prospectively included 50 patients for laparoscopic combined surgery. We secondarily excluded 10 patients, among them 4 patients who were not operated for progression of their metastatic disease under chemotherapy. Six patients underwent laparoscopic surgery but had not had combined surgery.

The analysis was done on a sample of 40 patients, there were 23 men and 17 women with a median age at 62.5 years (range 32–79), the median of the body mass index (BMI) was 24 Kg / m² (range 18 – 38). The distribution of patients according to the American Society of Anesthesiologists classification was as follows: 23 patients ASA I, 15 patients ASA II and 2 patients ASA III. All of our patients were in good general condition and rated 0 according to the WHO score. Twelve patients (30% of our cases) had a history of abdominal surgery.

Characteristics of the primary tumor and metastatic disease: The symptomatology revealing the disease was always linked to the primary tumor. The primary tumor was colonic in 24 patients (sigmoid 16, left colon 4, right colon 4) and rectal in 16 patients (upper rectum 5, middle rectum 6, low rectum 5). The characteristics of liver metastases are summarized in Table 1. Thirty–four patients (85% of the cases) had received neoadjuvant treatment.

Surgery characteristics: The approach of the two tumor sites, was performed in three different ways, all laparoscopic in 4 patients, hybrid in 24 patients and laparoscopic ″down staging″ surgery in 9 patients. Conversion was necessary in 3 patients (7.5%). Hepatic resections made simultaneously by laparoscopy or by laparotomy (hybrid) were all minor resections (metastasectomies, wedge resection, segmentectomies or bi–segmentectomies), in total 56 specimens were resected, including 8 laparoscopically. During laparoscopic ″down staging″ surgery, a portal vein ligation was performed in 6 patients. A major hepatectomy was performed a few weeks later to the 6 patients. The surgical procedures performed are summarized in Table 2.

Operating results: The average operating time was 323 min for the total duration of the operation, 222 min for colorectal part and 101 min for liver part, the longest operating time was 420 min.

Hepatic clamping in combined surgery was performed in 12 patients (selective in 2 patients and pedicular in 10 patients).

An intraoperative incident was recorded in 25% of patients (Grade 1 Oslo in 10%, Grade 2 Oslo in 15%). The occurrence of an intraoperative incident was statistically linked to the presence of comorbidities ($p = 0.049$). The occurrence of a severe incident (Oslo 2) was linked to the history of abdominal surgery ($p = 0.037$), especially if the anterior incision was a midline incision ($p = 0.013$).

	N = 40
Number of liver metastases Unique Multiple	 17 (42.5) 23 (57.5)
Mean number of metastases (extremes)	3 (1–11)
01 02 03 > 03	17 (42.5) 08 (20.0) 02 (05.0) 13 (32.5)
Mean size of metastases in mm (extremes)	39,95 (6 – 88)
Location of liver metastases Unilobar Bilobar	 29 (72.5) 11 (27.5)

Table 1: Liver metastases characteristics

	N = 40
Surgical approach	
All laparoscopic	04 (10)
Hybrid surgery	24 (60)
Down staging surgery	09 (22.5)
Conversion	03 (7.5)
Colorectal resection	
Anterior resection	14 (35)
Segmental resection	13 (32.5)
Abdominoperineal resection	02 (5)
Right colectomy	04 (10)
Left colectomy	04 (10)
Subtotal Colectomy	02 (5)
Total Colectomy	01 (2.5)
Liver surgical strategy	
One stage resection	31(77.5)
Two stages resection with portal vein ligation	06 (15)
Two stages resection without portal vein ligation	03(7.5)
Simultaneous liver resection (56 specimens)	
Metastasectomy	23 (41.1)
Wedge resection	26 (46.4)
Anatomical resection	7 (12.5)
Major liver resection (second stage) (6 patients)	
Right hemihepatectomy	04
Extended left hepatectomy (left trisectionectomy)	01
Right posterior sectionectomy extended to segment VIII	01

Table 2: Surgery characteristics

The conversion rate was 7.5%. The conversion was preemptive in one patient and reactive in two patients. Statistical analysis in search of risk factors leading to conversion had individualized the degree of severity of the peroperative incident according to the grades of the Oslo classification ($p = 0.044$) and the degree of parietal infiltration on pathological study ($p = 0.011$).

On visual analogue scale 62.5% of the patients had an estimated pain <3/10 on first postoperative day. Resumption of liquid feeding was early, it was authorized the evening of the intervention. Resumption of transit was early, 87.5% of patients had resumed their transit during the first 48 postoperative hours.

The postoperative hospital stay was on average 5.1 ± 2.58 days. There was no significant difference in the length of postoperative stay between the different types of surgical procedures (all laparoscopic, hybrid surgery or down staging surgery) or in case of conversion.

The overall 30–day morbidity was 27.5%, represented mainly by mild morbidity in 81.82% of patients who presented a complication.

Severe morbidity was represented by a perihepatic collection drained radiologically in one patient and a surgical revision for an intra–abdominal collection in another patient (Table 3). In multivariate analysis, anemia ($p = 0.046$) and the number of liver resections ($p = 0.018$) were independent factors of morbidity. Postoperative 30–day mortality was nil.

The resection margins were calculated on 40 specimens of colorectal resection and 56 specimens of hepatic resection. On the primary tumor 95% of the resections were R0. On hepatic resections, the rate of R0 resection was 92.8% relative to the number of analyzed specimens and 90% relative to patients' number. The mesorectum was complete on all rectal resections performed (16 resections). The average number of lymph nodes in dissection was 15.55 with a median of 12.5 and extremes ranging from 1 to 54 lymph nodes. The number of lymph nodes in the dissection was significantly lower in the case of preoperative chemotherapy (13.31 vs 21.45, $p = 0.034$).

Long–term outcomes: Patients follow–up period was on average 15 months with a median of 12.5 months and extremes ranging from 2 months to 41 months. During this period 9 patients had presented a recurrence (22.5%), the median time to recurrence was 13 months. All of the patients in our study were alive at the endpoint date.

Post operatives complications	Clavien–Dindo classification					
	Grade I	Grade II	Grade III a	Grade III b	Grade IV a	Grade IV b
Pneumonia		1				
Vomiting	1					
Transfusion		1				
Wound infection		1				
Collection			1	1		
Gastroparesis		1				
Fistula grade B		1				
Dehydration	1					
Urinary catheter	1					
tachyarrhythmia	1					
Total = 11	4	5	1	1	0	0

Table 3: Morbidity by Clavien–Dindo classification

	Control arm = 40	Experimental arm = 40	p value
Sex (m/f)	17/23	23/17	0.132
Age	60.28 ± 13.6	59.08 ± 11.28	0.669
BMI	24.83 ± 3.99	24.05 ± 4.06	0.392
ASA grade ASA I ASA II ASA III	 19 (47.5) 20 (50) 01 (2.5)	 23 (57.5) 15 (37.5) 02 (5)	0.490
Tumoral location Rectum Sigmoide Left colon Right colon	 25 (62.5) 11 (27.5) 01 (2.5) 03 (7.5)	 16 (40) 16 (40) 4 (10) 4 (10)	0.184
Neoadjuvant radiotherapy	18 (45)	10 (25)	0.061
Type of resection Anterior resection Segmental resection Abdominoperineal resection Hartmann's procedure Right Colectomy Left Colectomy Subtotal colectomy Total Colectomy	 21 (52.5) 09 (22.5) 03 (7.5) 02 (5) 03 (7.5) 00 (00) 02 (5) 00 (00)	 14 (35) 13 (32.5) 02 (5) 00 (0) 04 (10) 04 (10) 02 (5) 01 (2.5)	0.221
TNM T1 T2 T3	 1 (2.5) 4 (10) 35 (87.5)	 0 (0) 3 (7.5) 37 (92.5)	0.549
N+	36 (90)	35 (87.5)	0.500

Table 4: Patients and surgery characteristics in both arms.

	Control arm = 40	Experimental arm = 40	p value
Operative time	274 ± 63.62 mn	323 ± 52.6 mn	< 0.0005
Conversion	4 (10)	3 (7.5)	0.500
Global morbidity	13 (32.5)	11 (27.5)	0.606
Clavien I II	9 (22,5)	9 (22.5)	1.000
Clavien III IV	4(10)	2 (5)	0.338
Anastomotic leakage	4(10)	2 (5)	0.338
Intraoperative transfusion	0 (0)	3 (7.5)	0.120
Postoperative stay (days)	5.48 ± 2.81	5.10 ± 2.58	0.537

Table 5 Comparison of surgery results in both arms.

The mean recurrence–free survival (RFS) was 28.91 months. The median RFS was 27 months. Only one variable was linked to recurrence, the N + status (p = 0.032). RFS was estimated at 86% at one year, 62% at two years and 50% at three years (Fig. 1)

Comparative study: Populations of two arms study (SLS vs LCRS) were homogeneous and comparable (Table 4). The comparison of the surgery results is summarized in Table 5, there was no difference between the two groups except for operating time which was longer in SLS arm (p < 0.0005).

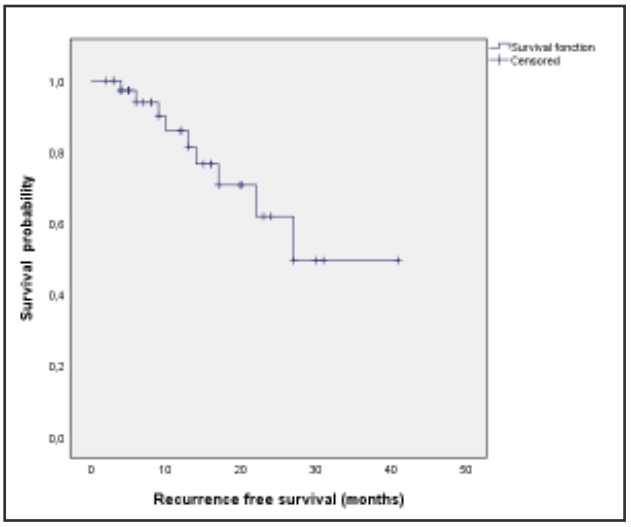

Figure 1: Experimental arm recurrence–free survival

Discussion

The present study is the first initiated in our country assessing the role of laparoscopy in the surgical management of resectable CRCSLM.

In our series the overall morbidity rate at 30 days was 27.5% (11/40), of the 11 patients, 03 had presented colorectal complications (fistula, collection and disorders related to protective ileostomy), 01 patient a hepatic complication. According to Clavien classification, minor complications (I, II) represented 81.82%, major complications (III) 18.18%. Ferretti[16] reported an overall morbidity of 31%. According to Clavien classification, minor complications (I, II) represented in his series 36.36% of the total, major complications (III, IV, V) 63.64% of the total. Compared to Ferretti's series, our results reflect a population with less co–morbidities (ASA III = 5%) and less extensive liver resection. In the literature, Francesca Ratti's series[17] is closer to ours since it included 69 patients operated by a hybrid approach. The overall morbidity rate was 24.6%. Mild Clavien morbidity (I, II) was predominant (82.35%) compared to major morbidity (III, IV, V) which represented (17.65%) of the total complications. Stefano Garritano[18] in his systematic review on the laparoscopic combined approach, had included 150 patients from 20 published studies. The overall morbidity rate was 18%. The rate of minor hepatic resection was 89.3% (134/150).

In our series, the 30–day postoperative mortality was nil. In the largest multicenter series of patients operated on simultaneously by laparoscopy, Ferretti [16] reported a mortality rate of 2.1% (3 patients died out of 142 included) but it should be noted that 31.7% of the patients in his series were classified ASA III, in our series they represented 5%.

As M.J van der Poel[19] and Bretagnol[5] did, we compared the short–term results between two groups of patients. An experimental group of laparoscopic combined surgery and a control group of laparoscopic colorectal surgery alone. These two authors did not find any significant difference in postoperative morbidity between these two groups. In our comparison too, there was no difference between the two groups in overall morbidity (p = 0.606), mild morbidity (p = 1.000) and severe morbidity (p = 0.338).

We had classified the intraoperative incidents according to their consequences on a change of the operating strategy (Oslo classification). The risk factor for the occurrence of intraoperative severe incidents was linked to the existence of a history of abdominal surgery. In this situation the importance of adhesions leads to a time of release with risks of visceral or vascular injury.

The average operating time for our series was 323 min. In the literature, laparoscopic simultaneous surgery was used if the planned total duration of the intervention was <8 hours[20]. This empirically fixed duration was considered as a threshold not to be exceeded since the advantages of the laparoscopic approach were lost and, an additional morbidity could be observed. In our series, the longest intervention lasted 7 hours. The median of the operative durations of the simultaneous laparoscopic approach reported in the systematic review of Moris[21] was 335.5 min (240 min – 495 min).

In our comparative study, the operating time was longer in the simultaneous surgery arm ($p < 0.0005$). Hepatic time significantly impacted the total operating time.

Regarding the quality of excision, our R0 resection rates were within the ranges reported in the literature. Ferretti[16] had reported an R0 resection rate of liver metastases of 93%, Ratti[22] in his comparative study had reported 100% R0 liver resection and 96% R0 colorectal resection. Hatwell[20] in his series of 51 patients (including 44 hybrid procedures) reported 100% R0 resection of the primary tumor and 82.35% R0 resection of hepatic metastases.

Regarding lymphadenectomy, the average number of lymph nodes in dissection was in line with the number of lymph nodes required by the TNM classification, however, despite a standardized surgical technique, we had observed in some patients an insufficient number of lymph nodes removed. By statistically analyzing subgroups of patients, it was found that patients who had received chemotherapy preoperatively had fewer lymph nodes in the dissection and significantly (13.31 vs 21.45) ($p = 0.034$) than patients who had not received chemotherapy before the intervention.

This hypothesis has been reported in several publications, the effect of concomitant radiochemotherapy (CRC) on the lymph node dissection in rectal surgery had been evaluated in the study of Amajoyi[23]. Chang[24] had made the same observations on the reduction in the number of lymph nodes removed but had introduced a new concept, the lymph node ratio remained stable between the two groups. Hiroshi Sawayama[25] also reported the effects of preoperative chemotherapy on lymph node status, vascular invasion and primary tumor in metastatic patients.

The strategy of simultaneous resection has been proposed in order to avoid delaying surgery for resection of metastatic liver disease. The main advantage of this strategy is the removal of the two tumor sites in a single operation followed by systemic chemotherapy with minimal delay[11].

Choosing the right approach becomes an important step in the surgical strategy. This choice depends on the patient's morphotype also on the topography of the primary tumor and hepatic metastases (right liver / left liver, anterior segments / posterior segments)[5]. In our study, we wanted to improve the approach of patients with CRCSLM compared to the classic one, a minimally invasive approach on at least one of the two tumor sites seemed advantageous to patients according to literature data, since the laparoscopy had been validated for colorectal surgery[7] and had become a standard for minor liver resections[9], why do not combine the two in patients who presented, precisely given the bifocal location of their tumors, a problem of approach? In our study, three types described in the literature were carried out, however hand assisted laparoscopic surgery was not used as well as robotic surgery. The number of patients in each type of approach was not equivalent. Hybrid surgery was the majority in our series, to explain this high rate of hybrid surgery, we must refer to the locations of hepatic metastases in our series, since in 65% of cases they were localized in the posterior segments which often required complete mobilization of the right liver.

The laparoscopic approach of the posterior segments is difficult, in this sense scores of difficulties of laparoscopic hepatic surgery have been reported by several authors and summarized in Ruben Ciria publication[28] where 7 of the 11 scores presented considered tumor location as a difficulty factor. The purely laparoscopic approach for the resection of hepatic metastases in our series concerned hepatic metastases localized in segments II, III and IV. Laparoscopic portal vein ligation was performed in six patients. There was no drop out of patients, and the six patients were reoperated and each time a major hepatectomy was performed.

The follow–up period of the patients was on average 15 months. During this period 9 patients had presented a recurrence (22.5%). Seven times out of 9 the disease had recurred on the liver. This recurrence was resectable in three patients. In the literature Takasu[29] over a follow–up period of 31.5 ± 33.5 months had reported a recurrence rate of 42.8%. Ratti[22] in his comparative study, over an average follow–up period of 37 months had reported a recurrence rate of 36% in the laparoscopic arm, the recurrence was hepatic in 44.4% of the cases, extrahepatic in 22.2% of the cases and mixed in 33.3%

of the cases, the treatment of the recurrence consisted of a re–resection in 22.2% of cases, radio frequency in 11.1% of cases and chemotherapy in 77.8% of cases. This recurrence and management profile is similar to our series, the possibilities of a curative treatment of recurrence exist but remain in the minority.

All the patients in our study were alive at the endpoint date, but the follow–up was insufficient to comment on overall survival. In contrast, the median recurrence–free survival was 27 months.

The limits of this study lie in the fact that it is a monocentric study on a limited sample, the results reflect the activity of a single team over a limited period. Also, the assessment of recurrence rates as well as survival rates could not be done optimally given the insufficient fellow–up. In addition, our perspective is to develop the "all laparoscopic" approach in the future, we imagine in this perspective a complementary work between two teams for the same intervention, a team for colorectal time and a second team for hepatic time. This would improve the short–term and oncology results by providing expertise for each operating time with a better distribution of the workload on interventions that can last as we have reported 6 to 7 hours.

Conclusion

The results of our study argue in favor of the feasibility of laparoscopy in the management of CRCSLM in selected patients. In addition to its diagnostic interest, laparoscopy can be used exclusively or in combination with laparotomy with a curative aim in combined surgery and can also constitute the first stage of ″down staging″ preparing a major hepatectomy. Minor liver surgery can be combined with laparoscopic colorectal surgery without increasing morbidity. The quality of the resection in the combined laparoscopic approach is good, the long–term oncological results are to be evaluated.

Acknowledgments:

None.

Conflicts of interest:

The authors declare that they have no conflict of interest

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