



Published in final edited form as:

*Transplant Proc.* 1979 March ; 11(1): 252–256.

## The Quality of Life After Liver Transplantation

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To assess the quality of life achieved with liver transplantation, we have looked at 44 liver recipients who lived for at least 1 year after operation. Their subsequent survivability, what they have done with their lives, and what have been their handicaps and triumphs will be the subject of this article.

### Case Material

The 44 1-year survivors represented a residual from 139 consecutive liver recipients treated 1–14½ years ago with orthotopic liver transplantation. The story of those who did not live for a year has been told elsewhere.<sup>1,3</sup> and we will not deal with that here. Obviously, the group of 44 finalists were highly preselected by their ability to survive the events surrounding and following operation.

### Patients Dying After 1 Year

#### Causes of Death

Eighteen of the 44 patients died after passing the 1-year mark (Table 1). Their total survival averaged about 2 years with a range of 12½ months to 6 years. There were always multiple causes of death. For example, infection was almost always a factor in the final events.

However, in Table 1 we have listed the single most important factor in each case. Liver failure was the most common, but in three patients this clearly was due to biliary obstruction, and in two more, hepatitis was responsible (Table 1). Chronic rejection had destroyed the livers of five of the patients who died of liver failure.

The same kind of rejection also was the chief diagnosis in 3 of the 4 livers that were removed after 1–2½ years and replaced by second transplants. These 4 patients with late retransplantation for liver failure (orthotopic transplant nos. [OT] 13, 14, 54, 74) died within 2 months after the retransplantations; their deaths were due to technical complications, such as enteric fistulas, and to infections. Two patients each died from recurrent cancer and overwhelming infections.

Although the 4 patients with late retransplantation derived little or no benefit from the second liver, there were 2 others whose primary graft failed early after 5 and 9 weeks. Second transplants were successful for 11 and 15 months (OT 16 and 98, see Table 1) before the supervention of chronic rejection.

### Assessment at 1 Year

Generally speaking, the patients who died late were already in trouble at the 1-year mark. Only 7 were thought to be satisfactory at that time (Table 2). The other 11 were receiving too much prednisone to have a good long-term outlook. Doses in individual cases are given in Table 1. In the entire group of 18, the prednisone doses at 1 year averaged 0.76 mg/kg/day (Table 2). Ten of the 18 patients were jaundiced at 1 year, with bilirubins ranging from 2 to 40 (Table 1). The average bilirubin in all 18 patients was 9.2 mg/100 ml.

### Hospitalization

The generally poor course of the 18 patients who died subsequent to 1 year was reflected in their hospitalization times (Table 3). During the first year, they were institutionalized an average of 54% of their time. Subsequent to 1 year, they still spent a major part of their time on hospital wards (56%) until the time of their death.

### Rehabilitation

The combination of high-dose steroid therapy, suboptimal liver function, and a need for close medical scrutiny militated against good rehabilitation. The eight infants were hard to classify in this respect. Of the 10 preadolescents, teenagers, and adults, 60% returned to school or work for significant periods of time (Table 4).

The best rehabilitation was in 4 patients (Table 1) who, at 1 year, had excellent clinical results with reasonable steroid doses and good liver function (OT 19, 27, 36, 78). One of the four developed recurrence of the duct-cell carcinoma, which had been the original indication for operation (OT 78). Another patient was in perfect condition until 3 years postoperative, but sustained severe liver and renal damage after a nearly fatal *Hemophilus* infection. He died several weeks later. The liver showed chronic rejection (OT 19). One of these patients developed biliary tract obstruction that led to death despite futile efforts at secondary reconstruction (OT 27). The fourth recipient had recurrence of the chronic aggressive hepatitis, HBsAg-positive, which had destroyed the native liver (OT 28).

## Patients Still Alive

### Hospitalization

The overall conclusion from the foregoing experience was that a poor long-term prognosis could often be established by evaluation at 1 year. The converse, namely a good prognosis, was usually equally evident at 1 year, as could be identified in the 26 patients who are still alive. During the first year, these patients also spent a large amount of time in the hospital, averaging 39% (Table 3). However, they eventually became independent of institutions, and subsequently spent an average of only 5% on hospital wards. Thus, they became free to pursue normal interests. Eleven of the 26 patients required secondary procedures in the biliary tract (Table 3, footnote), but this was usually completed before the end of the first year.

### Assessment at 1 Year

The generally superior state of these 26 patients was easily quantified. At 1 year, only 3 were jaundiced (Table 2), and the average bilirubin in the entire group of 26 was 1.44 mg/100 ml. Finally, the prednisone doses were lower than in the patients who died after 1 year, averaging 0.59 mg/kg/day (Table 2).

It was not surprising to find retransplantation less commonly represented in such patients still alive than in those who eventually died. Only one patient still alive has had

retransplantation. After her first graft failed in 23 months, a second liver has supported life for another 13 months. The second graft eventually became obstructed, causing intrahepatic and subhepatic abscesses (Fig. 1). Treatment was bile duct reconstruction.

### Rehabilitation

The degree of rehabilitation was very high in those 26 patients still alive. The adults almost uniformly returned to work. The adolescents, teenagers, and children are or have been in public or special schools. The fact that so many children who were infants ultimately became students reflects the fact that there are more than a dozen 4-year survivors and 7 who have been living for more than 5 years.

One of our liver recipients had a normal baby in February 1977. She is now almost 4 years posttransplantation. Another patient is in midterm pregnancy.

### Miscellaneous Observations

Infants and children requiring long-term steroid therapy are apt to be small as exemplified by our longest survivor whose liver replacement for biliary atresia was at the age of 3 years. She is now 8 years and 9 months postoperative. She attends public school and lives a normal life. She is only 3 feet, 2 inches tall, but she is growing steadily and has gained more than a foot in height during the last several years. As the song goes, there is a place for short people.

The same kinds of bone complications as seen in kidney recipients have been noted in the liver patients. Among the 18 patients who died after 1 year, there were 5 examples of osteoporosis and spontaneous fracture usually involving vertebrae. Such fractures have also been seen in 5 of the 26 patients still living. One of our patients, who is almost 6½ years posttransplant, is scheduled next month for bilateral hip replacement.

Psychiatric complications have been relatively uncommon among the recipients. One patient is a narcotic addict, a problem from which he suffered preoperatively. However, he is gainfully employed. Another patient, who is now 7½ years posttransplant, has been a social delinquent and marijuana dealer. This latter young man stopped all medication for 8 months postoperatively and developed a rejection that was easily controlled by resumption of treatment.

### Summary

The quality of life after liver transplantation ranges from poor to superior. The social and vocational outcome is dependent on the quality of homograft function and on the steroid doses necessary to maintain function. A good long-term prognosis is usually evident by 1 year postoperatively. The complete rehabilitation of so many patients has encouraged us to continue our efforts in this difficult field.

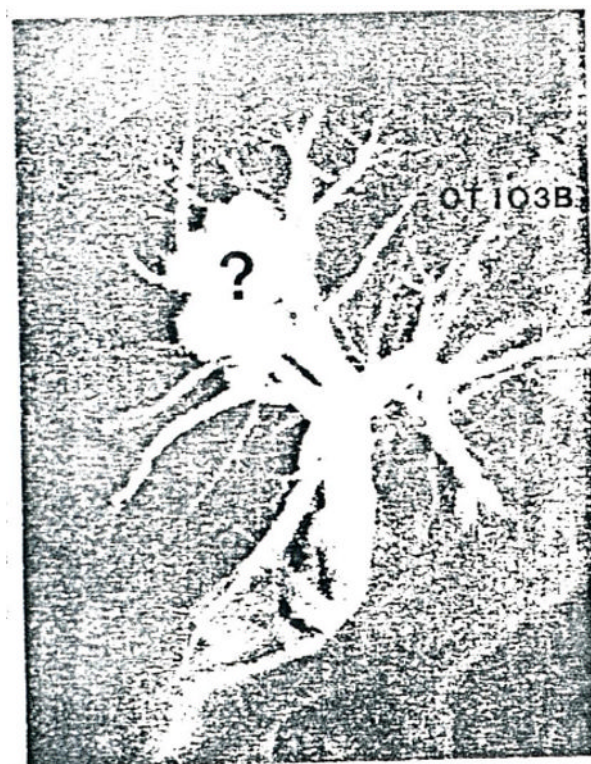
### Acknowledgments

Supported in part by research grants from the Veterans Administration; by Grants AM-17260 and AM-07772 from the National Institutes of Health; and by Grants RR-00051 and RR-00069 from the General Clinical Research Centers Program of the Division of Research Resources, National Institutes of Health.

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**Fig. 1.** Partial biliary obstruction at the cystic duct (arrow) after cholecystojejunostomy. An intrahepatic abscess developed (marked ?) as well as a subhepatic abscess (double arrow). The homograft was a second transplant, placed 23 months after the first liver graft. The biliary complication was treated by operative conversion to choledochojejunostomy.

**Table 1**  
**Measure at 1 Year and Causes of Eventual Death in 18 Patients Who Died More Than 1 Year After Liver Transplantation**

OT No	Days Survival	Age at Operation (years)	Original Disease	Pathology of Graft	Main Cause of Death	Bilirubin at 1 year (mg/100 ml)	Prednisone at 1 year (mg/kg/day)
8	400	1½	Hepatoma	Biliary obstruction: metastatic tumor	Recurrent cancer	12.5	0.33
13	901 (881 + 20)*	2	Biliary atresia	1. Chronic rejection 2. Aspergillus infection	Infection after retransplantation	16.4	0.39
14	436 (379 + 57)*	16	Hepatoma	1. Chronic rejection 2. Normal	Technical and infectious complications after second grafting	37.5	0.26
16	404 (65 + 339)*	2	Biliary atresia	1. Chronic rejection 2. Chronic rejection	Liver failure	10	1.25
19	1238	4	Biliary atresia	Chronic rejection	Liver failure: lung infection	0.7	1.5
27	2190	11	Wilson's disease	Partial biliary obstruction chronic rejection	Liver failure	0.5	0.33
29	377	5	Biliary atresia	Hepatitis	Liver failure	7.0	0.6
36	623	28	Chronic aggressive hepatitis	Chronic aggressive hepatitis	Liver failure: no cardiac infection	1.0	0.38
54	586 (566 + 22)*	22	Chronic aggressive hepatitis	1. Biliary obstruction 2. Normal	Hemorrhagic pancreatitis, infection after retransplantation	0.6	0.5
55	780	6	Chronic aggressive hepatitis	Biliary obstruction	Liver failure	28	0.7
58	407	34	Chronic aggressive hepatitis	Biliary obstruction	Liver failure	40.8	0.36
74	855 (820 + 35)*	16	Alpha <sub>1</sub> -antitrypsin deficiency	1. Chronic rejection 2. Normal	Infection after retransplantation	0.8	0.7
78	747	48	Duct cell carcinoma	Tumor recurrence	Recurrent cancer	0.5	0.29
89	590	3½	Biliary atresia	Chronic rejection: thrombosis of intrahepatic portal branches	Infection	0.4	0.71
98	511 (37 + 474)*	1	Biliary atresia	Chronic rejection	Liver failure	2.3	2.5
106	469	19	Chronic aggressive hepatitis	Healed acute rejection	Infection: liver failure	2.0	0.33
113	695	3	Biliary atresia	Massive liver necrosis	Infection	0.6	1.70
126	497	11	Biliary atresia	Chronic rejection: portal vein thrombosis	Liver failure: gastrointestinal hemorrhage	4.0	0.8

\* Underwent retransplantation. Figures in parentheses are survival of first and second grafts, respectively.

**Table 2**  
**Status at 1 Year of Survivors Who Lived Beyond This Time**

	<b>18 Who Died Later</b>	<b>26 Still Alive</b>
Bilirubin (mg/100 ml)	9.2 ± 13.1 (SD)	1.44 ± 2.5 (SD)*
Prednisone (mg/kg/day)	0.76 ± 0.61 (SD)	0.59 ± 0.40 (SD)
In trouble at 1 year	11/18	3/26

\* At 1 year, only 3 of the 26 patients had bilirubins of 3 mg/100 ml or higher (3, 3.5, and 12.6 mg/100 ml).

**Table 3**  
**Hospitalization (% Time) of 1-Year Survivors Who Lived Beyond This Time**

	First Year	After 12 Months
18 Who died later <sup>*</sup>	54% ± 29% (SD)	56% ± 40% (SD)
26 Still alive <sup>*†</sup>	39% ± 21% (SD)	5% ± 10% (SD)

<sup>\*</sup>Nine of the 18 patients had 1 or more reoperations exclusive of retransplantation. In four instances, the operation was duct reconstruction.

<sup>†</sup>Thirteen of the 26 patients had 1 or more reoperations exclusive of retransplantation. Eleven of the reinterventions were for biliary tract problems.



**Table 4**

**Rehabilitation in 44 1-Year Survivor\***

	18 Who Died After 1 Year <sup>†</sup>			26 Still Alive <sup>‡</sup>		
	Number	Returned to School	Returned to Work	Number	Returned to School	Returned to Work
Infants	8	0	0	7	6	0
5-18 Years	6	3	1	7	4	2
Adults	4	0	2	12	2	8

\*Being housewife classified as work.

<sup>†</sup>Twelve no real rehabilitation.

<sup>‡</sup>Two no real rehabilitation: one retired, the other derelict