Organ transplantation in the Kingdom of Saudi Arabia

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Abstract  The first organ to be transplanted in the Kingdom of Saudi Arabia (KSA) was a live related kidney transplant in 1979. Over the last 16 years 1822 kidneys, 94 livers, 53 hearts, 5 lungs, 2 pancreas, over 120 bone marrows and 5925 corneas were transplanted. Over the same period of time cadaveric organ donation was instituted through the establishment of the Saudi Center for Organ Transplantation. Now there are 11 renal transplant centers, 4 liver transplant centers, 3 cardiac/lung transplant centers, 2 bone marrow transplant centers and 8 cornea transplant centers.

The results in those organ transplantation programs are quite satisfactory. This article describes some historical milestone and background and describes briefly various organ transplant activities.


Keywords: Kingdom of Saudi Arabia, organ transplantation.

Organ transplantation is an advanced form of therapy which is only undertaken in institutions with advanced infrastructure including:

1. Well trained medical, technical and nursing staff.
2. Well equipped diagnostic departments - immunology, microbiology, biochemistry, serology, histopathology, diagnostic radiology and nuclear medicine etc.
3. High standard medical departments with backup facilities, such as cardiology, nephrology, hematology, endoscopy service, intensive care unit (ICU) services etc.
4. The ability to work as a team of many and varied specialities.

It is, therefore, only possible to carry out successful organ transplantation in an institution when a high standard medical service has been achieved by that institution.

It is therefore, heart-warming that in the Kingdom of Saudi Arabia organ transplantation has come of age. In the majority of instances, it is run by Saudi medical staff.

There are now 12 active renal transplant centers (4 in Riyadh, 3 in Jeddah, one each in Tabuk, Dhahran, Medina, Khamis Mushait and Al-Hada), 3 cardiac transplant centers (2 in Riyadh and 1 in Jeddah), 4 liver transplant centers (2 in Riyadh and 1 in Jeddah), 4 liver transplant centers (3 in Riyadh and 1 in Jeddah), 2 bone marrow transplant centers (both in Riyadh), 8 active corneal transplants (4 in Riyadh, 2 in Jeddah, 1 in Madina, 1 Khamis Mushait). In addition 2 lung transplants were carried out in Jeddah and Riyadh and 2 pancreatic transplants were carried out in Jeddah.

Although organ transplantation is costly, it is in the majority of instances the only hope for the patient with endstage organ failure for survival, and in all instances it is the best hope for optimal rehabilitation. In addition, the establishment of organ transplantation leads, by virtue of the need for expertise and technical advances, to improvement in the whole medical services in the particular institution carrying out the organ transplantation. Moreover, the multi-speciality

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need for organ transplantation improves and enhances the training of residents, nurses and technical staff.

The establishment of organ transplantation in the Kingdom of Saudi Arabia (KSA) also reduced the need to send people abroad with concomitant financial saving as well as reduction of social and psychological upheavals of the patient and his relatives and reduced morbidity and mortality when carried out in certain countries. For example, renal transplantation for a Saudi patient costs $12,000 when carried out in KSA as compared to $20,000 when carried out in USA. The figures for a liver transplant is $100,000 and $800,000 respectively and for cardiac transplant is $100,000 and $800,000 respectively. Bone marrow transplant is $150,000 and $250,000 respectively.

A number of public surveys have been undertaken in the Kingdom of Saudi Arabia regarding awareness of brain death and organ donation. In a survey among males attending the outpatient department in King Fahd National Guard Hospital (KFNCH), 88% were aware of organ donation, 43% felt they understood the concept of brain death and 67% were willing to be donors, 56% believed Islam allows organ donation. The results of this survey is generally encouraging but, ideally the public has to be more informed about the Islamic Fatwas allowing organ donation as this is extremely important in obtaining consent for organ donation.

In a survey of the views of secondary school students (both males and females) in the Kingdom of Saudi Arabia (KSA), 68% were willing to donate organs after brain death and 91% were willing to donate organs to relatives and 48% were willing to include the word “donor” in their driving licences.

A series of very useful and interesting articles emanating from the Saudi Center for Organ Transplantation (SCOT) has been published in the literature regarding SCOT as a model, the impact of multiorgan donation on consent, the reason for unused organs, and the experience of 10 years in organ harvesting in the Kingdom of Saudi Arabia, and the role of ICU's in organ retrieval.

**Historical background** The need for organ transplantation in KSA was realized by policy makers earlier on in view of the high incidence of organ failure in the Kingdom (100-150 PMP new cases of endstage renal disease, 50 PMP of endstage liver disease). To that end many patients with endstage organ disease were sent abroad for treatment. This proved to be costly both financially and socially (see above). To facilitate their treatment the government gave them priority for treatment allowing them to be treated in hospitals of all medical sectors in the Kingdom.

In order to enhance and establish an organ transplantation program the following steps were undertaken:

1. Seeking religious Fatwa to allow for live related and cadaveric organ donation and concept of brain death which is essential for cadaveric donation. A number of Fatwas were passed to support these.

2. Establishment of a central organization to oversee and establish an organ transplantation program. This was the brain child of His Royal Highness Prince Salman, Governor of Riyadh, which culminated in the establishment of the National Kidney Foundation in 1985 which became the Saudi Center for Organ Transplantation (SCOT) in 1993. The details of the workings of the organization have been published elsewhere. It encompasses all committees dealing with various organs, procurement of organs, education, research and statistics, accreditation of transplant centers and follow-up as well as coordination.

3. The publication of a Directory of Regulations which establishes the rules and regulations regarding recognition and accreditation of transplant centers, the establishment of a waiting list, priorities and workup of patient and donors, the diagnosis of brain death, organ distribution etc.

The setting up of the rules of cooperation between ICU’s, transplant centers and SCOT on the background of religious Fatwas, existence of SCOT and continuous governmental support has set the basis for the success in organ transplantation. However, the process is ongoing and requires vigilant work of public education and awareness and hardwork by SCOT, all transplant centers and ICU’s centers.

It is a tragic fact that the number of fatal road traffic accidents is high in KSA. It is estimated that the number of potential organ donors is 2000 per year of which 1000 are suitable for organ donation. One can see that the need for organ transplantation will be more than met, hence the importance of reporting brain deaths and obtaining consent.

Fig 1 shows that the total number of brain
deaths reported so far is 1727 of which 1045 were medically documented. The number of actual consents for donations were 403 (i.e. 39% of those medically documented). In 1995 alone 367 cases were reported.

Renal transplantation The first renal transplant to be carried out was a live related transplant in 1979 at Riyadh Armed Forces Hospital (RAFH). King Faisal Specialist Hospital and Research Center (KFSH & RC) started renal transplantation in 1981. The first renal transplantation to be carried out in a Ministry of Health Hospital was carried out in Al- Shaty Hospital, Jeddah in 1986. Now, there are 12 active renal transplant centers throughout the Kingdom. In the first few years all transplants carried out were live related. In 1983, cadaveric kidneys

Fig. 1: Details of brain death cases (reported, documented, consented and harvested 1986-1995).

Fig. 2: The annual number of renal transplants carried out (1986-1995). (NKF = National Kidney Foundation, SCO = Saudi Center for Organ Transplantation).

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which could not be used in Europe were donated and more than 60 such transplants were carried out. Most of them were non-optimal with long cold ischemic time but we have seen good results with them. We also learned a lot about the use of cadaveric kidneys and the logistics that are necessary for coordination and shipment of organs. The next phase in the development of cadaveric renal transplantation was establishment of locally harvested renal transplants. This took place at RAFH in December 1984. With the establishment of the National Kidney Foundation the number of cadaveric renal transplants increased, while the renal transplantation from live related donors continued (Fig. 2). The total number of live related transplants and cadaveric transplants since 1979 was 1092 and 731 respectively. It should be noted that while there has been an increase in renal transplants carried out, that the number of patients on dialysis also increased to a greater extent (Fig. 3), thus the number of patients on the waiting list continues to increase. This underlines the importance of procuring more organs than we are doing now.

Last year alone (1995) 267 transplants were carried out, of which 131 were cadaveric and 136 were live related.

The results of graft and patient survival are excellent and are shown in Figs. 4 and 5.

The medical and surgical complications met with are generally as seen in the West. However, transplant physicians practicing in Saudi Arabia should have a high index of suspicion for complications associated with TB, Kaposi’s Sarcoma, non-typoid salmonella hepatitis C virus (HCV) and hepatitis surface antigen (HBsAg).

**Liver transplantation** The incidence of liver disease is quite high in the Kingdom of Saudi Arabia. This is related to many factors, including the high incidence of HBsAg, HCV in certain groups in the population, schistosoma and possibly biliary atresia.

The first liver transplantation was carried out at RAFH in 1990. Four other liver transplants were also carried out at the same center. More recently active transplantations were also carried out at KFNGH, Riyadh (1994) and more recently in KFH, Jeddah.

The total number of liver transplants carried out so far is 94 (mostly in the last 2 years). The major indication for liver transplantations carried out in KFNGH were mainly chronic hepatitis secondary to hepatitis C viral infection. The results were excellent and comparable to anywhere in the world (73%).

In King Faisal Specialist Hospital, 45 liver transplants were carried out, 48% were for liver failure secondary to HCV. The overall patient survival was 68%.

![Graph: The annual rise in number of patients accepted on dialysis (broken line) and those receiving renal transplantation (solid line) (1981-1995).](#)
**Fig. 4:** Actuarial patient (solid line) and graft (broken line) survival of live related renal transplants.

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<th>Years</th>
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<td>3</td>
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**Fig. 5:** Actuarial patient (solid line) and graft (broken line) survival of cadaveric renal transplant.

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<th>Years</th>
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With the success in organ procurement and organ transplantation it is expected that more and more liver transplants will be carried out.

Again, like renal transplants, demand outstrips supply and new strategies are being applied by SCOT to meet at least part of this increasing demand.

**Cardiac transplantation** The first cardiac transplant in KSA was carried out at RAFH in 1986. So far 25 cardiac transplants have been carried out in that center. The age range of recipients was 22 months to 57 years. The indication for transplantation was cardiomyopathy in 15 patients, ischaemic heart disease in 6.
patients and valvular disease in 4 patients. The overall survival rate since the program started (8 years) is 45%. The other centers carrying out cardiac transplantations in KSA are KFSH&RC and King Fahd Hospital, Jeddah. Besides, whole organ transplantation, valves obtained through harvesting are also used. So far, 64 heart and 84 valves have been used. The overall patient survival in the Kingdom after cardiac transplantation is 50-60% after 2 years.

**Bone marrow transplants** The first bone marrow transplantation in the Kingdom was carried out in KFSH&RC in 1983. RAFH started bone marrow transplantation in 1986. Sixty-four children were reported by KFSH&RC, with overall survival rate of 72% after a mean follow-up period of 14 months. The indications for transplantation in this group were variable, the most common indications being acute leukemias.

In RAFH 60 bone marrow transplants were carried out. The main indications were chronic myelocytic and acute myeloid leukemia. The overall survival rate for these two conditions were 67% and 47% respectively after 5 years.

**Corneal transplant** There are 8 centers in the Kingdom carrying out corneal transplants. So far, 5768 corneal transplants have been carried out on corneas imported from abroad and 157 corneas harvested locally.

**Lung transplant/pancreas** Five lung transplants were performed so far, 4 in King Fahd Hospital, Jeddah starting in 1990 (29) and recently (1996) 1 was carried out at KFSH&RC. Similarly, 4 pancreatic transplants were carried out in Jeddah starting in 1991.

**Conclusion** Organ transplantation in the Kingdom of Saudi Arabia is now well established. Renal, cardiac, hepatic, bone marrow, lung, pancreatic and corneal transplants were carried out. Many centers throughout the Kingdom carry out such transplants. The results are encouraging. Procurement of cadaveric organs in the Kingdom and success of the organizational setup in SCOT is an example looked up to by many Islamic countries. SCOT also is a model for cooperation between medical sectors in the Kingdom. As a useful by-product of organ procurement and transplantation medical service, and training has improved in ICU's and other medical specialties such as, laboratory services, radiological services, various medical services, i.e., infectious diseases etc.

Nevertheless the demand for organs far outrips supply and SCOT has a lot of work to do to narrow the gap between demand and safety.

Further plans include more public education and awareness into the need of organ donation, more cooperation with GCC countries and encouragement of pre-emptive renal transplantation.

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**Fig. 6:** Total number of organs transplanted in the Kingdom of Saudi Arabia (1979-1995).
References


أول عضو زرع في المملكة العربية السعودية كان كلية من متنوع قريب حي في 1979م. وخلال السنة عشرة الماضية زرعت 1813 كليبة و94 كبدًا و32 قلبًا و358 رئة 5 في 925 قرنية و388 بشريين و388 خناع عظام.

وخلال الفترة نفسها أسس برنامج متكامل لزراعة أعضاء من متوفين عن طريق إنشاء " المركز السعودي لزراعة الأعضاء". وأصبح الآن في المملكة العربية السعودية 11 مركزًا لزراعة الكلى وأربعة لزراعة الكبد و3 لزراعة القلب/الرئة واثنان لزراعة نخاع العظام و8 لزراعة القرنية. نتائج عمليات زراعة كل هذه الأعضاء جيدة، وهذا المقال يوضح الخلفية التاريخية لزراعة الأعضاء في المملكة ويصف بايجاز الأنشطة المختلفة لزراعة كل عضو.