

## Early Postoperative Complications of Pediatric Liver Transplantation

MOHAMMAD HADI IMANIEH<sup>\*†</sup>, ASMA ERJAEI<sup>†</sup>, SEYED MOHSEN DEHGHANI<sup>\*†</sup>, ALI BAHADOR<sup>\*</sup> AND SEYED ALI MALEK-HOSSEINI<sup>\*</sup>

From <sup>\*</sup>Shiraz Transplant Research Center, and <sup>†</sup>Gastroenterohepatology Research Center, Department of Pediatric Gastroenterology, Nemazee Hospital, Shiraz University of Medical Sciences, Shiraz, Iran.

Correspondence to:  
Dr Seyed Mohsen Dehghani,  
Shiraz Transplant Research  
Center, Gastroenterohepatology  
Research Center, Nemazee  
Hospital, Shiraz University of  
Medical Sciences, Shiraz  
7193711351, Iran.  
dehghanism@sums.ac.ir  
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We reviewed records of 35 pediatric liver transplant recipients who were operated at the Shiraz Organ Transplant Center between April 1998 and April 2005 to gather demographic data, primary diagnosis, duration of hospital stay, source of graft, mortality, and surgical (vascular, biliary, fluid collection) and medical (infection, respiratory, neurological, cardiovascular, and gastrointestinal) complications. Among 23 male and 12 female pediatric liver transplant recipients (mean age: 11.8±4.9 years) with a mean hospital stay duration of 23.3±20.3 days, the postoperative complications included biliary leakage (7.20%), biliary stricture (3.10%), biliary obstruction (3.10%), pleural effusion (9.26%), lung collapse ( $n=1$ ) pulmonary hemorrhage ( $n=1$ ), and vascular complications of portal and hepatic vasculature ( $n=10$ , 28.6%); and infections of the peritoneum, lung, wound site, and urinary tract ( $n=10$ ; 28.6%). Acute cellular rejection was documented in 6 (17.1%) recipients. Overall, 13 (37.1%) children died.

**Key words:** Children, Complication, Iran, Liver transplant.

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Orthotopic liver transplantation (OLT) is the treatment of choice for all types of end-stage liver diseases in both children and adults(1-3); it was first used as a treatment for pediatric chronic liver disease in 1998 at our center. Despite the improvement in survival due to advances in organ preservation, improved immunosuppressive agents, and refinement of surgical techniques, there are still significant complications and mortality associated with pediatric OLT(3,4). The aim of this study was to determine the type and frequency of early postoperative complications that occurred among our pediatric liver transplant recipients.

### METHODS

We reviewed the records of 35 pediatric patients (less than 18 years old) who underwent first OLT at

Shiraz Organ Transplant Center between April 1998 and April 2005. The operative procedure was performed in a standard manner, using duct-to-duct anastomosis in 68% of cases and piggy-back technique was utilized in 90% and venovenous bypass in the rest. Immunosuppressive regimen included mycophenolate mofetil, cyclosporine, tacrolimus and prednisolone. Data including demographic characteristics, primary diagnosis, duration of hospital stay, source of graft, mortality, and early postoperative complications were gathered. Early postoperative complications were considered as any surgical or medical complication that occurred any time during the patient's hospital stay following transplantation.

### RESULTS

Twenty- three of the 35 pediatric liver transplant

recipients were male and 12 were female. The mean age of the recipients was 11.8±4.9 years (range, 11 mo-18 yr). 77% of the patients used organs from deceased donors and 22.9% from living sources. The primary diagnoses for these patients included cryptogenic cirrhosis (*n*=17, 48.6%), autoimmune cirrhosis (*n*=7, 20%), biliary atresia (*n*=5, 14.3%), Wilson disease (*n*=4, 11.4%) and neonatal hepatitis (*n*=2, 5.7%). The mean duration of hospital stay was 23.3±20.3 days. The complications are listed in **Table I**. Pleural effusion (*n*=9) was the most common respiratory complication. There was one case each of lung collapse and pulmonary hemorrhage. In all cases, the right hemithorax was affected. Re-laparotomy was needed in 11 (31.4%) cases due to complications. Outcome did not vary with the kind of complication and the need for re-laparotomy.

The infection sites included peritoneum (*n*=3), lungs (*n*=2), wounds (*n*=2) and the urinary system (*n*=1). Micro-organisms involved were fungal in 2 cases, viral (herpes and CMV) in 2 cases and bacterial in 6 others. Acute cellular rejection occurred in 6 (17.1%) cases; of these 4 died. All 10 cases with arterial and venous thrombosis also died. Overall mortality rate over one year was 37.1 % (*n*=13). The causes of death were rejection, vascular complications, hypoglycemia, gastrointestinal bleeding, and lymphoproliferative disorder.

**DISCUSSION**

Liver transplant recipients are at risk for the same postoperative complications as any patient undergoing a major intraabdominal operation, in addition to several complications specific to this procedure(5). At least one early postoperative complication was seen in 27 pediatric OLT patients in our study. We observed that biliary and vascular complications were the most frequent early postoperative surgical complications while respiratory, infectious, and acute rejection complications were the most common medical problems in the early post surgical period. Similar complications have been reported by other authors (3,4,6-10).

We conclude that the liver transplant complications found in the pediatric age group at our

**TABLE I** COMPLICATIONS OF LIVER TRANSPLANT

	Total	Living	Cadaver
<i>Surgical complications</i>			
Hepatic artery thrombosis	3 (8.6%)	0	3 (11.1%)
Portal vein thrombosis	4 (11.4%)	1 (12.5%)	3 (11.1%)
Portal vein stenosis	1 (2.9%)	1 (12.5%)	0
Hepatic artery stenosis	1 (2.9%)	1 (12.5%)	0
Hepatic artery pseudoaneurysm	1 (2.9%)	1 (12.5%)	0
Biliary leakage	7 (20.0%)	3 (37.5%)	4(14.8%)
Biliary stricture	3 (8.6%)	1(12.5%)	2 (7.4%)
Biliary obstruction	3 (8.6%)	1 (12.5%)	2 (7.4%)
Liver ischemia	0%	0	0
Liver infarction	0%	0	0
Liver abscess	2 (5.7%)	2 (25.0%)	0
Fluid collection	5 (14.3%)	1 (12.5%)	4 (14.8%)
Hematomas	6 (17.1%)	0	6 (22.2%)
<i>Medical complications</i>			
Infection	10 (28.6%)	1 (12.5%)	9 (33.3%)
Respiratory	11 (31.4%)	5 (62.5%)	6 (22.2%)
Neurological	6 (17.1%)	1 (12.5%)	5 (18.5%)
Cardiovascular	3 (8.6%)	1 (12.5%)	2 (7.4%)
Gastrointestinal bleeding	2 (5.7%)	1 (12.5%)	1 (3.7%)
Rejection	6 (17.1%)	2 (25.0%)	4 (14.8%)
<i>Others</i> (alopecia areata, hallucination)	4 (11.4%)	1 (12.5%)	3 (11.1%)

center were very similar to that found in other transplant centers worldwide(4-7). However, considering the fact that our study had evaluated the outcome of liver transplantation in the first few years of pediatric liver transplant surgery, our overall mortality rate is higher compared to similar studies from the West.

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*Competing interests:* None stated.

**WHAT THIS STUDY ADDS?**

- Overall mortality rate of liver transplant in children in Iran was 37.1% but the postoperative complications were similar to previous studies.

**REFERENCES**

1. Busuttil RW, Seu P, Millis JM, Olthoff KM, Hiatt JR, Milewicz A, *et al.* Liver transplantation in children. *Ann Surg* 1991; 213: 48-57.
2. Yamanaka J, Lynch SV, Ong TH, Fawcett J, Robinson HE, Beale K, *et al.* Surgical complications and long-term outcome in pediatric liver transplantation. *Hepatogastroenterology* 2000; 47: 1371-1374.
3. Araz C, Pirat A, Torgay A, Zeyneloglu P, Arslan G. Early postoperative complications of pediatric liver transplantation: experience at one center. *Transplant Proc* 2004; 36: 214-217.
4. Lin CC, Chuang FR, Wang CC, Chen YS, Chen CL, Liu YW, *et al.* Early postoperative complications in recipients of living donor liver transplantation. *Transplant Proc* 2004; 36: 2338-2341.
5. Ho MC, Wu YM, Hu RH, Ko WJ, Ni YH, Chang MH, *et al.* Surgical complications and outcome of living related liver transplantation. *Transplant Proc* 2004; 36: 2249-2251.
6. Saing H, Fan ST, Tam PK, Lo CM, Wei WI, Chan KL, *et al.* Surgical complications and outcome of pediatric liver transplantation in Hong Kong. *Pediatr Surg* 2002; 37: 1673-1677.
7. Shimizu T, Tajiri T, Akimaru K, Yoshida H, Yokomuro S, Mamada Y, *et al.* Postoperative management and complications in living-related liver transplantation. *Nippon Med Sch* 2003; 70: 522-527.
8. Egawa H, Uemoto S, Inomata Y, Shapiro AM, Asonuma K, Kiuchi T, *et al.* Biliary complications in pediatric living related liver transplantation. *Surgery* 1998; 124: 901-910.
9. Sieders E, Peeters PM, TenVergert EM, de Jong KP, Porte RJ, Zwaveling JH, *et al.* Early vascular complications after pediatric liver transplantation. *Liver Transpl* 2000; 6: 326-332.
10. Afessa B, Gay PC, Plevak DJ, Swensen SJ, Patel HG, Krowka MJ. Pulmonary complications of orthotopic liver transplantation. *Mayo Clin Proc* 1993; 68: 427-434.