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ORIGINAL ARTICLE – RECONSTRUCTIVE ONCOLOGY

Postoperative Morbidity and Mortality of Head and Neck Cancers in Patients With Liver Cirrhosis Undergoing Surgical Resection Followed by Microsurgical Free Tissue Transfer

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ABSTRACT

Background. The aim of this study was to evaluate the association and the related risk factors between postoperative complications and mortality and the severity of liver cirrhosis in head and neck cancer patients undergoing tumor ablation followed by microsurgical free tissue transfer.

Methods. Between January 2000 and December 2008, a total of 3108 patients were retrospectively reviewed. The diagnosis of liver cirrhosis was made mainly by abdominal ultrasonography. The Child's classification was used to assess the severity of liver cirrhosis.

Results. There were 60 men and 2 women enrolled. Preoperatively, 42, 17, and 3 patients were classified as Child's class A, B, and C, respectively. Class B patients had statistically significantly prolonged stay in the intensive care unit and hospital stay compared to class A patients. Patients with class B or C cirrhosis had more complications than those with class A cirrhosis (80% vs. 19.1%, $P < .001$). This included significantly increased rates of pulmonary complications, acute renal failure, and sepsis. The mortality rate was also significantly higher for patients with class B/C cirrhosis than for those with class A cirrhosis (30% vs. 4.8%, $P = .011$). By logistic regression model, preoperative platelet count, intraoperative blood transfusion $\geq$2 units, and Child's class were found to be significant predictive factors for morbidities. Likewise, Child's class, albumin level, intraoperative blood transfusion $\geq$2 units, intraoperative blood loss >500 ml, and prothrombin time were significant predictive factors for mortality.

Conclusions. Child's class, along with its several components, and intraoperative blood transfusion of $\geq$2 units are predictive factors for morbidity and mortality.

Head and neck cancer is a major global health issue and has been one of the top 10 leading causes of death from cancer in Taiwan since 1991.[1] Alcohol, betel nut, and smoking are the major predisposing factors for head and neck cancer in Taiwan.[2–4] Another major health problem in Taiwan is liver cirrhosis with a high prevalence of hepatitis B virus infection (approximated at 15–20%).[5] Moreover, increased risks of cirrhosis and hepatocellular cancer were found in betel nut chewers free of hepatitis B/C infection, and these risks were synergistically additive to those of hepatitis B/C infections.[6] Therefore, liver cirrhosis is not infrequently encountered among candidates for head and neck cancer surgery.

As microsurgical techniques have advanced, immediate free flap reconstruction has been extensively applied for head and neck cancer reconstruction after tumor ablation and radical neck dissection.[7] Potential complications and flap failure in microsurgical reconstruction can be devastating for both patients and surgeons. The incidence of perioperative mortality and morbidity seem to be related to the preoperative comorbidity status.[8] Patients with liver cirrhosis are a distinct group for whom surgical risk is high. With recent advances in medical treatment, patients with liver cirrhosis now live longer and die from illness other than liver disease.[9] Although previously published studies

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have documented a high perioperative risk in patients with liver cirrhosis undergoing general surgery, such as abdominal surgery, thoracotomy, open-heart surgery, orthopedic surgery, and trauma operations, there have been no reports describing the clinical outcomes and estimated risks of microsurgical free tissue transfer in head and neck patients with liver cirrhosis.[10–16]

The Child-Pugh classification (Child's classification) is the most widely used system for stratifying the risks of surgery in patients with liver cirrhosis. Basically, most surgery is well tolerated in patients with Child's class A cirrhosis, is permissible with preoperative preparation in patients with Child's class B cirrhosis, but presents a high risk for patients with Child's class C cirrhosis.[17,18] The decision regarding whether it is feasible for head and neck cancer patients with cirrhosis to undergo reconstructive microsurgery remains a common clinical dilemma.[19] To our knowledge, the current study provide the first evidence to determine the association between the preoperative severity of liver cirrhosis and postoperative morbidities and mortality in head and neck cancer patients who receive ablative surgery with immediate free flap reconstruction. Additionally, we seek to determine potential prognostic factors for the prediction of major medical complications and mortality in this group of patients.

PATIENTS AND METHODS

The medical records of 3108 patients who underwent microsurgical free tissue transfer after head and neck cancer ablation surgery at Chang Gung Memorial Hospital–Linkou Medical Center, Taiwan, between January 2000 and December 2008 were retrospectively reviewed. After free tissue transfer, all patients were hospitalized in the microsurgical intensive care unit for 7 days. A total of 62 patients, including 60 men (96.8%) and 2 women (3.2%), were enrolled onto this study by a diagnosis of liver cirrhosis. The diagnosis of cirrhosis was based on a history of liver disease, impaired liver function tests, abdominal ultrasonography and/or computerized tomography, and/or liver biopsy results, when applicable. All etiologies of liver cirrhosis were included.

To assess the severity of liver cirrhosis, the Child's classification was used.[20] Patients were divided into three groups according to the Child's classification on the basis of physical findings and laboratory values at admission. The following clinical data were obtained from the medical records and included in the analysis. Demographic data of the patients included age, sex, tumor stage, tumor site, and medical history. Details of cirrhosis included etiology (alcoholic, viral, mixed, and unknown) and decompensated complications of cirrhosis (gastrointestinal bleeding, esophageal varices bleeding, and encephalopathy). Preoperative laboratory studies included serum chemistries, blood counts, and coagulation profiles. Surgical data included operation time, the amount of intraoperative blood loss and blood transfusion, procedures performed, length of intensive care unit stay and hospital stay. Morbidity data included surgery-related complications, i.e., flap loss (partial or total), neck bleeding with hematoma formation, and postoperative infection (documented infection or the introduction of specific curative antibiotic), and medical complications included cardiovascular (acute myocardial infarct), pulmonary (pneumonia, pleural effusion, acute respiratory distress syndrome), gastrointestinal (esophageal varices bleeding), renal (acute renal failure), hepatic encephalopathy, and sepsis. Postoperative deaths were also recorded. No patient was noted to have encephalopathy preoperatively in the series. The positive event for postoperative morbidity was defined as the patient having at least one of the major medical complications listed above. The occurrences of morbidity and mortality were restricted to the hospital stay.

Characteristics of patients and clinical findings were stratified by Child-Pugh classification and evaluated by χ^2 test, Fisher's exact test, *t*-test, and Wilcoxon test where appropriate; the factors examined included sex, age, and other clinical factors. The statistical analysis was performed with SAS software, version 9.1 (SAS Institute, Cary, NC). Logistic regression models were used to define the risk factors for postoperative morbidity and mortality. Any clinical factor found to be significant in the univariate analysis was put into the multivariate analysis to estimate the adjusted odds ratio for prediction of postoperative morbidity and mortality. All P values were two-sided, and the significance level was set at $P < .05$.

RESULTS

Patient Characteristics

The demographic characteristics of the patients are presented in Table 1. The median patient age was 53.2 years (range, 35–72 years). The sublocations of all patients included buccal mucosa ($n = 23$), gum ($n = 12$), tongue ($n = 11$), hypopharynx ($n = 7$), palate ($n = 4$), mouth floor ($n = 4$), and lip ($n = 1$). Tumor, node, metastasis system (TNM) staging included 24 (38.7%), 8 (12.9%), and 30 (48.4%) patients with stage II, III, and IV disease, respectively. Preoperatively, 42 (67.7%), 17 (27.4%), and 3 (4.9%) patients were classified as Child's class A, B, and C, respectively. Twenty-seven patients (43.6%) had viral hepatitis, 14 patients (22.6%) had alcohol-related hepatitis, and 14 patients (22.6%) had synchronously virus- and alcohol-related hepatitis. In the remaining seven patients (11.2%), the cause of cirrhosis was unknown.

Clinical Parameters Compared by Child-Pugh Classification

The patients' laboratory data, operative time, intensive care unit stay, and hospital stay were compared on the basis of Child's classification. No statistically significant differences among the three groups were found with respect to age, prothrombin time (PT) difference, alkaline phosphatase values, and operation time. However, concerning the components of Child's classification, Child's class B patients had lower serum concentrations of albumin ($P < .001$), higher serum concentrations of total bilirubin ($P = .041$), increased amount of intraoperative blood loss ($P = .030$), increased amount of required blood transfusion ($P = .018$), and a higher probability of ascites found during abdominal ultrasonography compared to patients preoperatively assigned to Child's class A. Furthermore, patients in Child's class B had prolonged intensive care unit stay ($P = .008$) and hospital stay ($P = .006$) compared to patients in Child's class A (Table 2).

TABLE 1 Demographic characteristics of 62 head and neck cancer patients with liver cirrhosis who underwent radical resection and free tissue transfer

Characteristic	*n*	%
Sex		
Male	60	96.8
Female	2	3.2
Tumor stage		
II	24	38.7
III	8	12.9
IV	30	48.4
Tumor		
Primary	41	66.1
Second primary	10	16.1
Recurrence	11	17.8
Tumor site		
Buccal	21	32.9
Gum	12	19.4
Palate	4	6.4
Tongue	11	17.7
Hypopharynx	5	8
Larynx	2	3.2
Mouth floor	4	6.5
Lip	3	4.8
Cirrhosis cause		
Alcoholic	14	22.6
Viral	27	43.6
Mixed	14	22.6
Unknown	7	11.2
Flap reconstruction		
ALT	46	74.2
Fibula	8	12.9
Jejunum	3	4.8
FFF	2	3.2
LD	1	1.6
Ileocolon	1	1.6
ALT + fibula	1	1.6
Child-Pugh class		
A	42	67.7
B	17	27.4
C	3	4.9

ALT anterolateral thigh, *FRF* free forearm flap, *LD* latissimus dorsi

Postoperative Morbidity and Mortality Compared by Child-Pugh Classification

The overall postoperative morbidity rate (including surgical and medical complications) was 45.1% (28 patients). Twenty-seven patients (43.5%) had surgical complications, including recipient-site complications (wound dehiscence, wound infection, and orocutaneous fistula), flap loss, neck hematoma, and acute vascular pedicle occlusion, but there was no significant difference between Child's class A and class B patients (38.1% vs. 47.1%, $P = .569$). Twenty-four patients (38.7%) had postoperative medical complications, including pulmonary (pleural effusion, pneumonia, and acute respiratory distress syndrome), acute myocardial infarct, gastrointestinal bleeding, acute renal failure, and sepsis (Table 3). These major medical complications were significantly increased in Child's class B or C patients as compared to class A patients (80% vs. 19.1%, $P < .001$). The occurrences of pulmonary complications, acute renal failure, and sepsis were significantly increased in Child's class B patients (14.2% vs. 64.7%, $P < .001$; 2.3% vs. 29.4%, $P = .006$; 2.3% vs. 40.6%, $P < .001$, respectively) as compared to class A patients. However, there were no significant differences in the occurrences of gastrointestinal bleeding, acute myocardial infarct, and encephalopathy.

Eight patients died after surgery, resulting in an in-hospital mortality rate of 12.9%. Two (4.8%), 4 (23.5%), and 2 (66.7%) of these cases were Child's class A, B, and C patients, respectively. Of these eight patients, six patients died of multiple organ failure and two died of acute respiratory distress syndrome. The mortality rate was significantly higher for Child's class B or C patients than for class A patients (30% vs. 4.8%, $P = .011$) (Table 3).

The effect of preexisting comorbid disease, including hypertension, diabetes mellitus, myocardial infarction, and

TABLE 2 Comparisons between patients with different Child-Pugh classifications

Finding	Child-Pugh classification			P value[a]
	A (n = 42)	B (n = 17)	C (n = 3)	
Sex (M/F)	42/0	16/1	3/0	
Age (years)	53.2 ± 10.5	55.3 ± 8.9	51.5 ± 6.8	.470
Albumin (g/dl)*	4.07 ± 0.48	3.34 ± 0.60	2.57 ± 0.59	<.001
Bilirubin (mg/dl)*	0.92 ± 0.45	1.20 ± 0.49	1.80 ± 0.27	.041
PT (second)[b]*	1.54 ± 1.57	2.37 ± 1.73	5.93 ± 3.39	.048
Ascites*	4 (9.5%)	7 (43.7%)	3 (100%)	.006
ALK-P (units/l)	98.1 ± 43.7	99.2 ± 43.4	51.0 ± 1.4	.694
Operation time (min)[b]	743.1 ± 184.0	751.1 ± 163.7	750.0 ± 286.2	.876
Blood loss (ml)	446.1 ± 354.1	579.4 ± 356.2	533.3 ± 416.3	.030
Blood transfusion (ml)	363.5 ± 684.8	610.5 ± 598.1	750.0 ± 636.3	.018
Intensive care unit stay* (d)[b]	8.97 ± 5.13	22.06 ± 18.45	23.67 ± 16.04	.008
Hospital stays (d)*	31.23 ± 12.72	42.65 ± 16.77	47.0 ± 6.25	.006

ALK-P alkaline phosphatase

* $P < .05$

[a] Class A vs. class B

[b] Prothrombin time (seconds over control)

TABLE 3 Comparison of postoperative morbidity and mortality between patients with different Child-Pugh classifications

Finding	Child-Pugh classification			P value
	A (n = 42)	B (n = 17)	C (n = 3)	
Surgical complications	16 (38.1%)	8 (47.1%)	3 (100%)	.276[a]
Pulmonary[c]	6 (14.2%)	11 (64.7%)	2 (66.7%)	<.001[a]
Gastrointestinal bleeding	3 (6.9%)	4 (23.4%)	1 (33.3%)	.176[a]
Acute myocardial infarct	0	1 (5.8%)	0	.288[a]
Acute renal failure	1 (2.3%)	5 (29.4%)	1 (33.3%)	.006[a]
Encephalopathy	4 (9.52%)	5 (29.41%)	0	.103[a]
Sepsis	1 (2.3%)	7 (40.6%)	3 (100%)	<.001[a]
Medical complications[d]	8 (19.1%)	13 (76.5%)	3 (100%)	<.001[a]
Mortality	2 (4.8%)	4 (23.5%)	2 (66.7%)	.051[a] .011[b]

[a] Class A vs. class B

[b] Class A vs. class B + class C

[c] Pulmonary complications including pneumonia, pleural effusion, and acute respiratory distress syndrome

[d] Medical complications were defined as a patient had at least one of the postoperative medical morbidities including pulmonary morbidities, acute myocardial infarct, gastrointestinal bleeding, acute renal failure, encephalopathy, and sepsis

chronic obstructive pulmonary disease, that may have influenced the postoperative morbidity and mortality was evaluated. These potential comorbidities seemed to have no effect on postoperative medical complications (P = 1.000, .767, .517, .425, respectively) and even on in-hospital mortality (P = 1.000, .414, 1.000, 1.000, respectively).

Prediction of Preoperative Risk Factors for Postoperative Medical Morbidities

A logistic regression model was used to evaluate the risks of preoperative clinical factors for prediction of postoperative morbidities. In the univariate analysis, age, overall TNM stage, operation time, amount of intraoperative blood loss, and preoperative liver function test results were not statistically significant factors for postoperative morbidities. However, Child's classification, identification of ascites by ultrasonography, platelet count, albumin concentration, total bilirubin concentration, intraoperative blood transfusion of ≥2 units, and prolonged PT were statistically significant risk factors in the prediction of postoperative morbidities. These statistically significant factors were further analyzed by a multivariate logistic regression model adjusted for age, sex, and overall TNM stage. Child's class, albumin concentration, total bilirubin concentration, identification of ascites by ultrasonography, intraoperative blood transfusion ≥2 units, and prolonged PT preoperatively remained statistically significant risk factors for the prediction of postoperative medical morbidities (Table 4).

TABLE 4 Univariate and multivariate analysis of risks associated with postoperative major medical morbidities

Factor[a]	Crude OR (95% CI)	*P* value	Adjusted OR (95% CI)[b]	*P* value
Platelet ($\times 10^3$)	0.27 (0.09–0.82)	.020	0.31 (0.09–1.01)	.052
Blood transfusion (≥2 vs. <2U)	3.63 (1.20–10.99)	.022	3.88 (1.22–12.27)	.021
Child's class (>A vs. A)	12.75 (3.57–45.48)	<.001	14.61 (3.71–57.58)	<.001
Albumin (<3.5 vs. ≥3.5 mg/dl)	9.54 (2.55–35.69)	<.001	8.66 (2.25–33.30)	.001
Total bilirubin	3.28 (1.10–9.80)	.033	3.43 (1.07–10.96)	.036
PT[c] (>4 vs. <4 s)	10.27 (1.11–94.59)	.039	13.04 (1.12–150.82)	.039
Ascites (yes vs. no)	12.0 (2.83–70.17)	<.001	14.63 (3.04–70.17)	<.001

OR odds ratio, *95% CI* 95% confidence interval

[a] Logistic regression model used to evaluate the risks of various factors stratified by their medians (higher levels vs. lower levels), except where otherwise indicated; CI, confidence interval

[b] Logistic regression analyses were adjusted by age, sex, and overall stage

[c] PT, prothrombin time (seconds over control)

Prediction of Preoperative Risk Factors for Postoperative In-Hospital Mortality

For the prediction of postoperative mortality, we used a logistic regression model to evaluate the risks of preoperative clinical factors. In the univariate analysis, age, overall TNM stage, operation time, identification of ascites by ultrasonography, results of preoperative liver function tests, platelet count, and total bilirubin concentration were not statistically significant factors for the prediction of postoperative mortality. However, Child's class, albumin concentration, intraoperative blood loss of >500 ml, required blood transfusion of ≥2 units during surgery, and prolonged PT were statistically significant preoperative risk factors for the prediction of postoperative mortality. These five statistically significant factors were further analyzed by a multivariate logistic regression model adjusted with age and overall TNM stage. Child's class, albumin concentration, intraoperative blood loss >500 ml, blood transfusion of ≥2 units, and prolonged PT remained significant risk factors for the prediction of postoperative mortality (adjusted odds ratio [95% confidence interval] as follows: 9.17 [1.59–52.75], $P = .013$; 10.31 [1.71–62.09], $P = .010$; 6.18 [1.25–30.49], $P = .025$; 7.81 [1.40–43.51], $P = .019$; 19.72 [1.66–233.09], $P = .018$, respectively) (Table 5).

DISCUSSION

In patients undergoing abdominal surgery, liver cirrhosis is a major preoperative risk factor; there is a direct correlation between the severity of liver disease on the basis of the Child's classification and clinical outcome. In general, elective surgery is well tolerated and safe in patients with Child's class A or B, but at higher risk in patients with Child's class C or those undergoing emergent operations.[21] There has been only one descriptive report of a single-center experience with reconstructive microsurgery in seven head and neck cancer patients with cirrhosis.[22] Despite its limited numbers and small sample size, they still advised against microvascular head and neck reconstruction in patients with advanced cirrhosis (Child's class B and C). The paucity of reports in the literature makes any definitive conclusion difficult in terms of surgical indication and management of head and neck cancer patients complicated with liver cirrhosis.

Operation time in different types of surgery may have different importance contributing to the postoperative morbidity and mortality. In microvascular reconstruction of head and neck cancer defect, Singh et al. reported that longer operation time was not associated with increased risk of postoperative complications; however, only the presence of advanced comorbidity remained statistically significant.[23] Compared to the previously published reports of cirrhotic patients who underwent abdominal surgery, head and neck cancer patients with cirrhosis who received free tissue transfer had longer operative time, longer duration of general anesthesia, and two surgical wounds, including one incision wound for tumor resection, frequently along with neck dissection, and one donor site created for flap elevation. However, similar to the report of Singh et al., the present study also demonstrated that operation time is not a statistically significant factor of prognosis in this special disease group. It might be that head and neck surgery pose little fluid shift than major abdominal surgery. Besides, laparotomy leads to a greater reduction in hepatic arterial flow than does extra-abdominal surgery in patients with liver cirrhosis.[24] Hence, in contrast to severity of liver cirrhosis and hepatic function reserve, the extended operation time to prognosis could be weakened and veiled to some extent.

TABLE 5 Univariate and multivariate analysis of risks for postoperative mortality

Factor[a]	Crude OR (95% CI)	*P* value	Adjusted OR (95% CI)[b]	*P* value
Blood loss (>500 vs. ≤500 ml)	5.83 (1.21–27.99)	.027	6.18 (1.25–30.49)	.025
Blood transfusion (≥2 vs. <2 U)	7.80 (1.41–43.01)	.018	7.81 (1.40–43.51)	.019
Child's class (>A vs. A)	8.57 (1.54–47.49)	.013	9.17 (1.59–52.75)	.013
Albumin (<3.5 vs. ≥3.5 mg/dl)	6.15 (1.34–31.54)	.019	10.31 (1.71–62.09)	.010
PT[c] (>4 vs. <4 s)	10.00 (1.58–63.31)	.014	19.72 (1.66–233.09)	.018

OR odds ratio, *95% CI* 95% confidence interval

[a] Logistic regression model used to evaluate the risks of various factors stratified by their medians (higher levels vs. lower levels), except where otherwise indicated; CI, confidence interval

[b] Logistic regression analyses were adjusted by age and overall stage

[c] PT, prothrombin time (seconds over control)

During major surgery, substantial blood loss and blood transfusion are possible, and the amount of blood loss and transfusion may be dependent on the patient's conditions, disease stage, tumor size, and complexity of operative procedures, as well as on the expertise of the surgeon. Several studies have reported the deleterious effect of blood transfusion in head and neck cancer, and the blood transfusion volume was proved to be a statistically significant factor determining the outcome of the patients in our study.[25–27] The calculated odds ratio for mortality after red blood cell transfusion of ≥2 units was 7.81 compared with no transfusion patients by multivariate analysis. Thus, the primary aim of a surgeon during the operation should be the achievement of the least amount of bleeding and limited blood transfusion.

The significance of this study is that the mortality and morbidity risks in an individual patient with varying degrees of cirrhosis after surgery can now be determined. Thus, both patients and surgeons can make more informed decisions regarding candidacy for surgery. The most common medical complication postoperatively in 24 patients (38.7%) was pleural effusion (30.6%), which may be worsened with concomitant pneumonia or acute respiratory distress syndrome. We found that the risk of pulmonary complications, renal complications, and sepsis was increased statistically significantly in patients with more severe cirrhosis. Six statistically significant predictors for postoperative medical complications were the following: (1) Child's class B or C (2) low albumin level (<3.5 mg/dl), (3) increased total bilirubin, (4) prolonged PT, (5) intraoperative blood transfusion of ≥2 units, and (6) identification of ascites by ultrasonography. The incidence of postoperative fluid retention, characterized by pleural effusion, ascites, and generalized edema, was quite high, and management was troublesome in most cases. Poor nutritional status, sodium retention, and portopulmonary hypertension in cirrhotic patients may be responsible for the complications.[28,29]

The postoperative mortality of patient with Child's class A, B, and C cirrhosis were 4.8%, 23.5%, and 66.7%, respectively, and the overall mortality rate was 12.9%. The mortality rate was statistically significantly higher for those with Child's class B or C than for those with Child's class A, and the adjusted odds ratio for death was 9.17 (95% confidence interval, 1.59–52.75). The most important predictors of mortality are severity of liver disease as reflected by the Child's score, prolonged PT (>4 s of control), intraoperative blood loss (>500 ml), intraoperative blood transfusion (≥2 units), and low albumin level (<3.5 mg/dl). Variables in the Child's classification were selected empirically, and similar weight is given to each of the five parameters; however, our study identified three statistically significant predictors with different rate ratios for death (Table 5). Downstaging of Child's B and C cases seems to be the most reasonable treatment plan to improve the outcome of head and neck surgery in this population. However, the detailed effect of downstaging of liver cirrhosis needs to be investigated in future studies.

Bacterial infection is a frequent and severe complication of cirrhosis.[30–32] The incidence of wound infection in head and neck cancer surgery is still controversial; the reported rates of wound infection range from 11% to 47%.[33,34] In the present study, the overall surgical complication rate was 43.5% (27 of 62), with no statistically significant difference among the three groups. Our study indicates that the flap survival rate and patency of microvascular anastomosis have no association with liver cirrhosis. Postoperative neck hematoma is common with higher risk in more advanced cirrhosis.[35] In head and neck cancer patients with cirrhosis, the compromised systemic immune status due to abnormal defense mechanisms seems to increase the susceptibility to infection; however, oral hygiene status, tumor stage, and comorbid disease may influence the final result. Neck wound infection after free tissue transfer may imperil the vascular pedicle or result in life-threatening complications, such as rupture of the carotid artery or internal jugular vein, leading to massive bleeding and sudden death. The wound infection may be managed by prophylactic antibiotics and a low threshold for surgical debridement to ensure optimal wound healing and flap survival.

The operative risks of head and neck reconstructive microsurgery in cirrhotic patients are linked to the severity of cirrhosis. Although these parameters are clinically easy to use for estimating operability, they are not sufficient to select the most suitable operative procedures. Intraoperatively, meticulous hemostasis to minimize blood loss, a two-team approach, and avoidance of more complex surgical procedures have to be considered in this distinct subgroup. Cirrhosis assessment and correction of clinical and biologic abnormalities in the preoperative period could reduce perioperative morbidity and improve prognosis.

Preoperative optimization includes correcting coagulopathy, ascites, hepatic encephalopathy, malnutrition, and administering prophylactic antibiotics. To reduce blood loss, before surgery, vitamin K and blood components such as platelet transfusion and fresh frozen plasma can be provided to correct coagulopathy. Ascites and massive pleural effusion should be managed with diuretics, fluid restriction, and paracentesis with simultaneous administration of albumin to minimize worsening of renal function. Hepatic encephalopathy is usually treated with a low-protein diet and lactulose, which can enhance excretion of ammonia and ammonia-producing bacteria.[36]

In conclusion, the current study provides the first evidence that Child's class is an independent and important predictive factor for the prediction of postoperative morbidity and mortality in this specific population. Our results indicate that surgical complications were very high in patients with liver cirrhosis, regardless of Child's class, and the probability of major medical complications were not negligible in class A patients and were even unavoidable in class B/C patients. Preoperative platelet count, albumin, bilirubin, PT, and ascites also contributed to the prediction of the occurrence of medical complications. On the other hand, in addition to Child's class, only albumin and PT could be used independently for prediction of postoperative mortality. This study suggests that head and neck cancer ablation with immediate free tissue transfer might be performed with relatively low surgical mortality in patients with Child's class A. However, operative mortality remains very high in Child's class B/C patients. Our results indicate that surgeons should counsel patients preoperatively regarding the risks of surgery in Child's class B/C patients, consider less invasive and time-consuming procedures, and correct reversible clinical or biological factors before surgery when possible. Therefore, careful patient selection with maximum medical optimization before surgery may be critical in improving surgical outcomes in this specific group of patients.

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