

Medicare Coverage Policy ~ Decisions

Liver Transplantation for Patients with Malignancies (#CAG-00091N)

Literature Review

Author/Title/ Journal/Year	Type of Study	Outcomes Studied	Patient Characteristics	Results
Adham M, Oussoultzoglou E, Ducerf C, et al / Results of orthotopic liver transplantation for liver cirrhosis in the presence of incidental and/or undetected hepatocellular carcinoma and tumor characteristics / Transplant International / 1998	Case series	Tumor recurrence and survival. Comparison groups known HCC to incidental HCC.	26 patients (24 men mean age 52.6) from 1985 - 1996 OLT was carried out for liver cirrhosis in the presence of HCC. Two groups were used--HCC diagnoses pre-OLT and incidental HCC.	The mean patient survival rate is 690 days (751 for pre- OLT and 629 incidental). The prevalence of undetected HCC was 17.5% in a recent study, but this study found 74.3% of the HCCs were undetected. Reinforcement of immunosuppressives was not associated with HCC recurrence.
Bechstein WO, Guckelberger O, Kling N, et al / Recurrence-free survival after liver transplantation for small hepatocellular carcinoma / Transplant / 1998	Retrospective non-matched cohort	Patient survival and recurrence- free survival tumor stage, nodules, bi-uni- lobar, number of tumors. Comparison groups transplant patients with HCC with non- HCC	52 adult cases HCC was histologically confirmed in excised liver. These were 46 males and 6 females with a median age of 55 years ranging from 40 to 73. Underlying liver diseases were hepatitis C virus- related cirrhosis (22), hepatitis B virus-related cirrhosis (14), NANBNC cirrhosis (3), alcohol cirrhosis (7) and others (6). In 15 (29%) cases, the tumor was not diagnosed until the	Actuarial 1-yr survival was 88%, 5-yr survival 71%. This was significantly less than the survival of the 615 patients without HCC transplanted during the same period (91% & 84%). Tumor recurred in 11 patients. 5-yr RFS was less in patients with incidental tumors compared to preoperatively known tumors (53% Vs 64%), less for bilobar tumors

			<p>diagnosed until the excised liver was examined histopathologically. Tumor staging was carried out according to the TNM system</p>	<p>bilobar tumors compared to unilobar (36% Vs 70%), less for multiple compared to solitary tumors (54% Vs 68%) and less for stage IVa tumors compared to stage I - III tumors (17% Vs 71%). None of these differences were statistically significant in univariate analysis</p>
<p>Cotella G, Bottelli R, DeCarlis L, et al. / Hepatocellular carcinoma: comparison between liver transplantation, resective surgery, ethanol injection, and chemoembolization / Transplantation International / 1998</p>	Case series	Patient survival.	<p>Retrospective case review of 419 patients with HCC (of the 533 patients observed) in single hospital in Italy between January 1989 and June 1997. 55 patients had liver transplantation, 41 were resected, 171 treated with transarterial chemoembolization, and 152 received percutaneous ethanol injection. No patient had extrahepatic spread.</p>	<p>The 3- and 5- year actuarial survival rates were, respectively 72% and 68% for LT, 64% and 44% for resection, 54% and 36% for PEI, and 32% and 22% for TACE. Patient characteristics (age, sex, etc) are not significantly related to patient survival. Tumor-related variable and associated liver disease variables significantly conditioned survival in relation to different treatments. Liver transplantation seems to be the treatment of choice for monofocal HCC less than 5 cm in diameter and in selected cases of plurifocal HCC.</p>
<p>Figueras J, Jaurrieta E, Vallis C et al / Survival after liver transplantation in</p>	prospective cohort	Patient survival and recurrence rate. Compared transplant outcomes for	<p>38 patients with HCC and cirrhosis compared to 136 transplants for cirrhosis w/o tumor</p>	<p>1, 3, year patient survival for HCC was 82%, 75% and 63% compared to control 79% 71% and</p>

transplantation in cirrhotic patients with and without hepatocellular carcinoma: a comparative study / Hepatology / 1997		outcomes for HCC and non-HCC groups.	cirrhosis w/o tumor performed in a single hospital from January 1990 to December 1995. Study excluded patients with large and non-localized tumors, tumors with nodal involvement and patients with extrahepatic disease. No post transplant chemotherapy was used.	79%, 71%, and 68% (p=.84). Survival was significantly reduced in patients with a macroscopic vascular invasion (p=0.0029) and tumors greater than 5 cm (p=0.0011). Microscopic vascular invasion, although not significant, was also a poor prognostic factor. Recurrence free survival not calculated because no patient in HCC group is living with recurrence. 7 (18%) of HCC group required transplantation compared to 14% of control group.
Figueras J, Jaurieta E, Valls C, et al / Resection or transplantation for hepatocellular carcinoma in cirrhotic patients: outcomes based on indicated treatment strategy / American College of Surgeons / 2000	retrospective non-matched cohort	Overall and disease-free survival curves were calculated using Kaplan-Meier method. Continuous data were compared by the 2-tailed Student's t-test. Difference in proportions for demographic data were evaluated by univariate chi-square analysis or Fisher's exact test when appropriate. Univariate and multivariate Cox proportional hazards forward stepwise	Between January 1990 and May 1999, 85 patients received liver transplant for end-stage liver cirrhosis with coincidental HCC. (Incidental HCC cases were not considered in the analysis.) Pre-transplant treatment (chemoembolization) of the tumor was performed in 65 patients while awaiting transplant. Extrahepatic disease and nodal involvement were excluded. Transplantation was performed only for small localized tumor (5 cm or less	With mean follow up of 28 months (transplant group) and 30 months (resection group), 1, 3, and 5 year survival rates were 84%, 74% and 60% for transplant vs 83%, 57% and 51% for resection. (p=0.34) Hepatic tumor recurrence was much less frequent in the transplant group. The 1, 3, and 5 year disease free survival rates were 83%, 72% and 60% for the transplant group vs 70%, 44% and 31% for the resection group (p=0.006). In

		<p>stepwise regression analyses were done to estimate the relative risks for recurrence-free survival. Compared HCC patients treated with transplantation to those resected.</p>	<p>tumor (5 cm or less or 3 or fewer tumor nodules 3 cm or less). Patients with multicentric large, or diffuse HCC were ruled out for transplant. 35 patients underwent resection. Resection was restricted to patients with solitary HCC without gross macroscopic vascular invasion or Extrahepatic spread and with preserved liver function in whom transplantation was contraindicated (age, alcoholism, or associated disease). Patients in the resection group were older, had better liver function, and had better preoperative oncology staging.</p>	<p>($p=0.006$). In multivariate Cox regression analysis, macroscopic vascular invasion was the only factor independently associated with death or recurrence after transplant ($p=0.006$). Pre-operative AFP, tumor stage, and size greater than 5 cm were not significant prognostic factors.</p>
<p>Gennari L, Mazzaferro V, Regalia E et al / Reappraisal of the role of liver transplantation in the treatment of hepatocellular carcinoma arising in cirrhosis / Journal of Surgical Oncology Supplement / 1993</p>	Case series	<p>Patient survival and retransplantation tumor characteristics</p>	<p>Between November 1990 and September 1992, 27 OLT were performed on 25 patients with various forms of liver malignancies (22 HCC from cirrhosis. Mean age was 52. 7 were hepatitis B positive, 13 positive for hepatitis C and 2 for both. Tumor lesion judged surgically unresectable. Maximum of 3 nodules were accepted for waiting list. Exclusion criteria included age</p>	<p>2 patients retransplanted; one for primary nonfunction of graft and the other recurrent HBV fulminant infection. 4 patients did not survive for more than 2 months from TP related complications with no Extrahepatic tumor spread. 18 (82%) are alive without evidence of HCC after 11 months median follow-up. All HCCs were confined to liver. mean nodule</p>

			criteria included age over 65.	liver, mean nodule was 1.9 cm, all stage III or less
Iwatsuki S, Dvorchik I, March JW, et al / Liver Transplantation for hepatocellular carcinoma: a proposal of a prognostic scoring system / Journal of the American College of Surgeons / 2000	Case series	Prognostic risk score of each patient was calculated from the relative risks of multivariate analysis. The patients were grouped into 5 grades of tumor recurrence risk. Overall patient survival and tumor-free survival.	Various clinical and pathologic risk factors for tumor recurrence were examined on 344 consecutive patients who received hepatic transplantation in the presence of nonfibrolamellar HCC. Patients came from 18 year period (1981 - 1998). 257 men and 87 women. Ages ranged from 2.8 to 76.8 years with a mean of 52.9. 317 patients HCC developed in cirrhotic livers, 75 positive for hepatitis B, and 105 for hepatitis C. Only 18 patients did not have associated liver disease. HCC size ranged from .3 to 25.0 cm with a mean of 4.1. The number of gross tumors ranged from 1 to 5 with a mean of 2.22. The tumors were distributed bilobarly in 108 patients. HCC invaded vessels macroscopically in 62 patients and microscopically in 87 patients. Regional lymph node was involved in 9 patients, metastatic lesions were present in 18 patients. Chemotherapy was	Multivariate analysis identified 3 factors as independently significant poor prognosticators: 1) bilobarly distributed tumors, 2) size of the greatest tumor (2 - 5 cm and > 5 cm), and 3) vascular invasion (microscopic and macroscopic). Overall survival at 1, 3, 5, and 10 years was 73.0, 58.8, 49.4, and 32.7 and survival of tumor-free patients were 81.9, 73.0, 68.7, and 64.4. Tumor recurrence developed within 2 years after transplant in all 26 patients who had lymph node involvement, metastasis or positive microscopic surgical margins and should not be considered candidates for transplant. 5 grades of risk scores with respective tumor-free survivals at 5 year of 100, 61, 40, 5, 0% risk scores ranges from 0 (none of 3 risk factors) to 24.8 (all of the 3 risk factor present at the highest level). Relative risk factors are: bilobar tumor - 3.1, tumor size 2-5

			Chemotherapy was administered before transplant in 46 patients and given after transplant, but before recurrence in 29 patients.	3.1, tumor size 2-5 cm - 4.5, tumor size > 5 cm - 6.7, micro vascular invasion - 4.4, macro vascular invasion - 15.0.
Iwatsuki S, Starzl TE, Sheahan DG / Hepatic resection versus transplantation for hepatocellular carcinoma / Annals of Surgery / 1991	Retrospective non-matched cohort	Patient survival. Regression model was used to assess the relative prognostic importance of factors in predicting survival. Recurrence of HCC. Compared patients with HCC treated by resection to transplantation.	During a 10 year period (1980-1990), 76 patients with HCC were treated by subtotal hepatic resection. 105 patients were treated by transplant. Mean age of resection 51.4, 17 had associated cirrhosis, 8 chronic carriers of Hepatitis B, and 3 had surface antibody and/or core antibody for hepatitis B. 19 were stage II, 25 stage III, and 32 stage IV. Median follow-up was 53 months. Mean age of TP group was 43.5, 71 had associate cirrhosis, 23 hepatitis B carriers and 11 Hepatitis B antibodies. 4 were stage I, 19 stage II, 23 stage III, and 51 stage IV	No difference in survival between groups. When HCC was associated with cirrhosis the survival rates were lower in resection group, but not TP group. The survival of stage IV was lower in both treatment groups. Poor prognostic factors were multiple gross tumors, vascular invasion, advanced stage, positive surgical margin, and infiltrative shape of tumor. Tumor size of more that 2 cm was a significantly poor prognostic factor in TP group. Bilobar involvement of tumor and lymph node metastasis were significantly poor prognostic factors in TP group. Recurrence of HCC in resection was 50% and TP groups was 42.9%. The incidence of recurrence was extremely high (59.4% resection, 67.8% TP). 63.2% of resections and 63.8% of TP dies during the follow-up period. 12 resection patients and 13 TP

				patients and 13 TP patients survived 5 years. Of the 5 year survivors, 2 were stage I, 9 stage II or III, and 5 had stage IV tumors
Jain A, Reyes J, Kashyap R et al / Long-term survival after liver transplantation in 4,000 consecutive patients at a single center / Annals of Surgery / 2000	Case series	Long-term survival outcomes of a large cohort of liver transplant recipients and to identify static and changing factors that influence these outcomes over time. The effect of donor and recipient age at the time of transplantation, recipient gender, diagnosis, and year of transplantation were compared. Rate of retransplantation, causes or retransplantation, and cause of death were also examined.	400 consecutive patients who underwent liver transplantation between February 1981 and April 1998 and were followed up to March 2000.	The overall patient survival for the entire cohort was 59%; the actuarial survival at 1, 5, 10, 15, and 18 years were 79%, 67%, 57%, 50% and 48%, respectively. Patient survival was significantly better in children, in female recipients, and in patients who received transplants after 1990. The rates of retransplantation for acute or chronic rejection were significantly lower with tacrolimus-based immunosuppression. The risk of graft failure and death was relatively stable after the first year, with recurrence of disease, malignancies, and age-related complications being the major factors for loss.
Kilpe VE, Krakauer H, Wren RE / An analysis of liver transplant experience from transplant center as reported to Medicare / Transplantation /	Case series	1 and 5 year survival rates for various diagnosis necessitating liver transplantation.	Analysis of 5180 liver transplant cases from 37 liver transplant centers in the U.S. (1982-1991).	90% of patients had diagnoses covered by Medicare. 45 patients had malignancies. 1-yr survival for the cohort was 79.4% and the 5-yr survival rate was

Transplantation / 1993				survival rate was 69.2%.Survival for patients with liver cancer as their diagnosis had 1-yr survival of 64.2% and 5-yr survival of 33.6%.
Klintmalm GB / International registry of hepatic tumors in liver transplantation: a registry update on hepatocellular carcinoma / /	Case series	Patient survival. Variables effecting patient survival.	Registry established in 1992 using twice yearly mail out for follow-up. This report is based on 644 patients from 57 institutions worldwide. 73% males, 8% Caucasian, mean follow-up time was 31 months. Tumor grade was available in only half of the patients. 40% of the patients had incidental malignancy.	38.7% of patients still alive and tumor free; 20.5% of the patients died tumor free; and 21.6% died with tumor, 4.2% were alive with tumor. 51.4% of patients with incidental tumors were alive and tumor free compared to 41.7% of identified tumor transplants. Factors influencing survival of HCC is the size of tumor, multifocality, bilobar distribution, vascular invasion and tumor grade. In a Cox multivariate analysis tumor size more than 5 cm, positive nodes and poorly differentiate tumor were independent predictors of survival.
Klintmalm GB / Liver Transplantation for hepatocellular carcinoma a registry report on the impact of tumor characteristics on outcome / Annals of Surgery / 1998	Case Series	Impact of tumor characteristics on patient survival	53 programs in 21 countries supplied information on 553 patients with tumors. 422 patients had HCC. 169 (40%) were classified as "incidental tumors." For the remaining patients the tumor was known before transplant. Patients were mainly male	193 (46.7%) of the patients are deceased, 99 are tumor free at death. Of the 232 patients living at the time of the study, 215 are tumor free. Patient survival at years 1, 2, 4 and 5 respectively was: 72.2%, 63.4%, 47.4% and 44.4%

			<p>were mainly male (74.6%). 72.7% reported no other liver disease. Only 50% were given adjunctive therapy for HCC.</p>	<p>47.4% and 44.4% (compared to overall survival of 80.0%, 76.3%, 73.6%, and 68.8%). Factors that significantly effect outcomes were: (1) tumor size greater than 5 cm (p=0.0221), (2) vascular invasion (p=0.0005), (3) positive nodes (p=0.0014), and (4) histologic grade (p=0.0001). For incidental tumors, patient survival was negatively influenced by multifocality (p=0.0021) and age older than 60 years (p=0.0008). Previous history of hepatitis B had a weak but significant negative impact on survival. No significant difference between incidental and known tumors.</p>
<p>Koffron A, Fryer J, Abecassis M / Indications and results of liver transplantation for primary and metastatic liver cancer / Liver Directed Therapies for Primary and Metastatic Liver Tumors /</p>	<p>Literature review</p>		<p>Lymph node involvement has a major negative impact on survival. TNM staging demonstrated a clear correlation with survival in 2 studies. The presence of vascular invasion by tumor is associated with a much higher incidence of tumor recurrence. Pseudocapsule surrounding the tumor at the periphery is associated with</p>	<p>Patients with metastatic disease to the liver or those with metastatic primary hepatic malignancy are not candidates for OLT. Fibrolamellar variant of HCC and incidental HCC appear to have a better prognosis than those for whom the presence of HCC was the major indication for OLT. Experience has shown that patients with non-</p>

			associated with disease-free survival, but liver capsule involvement does not seem to have a significant deleterious effect on overall survival. OLT is not curative for cholangiocarcinoma.	with non-fibrolamellar HCC showed a strong correlation between tumor size and outcome. Other studies have shown tumor staging to be of significant prognostic value.
Marsh JW, Dvorchik I, Bonham CA, Iwatsuki S / Is the pathologic TNM staging system for patients with hepatoma predictive of outcome? / Cancer / 2000	Case series	Tumor-free survival. Using variables of lymph node status, vascular invasion, tumor size, lobar distribution, and tumor number model new staging system.	307 patients with HCC underwent liver transplant between 1981 and 1997. 70 patients excluded based on positive surgical margins, death within 3 months of transplant, and lost to follow-up.	There was neither a direct correlation between the current pTNM system and tumor free survival nor homogeneity in outcomes for patients within certain current pTNM categories. Depth of vascular invasion, lobar distribution, lymph node status, and largest tumor size were found to be independent predictors of tumor free survival; tumor number was not found to be significant in multivariate analysis.
Marsh JW, Dvorchik I, Casavilla A, Fung JJ, Iwatsuki S / Should reimbursement be denied for liver transplantation in patients with hepatocellular carcinoma / Journal of American Medical Association / 1997	case series	Patient survival. Kaplan-Meier analysis with comparisons between the investigated groups by log-rank test and Bonferroni correction.	267 patients with HCC, 200 males. 101 patients with single HCC tumors less than 5 cm. 166 other types of HCC	The survival of the 101 patients with single, small HCC did not differ significantly from that of any of the groups with nonmalignant diseases.
Mazzaferro V, Regalia E, Doci R	Case series	Patient and recurrence free	Between January 1991 and December	The overall mortality rate was 17%. After

<p>Regalia E, Doci R, et al / Liver transplantation for the treatment of small hepatocellular carcinomas in patients with cirrhosis / The New England Journal of Medicine / 1996</p>		<p>recurrence free survival, and tumor characteristics</p>	<p>1991 and December 1994, 48 patients with cirrhosis who had small (single tumor under 5 cm or less than 4 tumors with none exceeding 3 cm), unresectable HCC who underwent OLT. Patients with tumor invasion of blood vessels or lymph nodes (present or suspected) were excluded. Median age 52 (range 39 - 60). 94% of the patients had hepatitis B/C. The presence of the tumor was confirmed by biopsy or serum alpha-fetoprotein assay. The criteria for eligibility for OLT was the presence of tumor 5 cm or less in diameter in patients with single HCC and no more than 3 tumor nodules. 28 patients with sufficient hepatic function underwent treatment for the tumor, mainly chemoembolization, before transplantation. After liver transplantation, the patients were followed prospectively for a median of 26 months. No anticancer treatment was given after transplantation</p>	<p>rate was 17%. After 4 years the actuarial survival rate was 75% and the rate of recurrence-free survival was 83%. HCC recurred in 4 patients (8%). The overall and recurrence-free survival rates at 4 years among the 35 patients (73% of total) who met the predetermined criteria for the selection of HCC at pathological review of the explanted liver were 85% and 92%, respectively, whereas the rates in the 13 patients (27%) whose tumors exceeded the limits were 50% and 59% respectively ($p=0.01$ for overall survival and $p=0.002$ for recurrence-free). Tumor-node-metastasis status (stage), number of tumors, serum alpha-fetoprotein concentration, pre-transplant treatment were not significantly correlated with survival</p>
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			transplantation.	
Min AD, Sexena R, Thung SN, et al / Outcome of hepatitis C patients with and without hepatocellular carcinoma under gong liver transplant / The American Journal of Gastroenterology / 1998	retrospective non-matched cohort	Patient and graft survival. Comparison of liver transplant patients for HCC with hepatitis C without HCC. Also compared outcomes for transplant patients with known HCC to incidental HCC.	Reviewed the charts of 55 patients transplanted between November 1990 and December 1996 for HCV cirrhosis with HCC and compared them with a control group of HCV patients without HCC. Patients with a history of alcohol abuse or HBsAg positively were excluded. There were 37 men and 18 women with a mean age of 57.6 year (range 19 - 70) in the HCC group. 25 (45.5%) had a single focus of HCC. 14% of the patients with HCC had been treated with interferon, whereas 12% of patients in the non HCC group had received interferon. Duration of interferon treatment occurred within 5 years of transplant. A history of intravenous drug use or transfusion was identified in 37 (67%) of HCC patients. 32 patients (58%) without HCC had a parenteral exposure.	There was no significant difference in patient or graft survival rates between the patients with and without HCC. Approximately 1/2 of HCC was not detected before liver transplant. There was no significant difference in the mode of transmission, clinical status at the time of transplant, or outcome between the HCV patients with and without HCC. There was no significant difference between the HCC and non HCC groups regarding Child's class of UNOS status at the time of transplant 26 (45%) patients were diagnosed or suspected of having HCC before transplant.
Mion F, Grozel L, Biollot O, Paliard P, Berger F / Adult cirrhotic liver explants: precancerous lesions and	case series	The goal of this study was to determine the prevalence of undetected small HCCs in liver explants of adult	80 consecutive liver explants from October 1990 to March 1994 were analyzed. Pre-transplant testing did not indicate HCC	The prevalence of HCC was 17.5% with a mean size of 11.6 mm. Small HCCs and precancerous lesions are frequently found

lesions and undetected small hepatocellular carcinomas / Gastroenterology / 1996		explants of adult cirrhotic patients undergoing liver transplantation and evaluate the association of HCCs with hepatic lesions considered premalignant.	did not indicate HCC based on serum alpha-fetoprotein levels, absence of nodular lesion on abdominal ultrasound, and normal CT findings. The mean age of the patients was 43.6, 59 were male. Mean number of lesions per liver explanted was 17.	are frequently found in cirrhotic liver explants, especially in men older than 50 years. 56 [of a total of 79] HCCs were well limited, whereas in the 23 remaining nodules, the tumor cells extended beyond the confines of the nodule in an infiltrative manner. The survival rate was significantly greater in patients without HCC (with 59 or 66 patients alive in August 1996, 89%, $p=0.01$).
Otto G, Heuschen U, hofmann WJ et al / Survival and recurrence after liver transplantation versus liver resection for hepatocellular carcinoma a retrospective analysis / Annals of Surgery / 1998	case series	Survival and freedom from recurrence. Stratified TP prognostic factors: stage tumor size, number of tumors, vascular infiltration and cirrhosis.	102 patients with HCC from June 1987 to June 1996 in Germany. 52 patients were resected and 50 underwent OLT. Early mortality and death from reasons other than cancer were censored in recurrence analysis.	The 3-year survival rate and recurrence rate were not significantly different between transplantation and resection. In the Cox analysis tumor size (0.02) and vascular infiltration ($p=0.04$) were independent variables after transplant, whereas none of the tested prognostic parameters was significant for resection. Tumor size was the only independent variable with regard to recurrence after both OLT and resection. Conclude resection, if possible, is the preferred therapy for patients with

				for patients with small tumors. Recurrence leading to death occurred in 15 cases after OLT and 22 patients after resection. Overall, there were 18 OLT and 28 resection patients with recurrence.
Schlitt HJ, Neipp M, Weimann A, et al / Recurrence patterns of hepatocellular and fibrolamellar carcinoma after liver transplantation / Journal of Clinical Oncology / 1999	Case series	Frequency, localization, and timing or recurrence were analyzed and compared with primary tumor and patient characteristics.	69 patients who underwent OLT for HCC/FLC and survived more than 150 days. Minimum follow-up was 33 months.	Tumor recurrence was observed in 39 patients at 67 locations. Hematogenous spread was the major route of tumor recurrence and most frequent sites were liver (62%), lung (56%), and bone (18%). Parameters associated with recurrence were absence of cirrhosis, tumor size greater than 5 cm, more than 5 nodules, vascular infiltration, and stage IV.
Yamamoto J, Iwatsuki S, Kosuge T, et al / Should hepatomas be treated with hepatic resection or transplantation / Cancer / 1999	Retrospective non-matched cohort	Databases on the national cancer center hospital and Univ. of Pittsburgh exchanged to compare long term overall and tumor free survival rates between resection and transplantation in a large number of cirrhotic patients with HCC. Compared patients with HCC treated with	Between 1985 and 1994 723 patients underwent resection treatment of HCC in Japan. 403 (55.7%) had histologically proven concomitant cirrhosis. Resection was incomplete in 109 (27%) patients. The remaining 294 cirrhotic patients who underwent complete resection were selected for this study. Between 1981 and 1997, 307 patients underwent transplant in the	A total of 17 patients (5.8%) died within 150 days after resection, where for transplant that number was 49 (17.3%). The 1. 3. 5. And 10 year overall survival for resection was 88.7, 70.8, 47.1, and 24.4 while transplant it was 75.6, 63.1, 54.5, and 36.2%. During follow-up period, 176 (59.9%) of resection patients and 53 (19.6%) of transplant

		<p>HCC treated with transplant to those treated with resection.</p>	<p>transplant in the presence of HCC at UPMC. 270 had concomitant cirrhosis and were selected for this study. 87 (32.2%) had HCC that was not detected preoperatively. No significant difference between groups in tumor size. The transplant group had significantly more bilobar tumors. Overall vascular involvement was similar. The resection group contained more patients with purely differentiated tumors.</p>	<p>transplant developed recurrence. Tumor free survival rate of the transplant group was significantly higher than that of the resection group for tumors measuring < 5 cm, unilobarly distributed, and no or only microscopic vascular invasion, and tumors of well or moderate histologic differentiation.</p>
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