

Deviceless Low Pressure Hand-Assisted Laparoscopic Donor Nephrectomy

Doctoral Thesis Summary by Dr. Kovács János Balázs

One of the greatest interdisciplinary success stories of medicine in the 20th century was kidney transplantation. Implementation brought together representatives of several fields: surgeon, anaesthesiologist, nephrologist, immunologist, and pharmacologist. An organised transplant programme was set up in Hungary in 1973 and has been active ever since, dealing with the legal framework of transplanting and the introduction of brain death.

By the start of the 21st century, kidney transplantation has become a routine healing method, which we would like to facilitate for every patient in need. However, the number of cadaveric kidneys decreased in Hungary in the past years; therefore, alternative solutions should be developed.

Potential solutions of the shortage of donors includes the extension of donor criteria, organ removal from non-heart beating donors and the increase of the number of live donor transplants. We seek to apply the latter method at our clinic.

Live donor transplantation offers numerous advantages, however, the operation applying the conventional, open nephrectomy method is stressful for donors. Several studies have pointed out, that minimally invasive surgical techniques are characterised by the same safety compared with the traditional open surgery, in addition providing all advantages of minimal invasive surgery.

The objective of this dissertation is to provide a brief summary of the history of kidney transplantation and its practice in Hungary, the description of the legal framework of transplantation, analysis of donors, with particular regard to live donors.

In my work I introduce the surgical technique of hand-assisted laparoscopic donor nephrectomy, which was started on 17 March 2008 at the Department of Transplantation and Surgery Clinic of Semmelweis University, and the devices needed to perform the surgery.

In the second part of the dissertation the results of the newly developed and introduced low pressure deviceless hand-assisted donor nephrectomy will be demonstrated with special attention to prevention of DGF after transplantation and cost effectiveness of the new method.

Starting to use the minimal invasive donor nephrectomy techniques in March 2008 we expected that the introduction of hand-assisted laparoscopic technology, more attractive to donors, safe and providing aesthetical results shall mark a turning point in the activity of live donor kidney transplantation.

Althought the results of living donor kidney transplantations are good enough all over the world, increasingly used minimal invasive surgical technique resulted an unpleasant side effect besides its numerous advantages.

The intraabdominal or retroperitoneal - depending on the choice of method - carbon dioxide pressure, which is normally 12-13 mmHg for general surgical or urological laparoscopies has a bad impact on the microcirculation of the renal cortex. This phenomenon was clearly proved by several experimental models visualizing the impaired circulation in the cortex, but no available clinical data were found in 2008 on the low pressure operations and their effect on early kidney graft function after transplantation.

These facts conducted us to a decision: we want to try to avoid the barotrauma of the transplanted kidney by dropping the intraoperatively used gas pressure.

Our hypothesis was that the decreased gas pressure should decrease the incidence of barotrauma and consequently the incidence of DGF amongst laparoscopically retrieved transplanted kidneys.

As the experimental models suggested that 8 mmHg carbon dioxide pressure did not affect the renal microcirculation we concluded to drop the intraoperative gas pressure to this level. Let's see, if this would influence the operative process, the duration of surgery, brings other potential risks and finally, but most importantly whether this modification will decrease the incidence of DGF occurring more frequently after laparoscopic organ retrievals.

Together with dropping the gas pressure we also decided to improve the cost effectiveness of the hand assisted technique by not using the relatively expensive hand port devices as it has been already published by other authors.

From cost effectiveness point of our hypothesis was that not using hand ports for the assisting hand will not affect the safety and duration of these surgeries.

Finally we started a combination of the two new techniques and firstly published our results on deviceless low pressure hand-assisted donor nephrectomy.

After analyzing the pre-, peri-, and postoperative data of our first 148 HLDN cases it is possible to appoint that the applied modification of the traditional laparoscopic technique didn't effect the safety of HLDN procedures. No morbidity or mortality has been detected in connection with the newly introduced operative method.

The modifications didn't effect the duration of the donor operations.

A statistically significant drop was seen in the incidence of DGF using the low pressure technique.

In our practice the combination of low pressure technique and deviceless hand-assisted laparoscopy proved to be effective in decreasing the incidence of DGF amongst transplanted kidney graft being retrieved with the new technique in a cost effective way.