determined by correlating the recipient's serum reactivity against the T and B lymphocyte and monocyte populations as well as the use of HLA-specific monoclonal blocking antibodies. Thus, a procedure is now available for better prediction of graft survival in the recipient. The usefulness of this new procedure is particularly important in patients with high levels of sensitization. Investigators have noted that finding a serologically compatible kidney for these individuals is very difficult (*15*). Since the modified flow cytometric procedure can make the distinction between deleterious and irrelevant antibodies, some potential recipients may still be considered for transplantation with an available kidney despite a positive B cell crossmatch result. In conjunction with the CDC assay, we intend to use this modified flow cytometric crossmatch technique to study antibodies reactive with donor leukocytes in order to improve the success rate of renal transplantation.

In summary, we have described a modified flow cytometric crossmatch technique that utilizes donor peripheral blood leukocytes. The use of leukocytes provides a wider spectrum of antigens and has the potential to distinguish between antibodies that are detrimental and those that have no effect on graft survival. The procedure can also be performed in a shorter period of time than lymphocytotoxicity and previous flow cytometry crossmatch procedures. Three cases were described in which the modified crossmatch procedure was useful in characterizing the antibody responsible for the positive B cell CDC crossmatch. The application of this procedure in renal transplantation allows for the use of extended phases of crossmatch testing, thus enhancing the probability of graft survival. At the same time, some potential allograft recipients are not excluded from consideration for transplantation solely on the basis of a positive crossmatch result.

TIMOTHY J. FARLEY
THOMAS C. SHANAHAN
WILLIAM R. BARTHOLOMEW[1]
Department of Microbiology and Immunology
State University of New York at Buffalo
Histocompatibility Laboratory
Erie County Medical Center
Buffalo, New York 14215

[1]Address correspondence to: William R. Bartholomew, Ph.D., Assistant Director, Division of Clinical Microbiology and Immunology, Erie County Medical Center, 462 Grider St., Buffalo, N.Y. 14215.

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LATE COMPLICATIONS WITH GALLBLADDER CONDUIT BILIARY RECONSTRUCTION AFTER LIVER TRANSPLANTATION[1]

The preferred techniques for biliary tract reconstruction with liver transplantation are duct-to-duct anastomosis over a T-tube stent or anastomosis of the graft common duct to a defunctionalized Roux limb of jejunum (*1–3*). A more complex but occasionally useful procedure is the gallbladder conduit operation, which was recommended by Waddell and Grover (*4*) for use in liver transplantation and adapted by Calne (*5*) for this purpose.

In our own experience with almost 2000 liver transplantations, the Waddell-Calne option for biliary reconstruction has been exercised on only 10 occasions. In most of the 10 patients (Table 1), multiple previous operations had caused extensive scarring, and/or there had been the loss of a large portion of the small bowel, either from construction of multiple Roux limbs or because of extensive intestinal resections for other reasons. The use of the gallbladder conduit under these circumstances either obviated the need for extensive dissections, permitted the use of a short residual Roux limb, or allowed both advantages.

The biliary reconstructions were performed exactly as described by Calne (*5*). In essence, the donor common duct is anastomosed to the base of the donor gallbladder (Hartman's pounch) and the fundus of the gallbladder is anastomosed to

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TABLE 1. Complications of gallbladder conduit biliary reconstruction

OT[a] No.	Age at transplantation	Date of transplantation	Multiple previous operations	Complication	Time to revision	Status
235	45	8/8/82	Yes	No complication	No revision	Alive and well
250	3	8/22/82	Yes	Gallstone/cholangitis	5 Years	Alive and well
768[b]	22	10/5/88	Yes	No complication	No revision	Died 3 weeks postop.
1277	2	10/28/87	Yes	Gallstone/cholangitis	1 Years	Alive and well
1305	44	10/20/87	No	No complication	No revision	Alive and well
1321	20	12/8/87	Yes	No complication	No revision	Alive and well
1371	1½	1/17/88	Yes	No complication	No revision	Alive and well
1402	3	2/13/88	Yes	Sludge/cholangitis	6 Months	Alive and well
1601	54	7/6/88	Yes	Increased liver enzymes/gallstone	3.5 Months	Alive and well
1732	53	10/11/88	Yes	No complication	No revision	Died 9 weeks postop.

[a] OT, orthotopic transplantation.
[b] Retransplantation—first transplantation was 4/21/86.

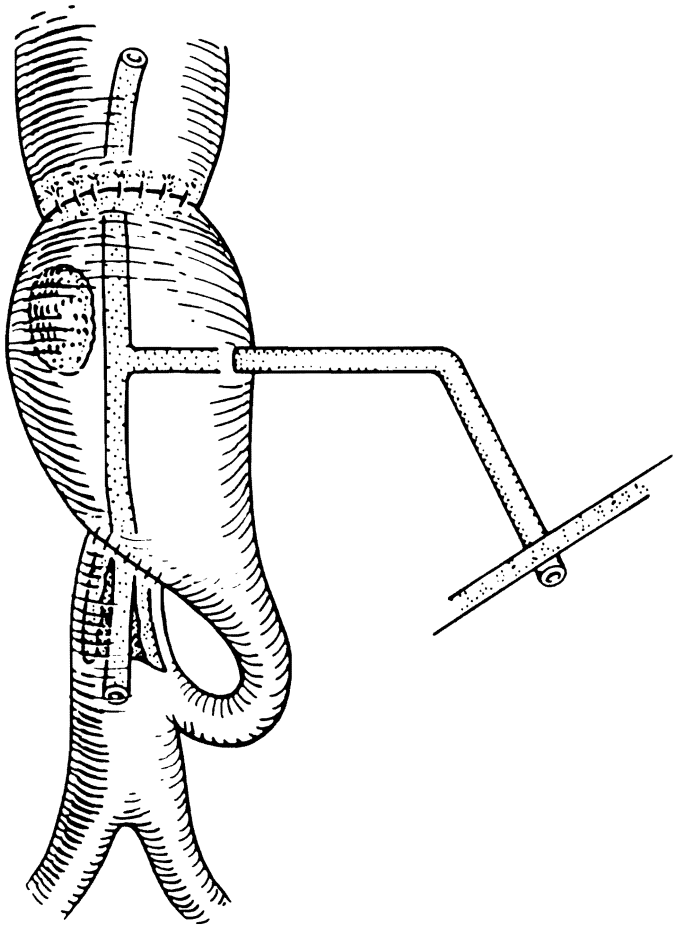

FIGURE 1. Biliary reconstruction with a gallbladder conduit. The T-tube passes through the proximal and distal anastomosis and out through the gallbladder wall to the skin.

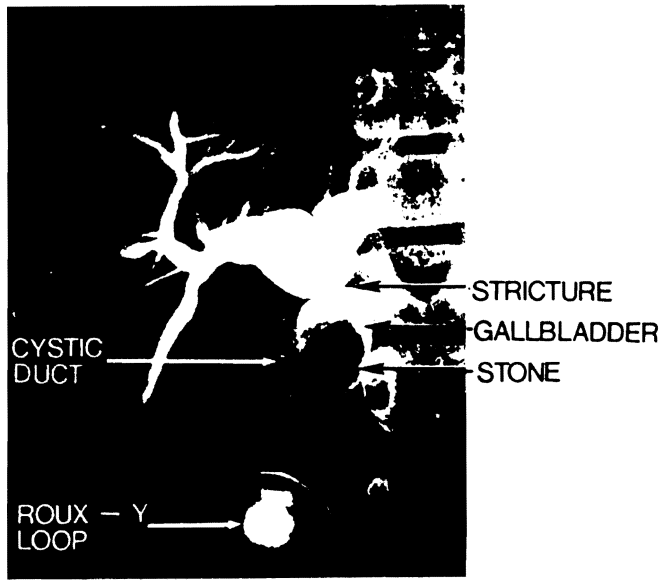

FIGURE 2. Transhepatic cholangiogram 5 years after transplantation and biliary reconstruction with gallbladder conduit.

the recipient bowel or to the recipient common bile duct. The proximal limb of a T-tube is passed through the choledochocholecystostomy anastomosis and the distal T-limb is passed through the anastomosis of the gallbladder fundus to the intestine or recipient common duct. The T-limb of the T-tube is brought through the gallbladder wall to the skin (Fig. 1).

Eight of the 10 patients survived chronically after operation and have been followed for 6 months to 6-½ years. The other two died after 3 and 4 weeks. The bile duct reconstruction was not a factor in their deaths. Of the 8 who are alive, 4 developed biliary tract stones, sludge, or strictures, and usually all 3 (Table 1).

A typical late complication is shown in Figure 2. The stricture occurred at the site of the anastomosis between the donor duct and the gallbladder. The stones were found in the donor duct, the gallbladder, or both places (Fig. 2). Reoperation was required in each instance with conversion to a choledochojejunostomy 0.3, 1, 3.5, and 5 years after the transplantation. The symptoms leading to operation were life-threatening in 3 patients with severe cholangitis. The fourth patient had silent obstructive jaundice. Reoperation was successful in all 4 cases.

By 1974, the devastating effect of biliary tract complications after liver transplantation had been recognized and the need for improved techniques was obvious (*6*). The options settled upon in our program were either choledochojejunostomy or choledochocholedochostomy with a T-tube stent (*1–3*). The alternative technique of reconstruction with a donor gallbladder conduit has the advantages of providing a double passage of bile from the new liver via the common duct and cystic duct, as well as easy access for postoperative irrigation through a carefully placed T-tube. In addition, dangerous dissections and loss of additional jejunal length can be avoided in patients with multiple previous operations. With this method, the rate of complications in the Cambridge program was substantially reduced (*7*).

However, it has not been appreciated that sludge and stone formation would be a common late complication, particularly in pediatric recipients. In our small series of only 10 patients, reoperation became necessary as early as 3.5 months after transplantation, and as late as 5 years. The potential hazards as well as the inconvenience inherent in this method of biliary tract reconstruction should preclude its use except for those specific indications already mentioned.

In summary, the Waddell-Calne method of biliary tract reconstruction using a gallbladder conduit was associated with a 50% incidence of late biliary tract sludge or stone formation, with obstruction and frequent cholangitis. This procedure should not be used for the biliary tract reconstruction of liver transplantation except under extremely specific and very rare circumstances.

GLENN HALFF
SATORU TODO
ROBERTA HALL
THOMAS E. STARZL[2]
The Department of Surgery
University of Pittsburgh Health Center
University of Pittsburgh
Pittsburgh, Pennsylvania

[2] Reprint requests should be sent to Thomas E. Starzl, M.D., Ph.D., Department of Surgery, 3601 Fifth Avenue, Falk Clinic, Pittsburgh, PA 15213.

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NONTROPICAL PYOMYOSITIS IN A RENAL ALLOGRAFT RECIPIENT

Pyomyositis (pyomyositis tropicans) is an abscess-forming bacterial infection of skeletal muscle. This illness usually occurs in tropical climates, where it is well recognized, but is infrequently diagnosed in nontropical climates. It is, however, being recognized with increasing frequency in the United States. Although trauma, parasitic and viral infections, nutritional and other metabolic factors have been implicated, the exact pathophysiologic mechanisms leading to bacterial infection of skeletal muscle are unknown. *Staphylococcus aureus* is almost always the offending organism but the disease can be caused by virulent streptococci and other species. The disease occurs most often in males and in younger patients. Pyomyositis carries an important morbidity and mortality if not diagnosed properly and treated aggressively with antibiotics, as well as surgical intervention (*1–8*).

We present the first published case of nontropical pyomyositis occurring in a renal allograft recipient and comment on the presenting features, diagnosis, and therapy of the disease in this paper.

The patient is a 53-year-old white male with end-stage renal disease secondary to chronic glomerulonephritis. He underwent a cadaver donor renal transplant in 1978 which was lost to chronic rejection in 1985. He returned to dialysis at that time and underwent a second cadaver donor renal transplant in December 1987. Since that time he has enjoyed excellent allograft function (baseline serum creatinine 1.4–1.7 mg/dl). His maintenance immunosuppressive medications are prednisone 10 mg/day and cyclosporine A 250 mg/day (3.2 mg/kg/day). His past medical history is also significant for chronic hepatitis B infection with probable cirrhosis, hypertension, gouty arthritis, and lower extremity venous thrombosis. There is no history of previous dermatologic problems or intravenous drug abuse. He has never traveled outside the continental United States.

On July 1, 1988 he developed pain in the right elbow which became progressively worse, especially at night, and he presented for evaluation in Transplant Clinic on July 5. There was no history of trauma to the arm or any other difficulty. At that time he was afebrile. Examination of the right arm revealed moderate swelling with tenderness to palpation and motion in the area of the right elbow. The musculature of the arm appeared normal. His laboratory parameters were within normal limits. Because of a past history of gouty arthritis an empiric trial of colchicine and indomethacin was begun. After initial improvement the pain began to worsen dramatically and became constant, with subjective fever and increased swelling in the upper arm.

The patient was hospitalized for further evaluation on July 22, 1988. At that time physical examination showed the temperature to be 38.2°C, blood pressure 118/78, respirations of 14 per minute, and pulse of 88. The patient was in moderate distress from right arm pain. The right upper arm was edematous and the inner aspect of the upper arm was exquisitely