

Organ transplantation in Germany—current concepts

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For the first time, *Langenbeck's Archives of Surgery* focuses on the art of organ transplantation in Germany. Contributions of relevant transplant surgeons and physicians are assembled to present the state of the art of transplantation within surgical departments. Several of the authors overlook more than three decades of experimental and clinical transplantation particularly in visceral organ transplantation. They had been fascinated by the rapidly developing field of organ replacement, which has created an entirely new field of research and clinical practice not only in surgery but also in hepatology, nephrology, cardiology, pulmonology, pediatrics, pathology, virology and immunology. Virtually, the entire field of “internal medicine” underwent sub-specialisations to cooperate with surgeons to the benefit of transplant recipients. The once distinguishable border between the “cutting profession” and the “thinking profession” vanished.

What was achieved is being presented within this volume and by Operation Videos to demonstrate that the first step in successful organ replacement still remains the technically superbly harvested donor organ followed by a technically impeccably implanted transplant!

Surrounded by an efficient concept of immunosuppression, virtually no transplant is being lost to acute or hyperacute rejection. The development of combined strategies by induction immunosuppression followed by triple drug therapy already allows for the transplantation of blood group incompatible donor and recipients. In addition, realistic concepts of induction of lifelong tolerance are presently under investigation. Transplant surgeons, in fact,

could be satisfied with the accomplished results and their masterful techniques and there are thousands of patients alive who are the beneficiaries and the heroes of this success story. *Truly*, there is *some* reason to celebrate *but* no reason to rest!

What has once been an attempt to rescue an individual life endangered by one organ failure has evolved into a medical/surgical field where thousands are waiting and suffering to receive a lifesaving procedure. The *originally* pioneering surgery performed at a few institutions is now being overburdened by the need of too many patients competing for scarce donor organs. While more than 20,000 patients are awaiting a kidney transplant, 2,000 patients are waiting for a liver transplant and even more are awaiting a donor heart or heart/lung organ. Every day, patients die because of the lack of donor organs. Within a political dimension, this is a small number of human beings, irrelevant for major political concern; but whoever cares in broad public media articles about the possible violation of a human right by one Guantanamo prisoner should rather focus on the violation of the rights of many patients to live while our legal system puts their rights to live behind the individual right to reject organ donation after death. Integrity of the dead body takes priority to the life of a dying other. German transplantation law enacted 1997!

While the law was enacted to secure organ donation in a rightful way, calling upon all participants to work together for a mutual goal; organ procurement has not kept pace with the demand for organs by the growing number of patients. Thus, surgeons went on to enlarge the pool of donor organs by increasingly using organs or part of organs from live donors.

In liver transplantation, the use of liver lobes started at the Hannover Medical School with the first *transplantation*

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of a left lateral segmental graft for a 2-year-old child, which eventually died by a *Cytomegalovirus* infection. The series was continued at the University of Chicago and heavily criticised by the transplant community for traumatising scarce organs to produce inferior results and thus, taking away organs for better candidates. The principle of equipoise adjusted those critics by arguing that more children are being transplanted with innovative procedures even at inferior individual results. Out of the experiences with segmental grafts, the procedures of split liver transplantation and living-related liver transplantation evolved. Both procedures carry their own sets of ethical and technical problems: While “splits” potentially endanger two recipients of cadaveric organs, live donors predominantly carry responsibility for the donor, although both parts are intrinsically dependent on each other, not only in a physical way but also in a psychological relationship.

Especially in Germany, the Hamburg Eppendorf group focussed on the improvement of the split grafts, by introducing the “in-situ harvesting procedure”, which allows for early detection of pitfalls of the graft quality. The original idea of a split, 2 recipients out of 1 organ, has failed in so far as presently the split procedures provide sharing of 1 organ between a child and an adult recipient who receives at least 66% of the liver volume, while the child carries the left lateral segment or the left lobe. The present allocation rules, however, leave no incentive for the surgical team providing the effort of splitting, by requiring the re-location of the residual graft into the general pool. As a result, splitting is virtually abandoned.

Segmental grafts of lung transplant were not performed in Germany but in Canada and the United States. There are certainly ethical issues to be addressed because in the lung setting, 2 potential donors have to be considered with a potential 300% mortality for 1 transplant procedure. As the risks can be minimised—not eliminated!—the time shall arrive when this procedure is being performed. Exemplary to this are experiences in Korea where two donors are increasingly selected to perform one liver transplant procedure with two left lateral segments in adults. The surgical procedure of left lateral segmentectomy is considered a minor procedure compared to the sometimes-difficult right hemihepatectomy.

With a high standard of laparoscopic surgery in Germany, the harvesting procedure for a left lateral segmental graft was not performed. There are two reasons for this situation:

Transplant surgeons are usually general and visceral surgeons and capable of performing laparoscopic surgery on the liver. Exact anatomic dissections, control of any possible pitfalls within the shortest possible operating time to harvest a viable transplant remains the highest priority. French and American surgeons are presenting their experiences at various meetings and share the information

without withholding any detail. Thus, the information is available! But, German transplant surgeons are striving for the most safe procedure, which is the one they do best to their ability at the given time. Presently, it's the “open procedure”; although, by experience, the incisions have become smaller and smaller. Nobody knows by now, what disadvantage any abdominal cut will present to the donor in the decades to come.

Donor deaths have occurred in Germany (a total of three) and all were reported and presented in detail to the Institutional Ethics Committees. The incidences are distinct different from the rumours around the world of undiscovered donor deaths; and because of the openness of the Western transplant teams, their unfortunate fate will not hamper the progress in living organ donation and transplantation. Meanwhile, new avenues of transplanting ABO incompatible donors and recipients are opening itself because of the opportunity of pre-treatment and conditioning of both recipient and donor.

Cadaveric donor procurement has become a new dimension for transplant surgeons to select the right donor for the right patient. The so-called ideal donor has become rare and is being replaced by the “marginal donor”, which is the donor above 60 years of age with a long ICU treatment and cardiovascular complications. The young donor with isolated brain injury has virtually vanished as a result of well-justified safety requirements. The marginal donor, however, *results* in more post-operative ICU treatment, longer respiratory assistance, more diagnostic work up and leads to a higher rate of re-transplants. The bottom line is marked by higher costs for the procedure and inferior outcome. Still, the results reported remain at an outstanding high level. Whether this level can be *maintained* remains to be seen, especially because recent allocation rules have changed into a system of predicted outcomes assessed by the advanced morbidity of a patient. Presently, the sickest patient gets the next available (marginal) donor organ, which, from a humanitarian point of view, may be justified. From a medical point of view, it is *nonsense*.

Unlike cardiovascular transplantation, which can temporarily embark on artificial, mechanical organs, visceral transplantation depends upon viable human grafts. The present research on xenografting has not yet overcome the state of experimental design. Thus, the concept of xenografting remains for the laboratory, although animal studies allow for certain hopes in cardiac transplantation. Together with artificial organ transplantation, xenografting could find its place in “bridging” for a definite biological graft. Any clinical trial, however, has not yet been granted its permission by an ethics committee.

Following the antique pathway of immunological testing for appropriate HLA matching and ABO blood group compatibility, the set up for crossover kidney transplantation

was found to be consistent with the German Transplant Law and was performed in Centers in Essen, Düsseldorf and Cologne. The apprehension of this procedure is not purely a human one, but also originates from a reluctant flow of correct information by dialysis centers. In the United States, internet circles were set up to register for a crossover kidney transplant. Within Europe, other systems are evolving to guide recipients and their donors into the appropriate set up for kidney exchange (The Netherlands). This development has nothing to do with commerce or coercion, which was initially argued by certain groups to lead into open organ trade. Just because any type of “trade” should be strictly prevented—even prosecuted—open declarations of need, preparedness and voluntarism prevent concealed trade and could serve quite a number of patients. The one who needs a transplant will understand this easily. Do the others care?

All this has to be seen in the presence of scarcity of donor organs. Obviously, there will never be sufficient supply of organs—biological remedies not commodities—but surgeons have reached a limit of their capacities and need help from public understanding for the need of their patients. The

patients, however, are the citizens of our country and communities. Organ scarcity should become their issue and their outcry should be heard, particularly, when their Health Care System is under change. It is applaudable, but not enough, that our exemplary health care systems provide funds for any procedure. Transplants need organs as other treatments need medication. Even for the most advanced cancer diseases, medication of questionable therapeutic value are being provided at enormous costs to extend the life of an individual for a few months. What can be industrially manufactured is being rendered without questioning its true efficacy. Wherever ethical questions originate, the same society retreats into compromise instead of courageously ensuring the availability of organs and alleviating the drama of the waiting lists for those who wait for a vitally indispensable organ. All procedures of transplantation are available in Germany and are being carried out by immense commitments of personnel and physicians. Transplant surgeons have now demonstrated in *Langenbeck's Archives of Surgery* that they are the leading surgeons of the world and are well-prepared to serve their patients.