Introduction

Since the first human liver transplant was performed in 1963, liver transplantation has rapidly evolved from an experimental procedure to a standard treatment modality for most end-stage liver disease in Western countries. In the year 1999, the Pitt-UNOS Liver Transplant Registry recorded 4,489 liver transplants in 104 centres in the United States. Continuous developments in organ preservation, immunosuppression, surgical technique, anesthesiology, and intensive care medicine have refined the procedure and improved the outcome of patients after transplantation. The one-year patient survival for those transplanted in recent years averaged 80-85%. For recipients who survived the first posttransplant year, the long-term survival was excellent with 5- and 10-year survival rates of 92% and 84%, respectively. Before the turn of the century, liver transplantation has become the most effective treatment option for almost all non-malignant end-stage liver diseases and for selected patients with hepatic malignancies. The impact of liver transplantation on hepatology and liver surgery is so overwhelming that it becomes impossible to have a liver disease centre without liver transplant capability.

Problems in Hong Kong

Despite Western experience demonstrating the success of liver transplantation, this service was not available in Hong Kong until the first successful case was performed at Queen Mary Hospital in October 1991. The development of liver transplantation in Hong Kong has been seriously restricted by a lack of organ donors, lack of funding and the prevalence of hepatitis B virus-related end-stage liver disease. Over the last 10 years, various strategies have been adopted that have ultimately led to a wider application of liver transplantation in Hong Kong.

Organ Shortage

As in other Asian countries, various religious, philosophical and cultural traditions impose insurmountable barriers towards the promotion of organ donation in Hong Kong. To improve the donor supply, we have relaxed the criteria for cadaver donor acceptability and marginal donors irrespective of age, adverse in-hospital events or use of inotropes have been widely used. The only absolute contraindications for donation are the presence of systemic infection, transmissible diseases, or malignancy. Together with more public education, there has been a significant increase in the number of cadaver liver transplants at Queen Mary Hospital from one or two per year to about 10 per year recently. Nonetheless, the need for this life-saving operation continues to exceed the supply of cadaver liver grafts, and this disparity has resulted in a very high mortality rate on the waiting list of over 40% in general and 90% for high-urgency patients who require urgent liver transplantation.

To provide a source of organs for pediatric patients, the technique of reduced-size liver transplantation and living donor liver transplantation was introduced at Queen Mary Hospital in 1993. Pioneering surgical innovations were developed that have finally extended the benefit of living donor liver transplantation to adult recipients. In 1994, the first case of a husband-to-wife left lobe liver donation for fulminant hepatic failure opened the gateway towards adult-to-adult living donor
liver transplantation. However, it was the development of the innovative technique of right lobe liver transplant since 1996, that has ultimately overcome the barrier of donor-to-recipient size matching and has widen the application of liver transplantation in Hong Kong. In addition, agreements for collaboration with transplant centres in neighbouring countries have also been established for sharing of liver grafts. In January 1999, the first experience with international sharing of split liver grafts in Asia was realized. A split right lobe graft was transported from Kaohsiung, Taiwan to Queen Mary Hospital and the operation saved the life of a 51-year old man who was critically ill with hepatic coma and hepatorenal syndrome. Subsequently, in January 2000, the first case of split liver transplantation for two adult recipients was successfully performed at Queen Mary Hospital. Although the technique offers the attractive concept of transplanting two patients with one donor liver, the logistic difficulty of two simultaneous transplants and the resource constraint seriously limit its wider application in the near future.

**Lack of Funding**

Liver transplantation is a high-cost operation. The cost per transplant is approximately US$200,000 in the United States and A$120,000 in Australia. The establishment of a program in a hospital requires not only sophisticated equipment, expensive drugs, and a team of dedicated, skilled surgeons, but extensive development and support from other specialties including hepatology, anesthesiology, intensive care, pathology, microbiology, nursing and other paramedical departments. The acquisition of the special equipment for the initiation of the liver transplant service at Queen Mary Hospital was made possible through a donation from a charitable organization. There has not been any funding for new staff but the marginal cost (cost of drugs, laboratory tests and other investigations) per transplant is estimated at US$50,000.

**Prevalence of Hepatitis B Virus Related Liver Disease**

Chronic hepatitis B infection is the most important cause of end-stage liver disease in Hong Kong. The major concern with liver transplantation in patients with chronic hepatitis B is recurrent hepatitis which often progresses rapidly to graft failure. The use of hepatitis B immunoglobulin is prohibitively expensive and we have investigated the use of lamivudine monotherapy as prophylaxis. In our recent report on the first 31 patients who underwent liver transplantation for chronic hepatitis B-related liver disease, the patient survival rate was 84% at a median follow-up of 16 months and the viral breakthrough rate was low (3.8%) when compared with Western experience. With the use of lamivudine prophylaxis, chronic hepatitis B infection should no longer be considered a contraindication for liver transplantation.

**Results of Liver Transplantation at QMH**

With all these measures, the number of liver transplants performed each year at Queen Mary Hospital has increased rapidly from 2 in the year 1991 to 41 in the year 2000 because of an increase in both cadaver and living donor operations (Table 1).

By the end of December 2000, a total of 155 liver transplants have been performed for 148 patients (127 adults and 21 children). The most common disease condition was biliary atresia in children and hepatitis B infection in adults. Over one-third of the patients required intensive care before urgent liver transplantation and the liver grafts were from living donors in over 50% of the cases. The overall patient survival rate was 82% at one year and 77% at 5 years. The survival rate for 20 patients with fulminant hepatic failure was 79%. For 18 patients with hepatocellular carcinoma at the time of transplantation, 91% were alive at a median follow-up of 15 months (range, 6 - 70 months).

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<th>Year</th>
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Conclusions

Despite all the factors limiting the development of liver transplantation in Hong Kong, a liver transplant program with gratifying results has been established at Queen Mary Hospital. With the combination of public education to promote organ donation and innovative techniques in living donor liver transplantation, the applicability of the operation can be widened and more patients with end-stage liver disease will benefit from this life-saving operation. Continuous effort in public education and formal funding are essential before the program can further develop to cope with the need of the population in Hong Kong.

References