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KIDNEY TRANSPLANTATION IN KAZAKHSTAN: THE BURDEN OF ORGAN SHORTAGE

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Kidney transplantation has been the best replacement therapy for end-stage kidney disease for over 60 years. The Republican Coordination Center for Transplantation reports that as of January 29, 2020, there were 2675 people on the kidney transplant waiting list in the Republic of Kazakhstan. The issue of deceased donation in Kazakhstan is problematic for various reasons. Over the past couple of years, the already low rates of deceased donors have fallen by more than 2 times. **Objective:** to objectively assess the effectiveness of deceased-donor kidney transplant in order to indicate the need for development of cadaveric donation and reduce the number of patients in the transplant waitlist. **Materials and methods.** Fifty-two kidney transplants from a deceased donor were performed at the National Research Oncology Center (NROC) from 2010 to 2020. The age group of recipients ranged from 20 to 75 years old. In most cases, end-stage chronic renal failure resulted in chronic glomerulonephritis (76%), pyelonephritis (1.9%), polycystic kidney disease (9.6%) and diabetic nephropathy (11.5%). **Results.** The 1-year and 5-year survival rates were 96% and 86%, respectively. There was delayed graft function in 13 of cases. In one case (1.92%), there was intraoperative hyperacute rejection of the kidney transplant that could not be treated with high doses of glucocorticosteroids; the kidney graft was removed. Two patients (3.8%) in the early postoperative period, on days 2 and 7 after surgery, developed a clinic of acute renal transplant rejection; after the rejection crisis was stopped by drug therapy, graft function was restored. One patient (1.92%) died as a result of bilateral pneumonia, which led to sepsis and death. **Conclusion.** Graft and recipient survival rates after deceased-donor kidney are comparable to those after living-donor kidney transplantation. The solution to the problems of increasing the number of deceased organ transplants should not rest entirely on the shoulders of transplant doctors; this task must also be addressed at the government level with constant propaganda to explain to the citizens the need for a deceased organ donation program.

Keywords: kidney transplantation, posthumous donor, organ shortage.

BACKGROUND

Kidney transplantation remains the primary therapy for end-stage kidney disease. At present, over 90,000 kidney transplants are performed annually in the world [1]. However, organ shortage still remains extremely severe [2, 3]. According to statistics, there is a progressive increase in the number of patients in need of kidney transplantation. The Republican Coordination Center for Transplantation (RCCT) reports that as of January 29, 2020, there were 2,675 people in the Republic of Kazakhstan waitlisted for kidney transplant. Of these, 75 patients are children under 18 years of age. The issue of cadaveric donation in Kazakhstan is problematic for various reasons, both on the part of society and on the part of donor hospitals. Since the end of 2019, the government has been actively working in this direction. It is worth noting that over the past couple of years, the already low cadaveric donor indicators have decreased by more than twice [4].

According to the RCCT, from 2012 to the end of 2019, 1278 kidney transplants were performed at all transplant centers in Kazakhstan, including 161 deceased-donor kidney transplants [4]. Deceased donors accounted for 12.5% of the total number of operations performed and less than 1% per million population, which is a very low figure.

According to world statistics provided by the Global Observatory on Donation and Transplantation (GODT) on kidney transplantation for 2017 (Fig. 1), Kazakhstan occupies one of the last positions in terms of number of deceased-donor kidney transplants per million population [1].

Objective: to objectively assess the effectiveness of deceased-donor kidney transplant in order to indicate the need for development of cadaveric donation programs and reduce the number of patients in the transplant waitlist.

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MATERIALS AND METHODS

This work is based on a clinical review of 52 cases of deceased-donor kidney transplantations in the period from 2012 to 2019 at the National Research Oncology Center, Nur-Sultan, Kazakhstan (Fig. 2).

The age group of the recipients ranged from 20 to 75 years old. In most cases, end-stage chronic kidney disease resulted in chronic glomerulonephritis (76%), pyelonephritis (1.9%), polycystic kidney disease (9.6%) and diabetic nephropathy (11.5%), all of whom were on long-term hemodialysis at the time of kidney transplantation.

Priority was given to recipients who were to undergo a kidney transplant for the first time, since repeated kidney transplants had a high immunological risk and there was no tissue compatibility with a deceased donor. In one case, a repeated kidney transplantation from a cadaver was performed, while there was tissue compatibility

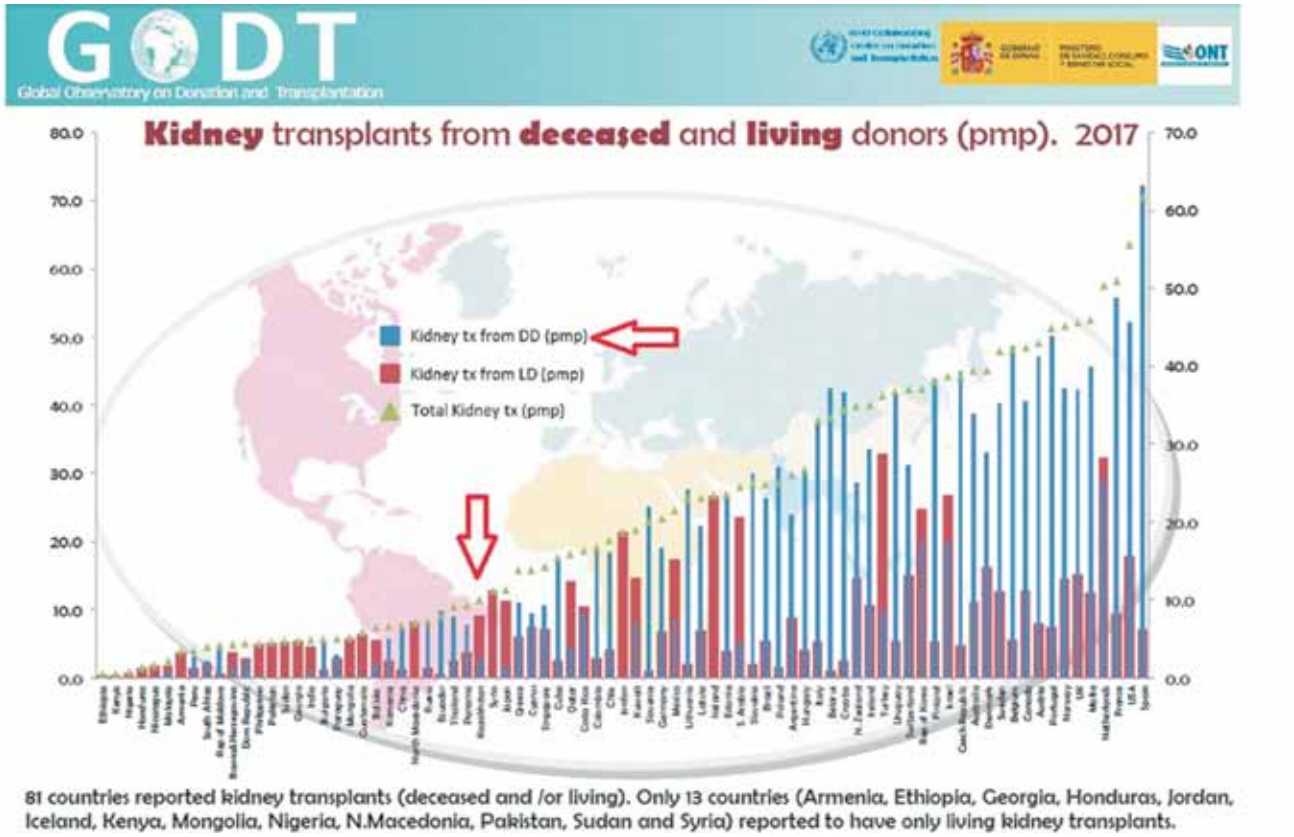

Fig. 1. Statistics on kidney transplants performed in the world per million population (Global Observatory on Donation and Transplantation data for 2017)

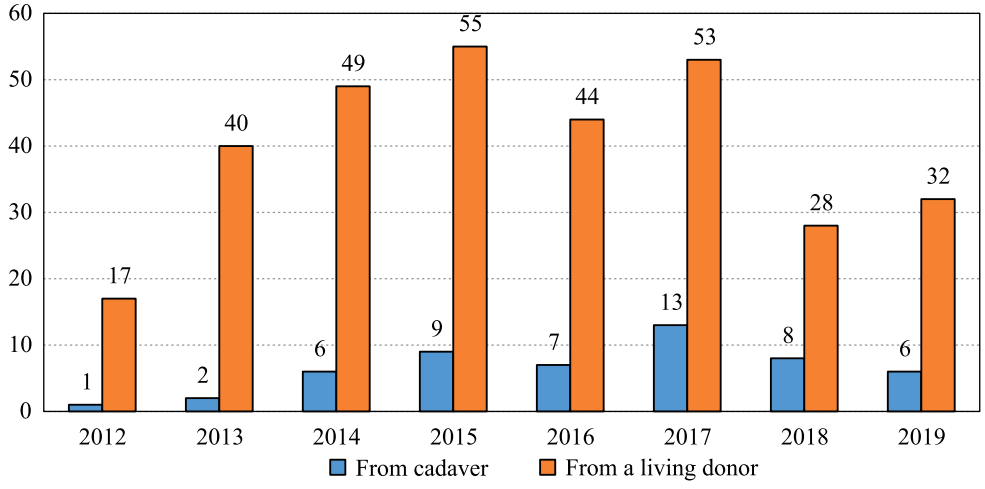

Fig. 2. The number of deceased-donor and living-donor kidney transplants performed in Kazakhstan from 2012 to 2019

between the donor and the recipient and there was a low immunological risk.

Cold ischemia time varied from 6 to 23 hours and depended on many reasons, including the location of the deceased donor, and the time it took to perform the necessary tissue compatibility tests and conduct a cross match test. In most cases, transplantation was performed according to the standard technique in the retroperitoneal space, in the right iliac region. In two cases, in the left iliac region. In one case, taking into account simultaneous kidney and pancreas transplantation, the transplantation was carried out through a laparotomic incision into the abdominal cavity. Secondary heat ischemia did not exceed 40 minutes. There were no technical difficulties during the operation, given the great length of the donor kidney vessels and the possibilities for various types of vessel modeling.

Immunosuppressive therapy during surgery and in the postoperative period as a whole, in comparison to that used after living-donor kidney transplantation, has slight differences and included the use of thymoglobulin at the rate of 1.25–1.5 mg/kg body weight (rabbit antithymocyte immunoglobulin), prograf (tacrolimus) with target plasma levels of 8–12 ng/mL or Sandimune Neoral (cyclosporine) 250–350 ng/mL, CellSept (mycophenolate mofetil) 2 grams per day or Mayfortic (mycophenolic acid) 1540 mg per day and high doses of glucocorticoids.

RESULTS

In 35 cases (67%) after renal transplant reperfusion, initial appearance was noted within the first 10 minutes. In 13% cases, there was delayed graft function due to prolonged cold ischemia and subsequent reperfusion injury, which required postoperative renal replacement therapy before the transplanted kidney began to function. In one case, there was an intraoperative ultra-acute graft rejection that could not be treated with high doses of glucocorticoids; the kidney transplant was removed. Two patients (3.8%) developed a clinic of acute renal graft rejection in the early postoperative period – on days 2 and 7 after surgery; after the rejection crisis was stopped by drug therapy, graft function was restored. In the early postoperative period, one patient after simultaneous kidney and pancreas transplantation developed acute rejection of the transplanted organs, which could not be treated conservatively and required subsequent removal. One (1.92%) patient died as a result of bilateral pneumonia, which led to sepsis and death.

DISCUSSION

Organ transplantation is the most rapidly developing branch of surgery. The first human kidney transplantation was performed more than 60 years ago [5]. This treatment remains the gold standard in the treatment of end-stage kidney disease [6]. Currently, transplantation as a science has become multidisciplinary, including not only surgery but also immunology, genetics, nephrology, and pharmacology [7]. Advances in immunology have improved graft and recipient survival [8]. The use of a cross-match test practically eliminated the possibility of developing acute rejection. Identification of donor-specific antibodies in recipients and the use of desensitizing therapy have reduced the frequency of antibody-mediated rejections [9]. Organ preservation methods, which include modern preservation solutions, as well as various mechanical devices to preserve organ viability, reduce the degree of ischemic injury to the organ [10]. Transplant science is continuously evolving and the main limitation is organ shortage. One of the important factors, of course, is the lack of public awareness and the general unpreparedness of the society for organ donation. This is a complex issue that requires ethical and religious debate. However, the society around the world should be convinced that it is currently the only way to save lives and improve the quality of life for this group of patients. The idea of creating artificial organs and using organs from animals, even at the stage of experiments and before application in practice, still requires decades of research. As an alternative to heart transplantation, ventricular assist devices and artificial heart are now being used as a specific therapeutic regimen and have been shown to prolong life compared to conservative therapy alone. However, no artificial organ, kidney or heart can match the life expectancy or quality of life of a successfully transplanted organ.

CONCLUSION

A kidney transplant from a posthumous donor has priority over kidney transplantation from a living donor for various reasons. The main advantage is the exclusion of organ removal from a living donor, and exclusion of all risks associated with surgical intervention (donor nephrectomy).

According to the WHO program, deceased-donor organ transplantation is the main direction in treating patients who have been waitlisted for organ transplantation. In developed European countries and the USA, the main emphasis is on development of cadaveric transplantation. In Kazakhstan, the number of patients on the waiting list for cadaveric kidney is growing, while the number of cadaveric donors is falling.

The task of increasing the number of cadaveric organ transplants should not rest entirely on the shoulders of transplantologists, it should also be addressed at the government level with constant propaganda to explain to the citizens the need for a cadaveric donation program.

The authors declare no conflict of interest.

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