

## STARTING A LIVER TRANSPLANTATION PROGRAM: EXPERIENCE AT KING FAHAD NATIONAL GUARD HOSPITAL IN RIYADH

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Since the early eighties, liver transplantation has quickly become the ultimate solution for patients with end-stage liver disease. As a result, liver transplant programs proliferated all over the world, particularly in North America and Europe.<sup>1</sup> This has not been the case in the developing countries, due to the lack of qualified technical experience with the procedure, the lack of advanced hospital set-ups required to support such a demanding procedure, and finally the cost. This led to the establishment of only a few centers, in addition to a few sporadic cases being performed outside a well-organized program.

Liver disease is endemic in Saudi Arabia. It is estimated that at least 300-500 patients require liver transplantation annually.<sup>2</sup> Between 30 and 50 Saudi patients a year receive transplants in the USA, at a total cost of approximately 50 million US dollars. This, among other factors, has led to the establishment of liver transplant programs in the Kingdom. In this paper, we describe our experience with the establishment of this program, emphasizing problems peculiar to developing countries.

### Method

#### *Historical Background*

The first liver transplant in the Kingdom was performed in 1990, after which there was a "quiet" period.<sup>3</sup> The largest transplant center was launched in 1994 at King Fahad National Guard Hospital. Up to July 1997, a total of 74 transplant procedures had been performed, with an early and intermediate survival rate of 75%-80%.

#### *Feasibility*

In order to determine the need for liver transplantation, a hospital-based feasibility study was conducted. A

retrospective analysis of all inpatients with liver disease admitted over a two-year period revealed that at least 70 patients at King Fahad National Guard Hospital required liver transplantation, which would cost more than 50 million US dollars if treated abroad. The number of patients was expected to be even greater, considering the referrals to what would be the only liver transplant program nationwide. This data was presented to decision-makers at a high administrative level in order to justify the establishment of the program and was followed by a working plan proposal.

#### *Manpower*

Two full-time surgeons began the program with no clinical responsibilities other than those that were transplant related. Both had undergone formal transplant training in North American centers. A part-time hepatologist assisted with the work-up and management of patients. A pathologist with interest in liver disease was sent to a major European transplant center for two months to gain experience in transplant pathology. Two general anesthesiologists underwent a short training period in two US centers. One transplant coordinator was recruited, followed by the recruitment of a second. Two perfusionists were also employed. Two well-qualified OR nurses were sent for a short training period to a major US center, and a clinical pharmacist spent six months in a major US center. Finally, two invasive radiologists were exposed to transjugular intrahepatic portosystem shunt procedures in a major European center.

An extensive education program was initiated in order to educate ward and intensive care unit nurses regarding care of liver transplant patients and, in particular, liver transplant recipients.

#### *Support From Other Hospital Departments*

A series of meetings were held with the concerned departments in order to clarify their role, and to fill any gaps which might jeopardise the success of the program. The Blood Bank undertook major revisions of their policies and procedures, purchase of equipment and donor recruitment, so they could supply more than 100 units of blood and products. Pharmacy, Nursing, Intensive Care,

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Medical Imaging, Dietary, Public Relations, Social Services, Psychiatry and other departments were directly involved in the planning and implementation stage. Each department was given specific guidelines with regard to their role in the program. Difficulties encountered in manpower and procurement/maintenance of required equipment were quickly resolved with the aid of a supportive administration.

#### *Cost*

King Fahad National Guard Hospital is a 600-bed tertiary care center, and is one of the largest facilities in the Kingdom. The basic requirements of a tertiary care center were available to our program. However, additional equipment and personnel were provided in order to meet the requirements of the program. Capital equipment costs were as follows: transplant surgery, \$300,000; anesthesia equipment, \$300,000; laboratory equipment, \$150,000; nursing, \$100,000. This amounted to a total cost of \$850,000. The running cost of the program provided funding for 25 transplant procedures annually. This amounted to \$83,000 per procedure, including manpower cost of \$25,000, anesthesia and surgical consumable cost of \$7000, laboratory cost of \$15,000, hospital stay costs of \$1000/day, and costs of immunosuppression drugs for one year of \$15,000.

#### *Policies and Procedures*

A series of meetings were conducted between team members to devise an action plan for patients, from the initial referral for liver transplant until time of discharge from hospital. This included step-by-step policies and procedures for patient work-up, recipient surgery, immediate postoperative and hospital care, and long-term follow-up. This was thoroughly explained, formally documented, and distributed in protocol form to all involved departments. Simulation of the transplant procedure was carried out, both in the hospital and animal laboratory, in order to establish significant deficiencies in the protocols devised.

#### *Relationship With Hospital and Retrieval Agencies*

The Saudi Centre for Organ Transplantation (SCOT) is the official coordination and retrieval body in Saudi Arabia. Donors are referred to SCOT, who in turn refer the donor to the Transplant Center, followed by the dispatching of a surgical team for organ retrieval. Donor management is carried out jointly with SCOT, mainly by telephone communication with the referring ICU. An accurately maintained waiting list is sent to SCOT on a daily basis.

### **Results**

The program was officially opened in January 1994, and in February of the same year the first successful liver

transplant was performed. The patient continues to do well with a satisfactorily functioning graft. From the inception of the transplant program until July 1997, a total of 74 procedures have been performed on 69 patients, with an early and intermediate survival rate of 75%-80% being maintained.

### **Discussion**

The ingredients of a successful liver transplant program include adequate hospital set-up, a well-trained transplant team, cooperation from the referral hospitals and coordination and retrieval agency, and finally administrative back-up. These were clearly demonstrated during our 3½-year experience at the King Fahad National Guard Hospital Liver Transplant Program. The initiation and maintenance of a successful liver transplant is an involved process due to the complexity of the procedure, the critical condition of the patients, and finally the cost incurred in the care of these patients before and after transplant. However, this service is clearly required in the Middle Eastern countries, with Saudi Arabia being a prime example. Liver disease is endemic in many of the Middle Eastern countries, emphasizing the need for organized liver transplant programs. It would appear that transplant programs are cost effective, especially following cost comparison of liver patients who were being sent to other countries for transplantation. This particular component of our program has been clearly demonstrated in our experience over the past few years in Saudi Arabia.

The majority of Middle Eastern countries face similar problems regarding availability of donors, not only in the number of organs but also the quality of the organs retrieved. The brain death concept seems to be accepted in most of these countries, however, obtaining consent for organ donation continues to be a major problem, creating a shortage in the number of organs available. This shortage is complicated by the fact that organ transplantation in general is a relatively new concept within the medical community in this region, and therefore brain death identification and donor maintenance is inadequate in many of the intensive care units in Saudi Arabia. This has resulted in obtaining marginal quality organs which can cause major clinical problems in the post-transplant period. It appears that much work is required in terms of obtaining more organs, and also educating the medical community in donor maintenance. This effort must be made jointly by the transplant program and the coordination and retrieval agencies.

The most common indication for liver transplant in our program is end-stage liver disease secondary to hepatitis C, which is related to the high incidence of viral hepatitis in the Kingdom. Generally, these patients are referred at a late stage, at which time risk of transplant is higher than if referred earlier. This is in contrast to the Western experience, where the more common indications are those

of cholestatic liver disease and subsequent improved outcome. We anticipate that the long-term outcome in our group of patients will be inferior because of viral hepatitis recurrence in the grafts.

In the face of few good donors in a program which has just begun, it is important to be selective in choosing recipients due to the highly visible nature of this program in the local community. Success in the first few cases will pave the road for expansion of the program, boosting administrative and public support. The importance of donor selection is demonstrated in our situation, where up to 25% of the livers offered were unacceptable due to the marginal quality of the organs.

### Conclusion

A liver transplant program in Saudi Arabia is not only feasible but necessary and cost effective. Adequate hospital set-up, a well-trained transplant team and administrative back-up are vital components in the initiation of such a program. The major problem facing this type of program

in developing countries is the availability of donors and quality of organs obtained. Great effort is required in this direction in order to achieve a successful transplant program, which in our opinion, is urgently required in the Middle Eastern region.

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