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Frozen Section of Liver Biopsy for the Evaluation of Liver Allografts

S. Kakizoe, K. Yanaga, T.E. Starzl, and A.J. Demetris

INTRODUCTION

THE success of liver transplantation has resulted in an increased rate of harvesting of donor organs, some of which may have an abnormal gross appearance or are taken from unstable or nonheart-beating donors.[1] The pathologist may be requested to assist in the evaluation of the organ's suitability for transplantation. The following is a synopsis of the experience at the University of Pittsburgh with the pathologic evaluation of donor organs by gross inspection and frozen section evaluation.

MATERIALS AND METHODS

Thirty-eight of 594 donor livers harvested between January 1988 and February 1989 and preserved with University of Wisconsin solution were evaluated by a pathologist before implantation at the request of the donor and recipient surgeon. All the donor livers were examined grossly and frozen section biopsy evaluation was performed in each case. Twenty-seven of the 38 organs evaluated were not used (Table 1); 21 of these were steatotic, 4 had "reactive" hepatitis, one hepatocellular swelling, and one had an intrinsic arterial wall defect due to arthrogryposis multiplex. Eleven of the grafts examined by the pathologist were transplanted after the evaluation.

The grafts used for transplantation after pathology evaluation were followed for 1 month after implantation and compared with 34 contemporaneous controls, where "backtable" biopsies were performed but processed routinely and evaluated only after transplantation.[2] Donor variable examined in both groups were age, sex, body weight, alcohol or drug history, cause of death, days in ICU before procurement, history of cardiac arrest, and preservation time.

RESULTS

Two of the 11 (18%) organs transplanted after pathologic evaluation failed within the first postoperative month, both because of severe ischemic injury, presumably incurred during preservation or implantation. Frozen section evaluation of these two grafts revealed only mild microvesicular steatosis. Four of the 34 contemporaneous controls failed and 2 of these patients died. Ischemic "preservation" injury was thought to be responsible for two of these failures and sepsis and esophageal perforation in the others. The difference in the rate of graft failure was not statistically significant. The only significant difference in donor variables noted between the two groups was the incidence of obesity (>15% overweight) (unused grafts vs controls: 13/27 vs 4/34) and history of alcohol abuse in the donors.

Table 1. Summary of Histologic Findings

Histologic Findings	Unused* (n = 27)	Used† (n = 11)	Control‡ (n = 34)
Severe steatosis	13	0	0
Mild to moderate steatosis	8	2	11
Hepatocellular swelling	1	1	7
Reactive hepatitis	4	1	6
Benign tumorous lesion	0	2	0
Anomaly	1	0	0
No pathologic change	0	5	10

*Grafts were used for research purposes after FLBx evaluation
†Grafts were transplanted after FLBx evaluation
‡Grafts were biopsied during backtable preparation but the slides were reviewed after transplantation

DISCUSSION

Frozen section evaluation has been used at Pittsburgh to evaluate donor organs since several grafts that contained severe macrovesicular steatosis were transplanted and failed shortly thereafter.[3] We have had experience with one additional case since the original report as have others,[4] all of which have failed in a similar fashion. We therefore feel justified in diverting these organs for research purposes. By contrast, 12 of the organs were discarded because of mild to moderate steatosis or "reactive" hepatitis: lesions which were present in biopsies from the control population were associated with livers that functioned normally after transplantation.

The final decision to use the organs or to divert them for research rested with the recipient surgeon but was influenced by the histology in some cases. In several instances where the pathology was only minimally abnormal, the recipient surgeon was wary of apparently unfavorable events that occurred during the agonal stages in the donor, and was searching for additional objective data to abort the procedure. In others, the decision to abort the procedure despite a relatively good histologic appearance was based on cold ischemia prolonged to more than 26 hours. In none of these cases was the decision based purely on the histology, other than those with severe macrovesicular steatosis.

Finally, it should be emphasized that all organs selected for biopsy evaluation were considered suspect because of gross physical alterations or an unfavorable history in the donor. After frozen section screening, the rate of graft

From the Departments of Pathology (S.K., A.J.D.) and Surgery (K.Y., T.E.S.), Presbyterian University Hospital, University of Pittsburgh, Pittsburgh, Pennsylvania.

Address reprint requests to A.J. Demetris, MD, Pathology Department, Presbyterian University Hospital of Pittsburgh, De Soto at O'Hara Streets, Pittsburgh, PA 15213.

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failure after transplantation was similar in those evaluated and in the controls. We assume that all 13 of the grafts with severe steatosis would have failed based on our previous experience; however, in the absence of obvious features that would disqualify the organ, the pathology evaluation was unable to predict the adequacy of organ function after transplantation in those livers with minimal pathologic changes.

Frozen section evaluation was also valuable for the diagnosis of tumorous lesions. Nodular regenerative hyperplasia and biliary cysts have been identified pathologically. None of the donor livers with these lesions have caused complications after 10 months of follow-up.

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