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KIDNEY TRANSPLANTATION: RELATING TYPE OF GRAFT AND ISCHEMIA TIME TRANSPLANTE RENAL: RELACIONANDO TIPO DE ENXERTO E TEMPO DE ISQUEMIA TRASPLANTE RENAL: RELACIONANDO TIPO DE INJERTO Y TIEMPO DE ISQUEMIA

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ABSTRACT

Objective: to evaluate the success of renal transplantation in relation to donor and recipient variables, graft type, age, complications, infections and duration of ischemia. **Method:** this is a quantitative study of the retrospective documentary cohort, evaluating 282 medical records of patients attended by the Renal Therapy Unit, aged over 18 years and the results were presented in the form of tables and figures. **Results:** it was shown that of the transplants performed, 100 were with live donor kidneys and 182 with deceased donor kidneys; 18 and 37 patients died, respectively, and the mean cold ischemia time was 25.9 hours for organs of deceased donors. **Conclusion:** the greater number of patients who developed infections and complications of grafts from a deceased donor is shown to be an influencing factor in the success of renal transplantation, showing that the longer the cold ischemia time, the greater it will be the loss of viable tissue from the graft, which causes a greater propensity for infectious events and failure of renal function, therefore, it is extremely important to implement actions and new behaviors, thus favoring bases for the success of renal transplants. **Descriptors:** Transplantation; Kidney; Tissue Donors; Ischemia; Renal Insufficiency, Chronic; Survival Analysis.

RESUMO

Objetivo: avaliar o sucesso do transplante renal diante das variáveis de doador e receptor, tipo de enxerto, idade, complicações, infecções e duração do tempo de isquemia. **Método:** trata-se de estudo quantitativo, do tipo coorte documental retrospectivo, avaliando-se 282 prontuários de pacientes atendidos pela Unidade de Terapia Renal, com idade maior que 18 anos e os resultados apresentaram-se em forma de tabelas e figura. **Resultados:** mostrou-se que dos transplantes realizados, 100 foram com rins de doador vivo e 182 com rins de doador falecido, sendo que evoluíram para óbito, respectivamente, 18 e 37 pacientes, e o tempo médio de isquemia fria foi de 25,9 horas para os órgãos de doadores falecidos. **Conclusão:** refere-se o número maior de pacientes que desenvolveram infecções e complicações aos que receberam enxerto advindo de doador falecido, mostrando-se como um fator influenciador no sucesso do transplante renal, evidenciando que, quanto maior for o tempo de isquemia fria, maior será a perda de tecido viável do enxerto, o que acarreta maior propensão a eventos infecciosos e falha de função renal, portanto, é de extrema importância que se implementem ações e novas condutas, favorecendo, assim, bases para o sucesso dos transplantes renais. **Descritores:** Transplante; Rim; Doadores de Tecidos; Isquemia; Insuficiência Renal Crônica; Análise de Sobrevida.

RESUMEN

Objetivo: evaluar el éxito del trasplante renal ante las variables de donante y receptor, tipo de injerto, edad, complicaciones, infecciones y duración del tiempo de isquemia. **Método:** se trata de estudio cuantitativo, del tipo cohorte documental retrospectivo, evaluando 282 prontuarios de pacientes atendidos por la Unidad de Terapia Renal, con edad mayor que 18 años y los resultados se presentaron en forma de tablas y figura. **Resultados:** se mostró que de los trasplantes realizados, 100 fueron con riñones de donante vivo y 182 con riñones de donante fallecido, siendo que evolucionaron a muerte, respectivamente, 18 y 37 pacientes, y el tiempo promedio de isquemia fría fue de 25,9 horas para los órganos de donantes fallecidos. **Conclusión:** se refiere al número mayor de pacientes que desarrollaron infecciones y complicaciones a los que recibieron injerto proveniente de donante fallecido, mostrándose como un factor influyente en el éxito del trasplante renal, evidenciando que, cuanto mayor sea el tiempo de isquemia fría, mayor es la pérdida de tejido viable del injerto, lo que acarrea mayor propensión a eventos infecciosos y fallo de función renal, por lo tanto, es de extrema importancia que se implementen acciones y nuevas conductas, favoreciendo así bases para el éxito de los trasplantes renales. **Descriptor:** Trasplante; Riñón; Donantes de Tejidos; Isquemia; Insuficiencia Renal Crónica; Análisis de Supervivencia.

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INTRODUCTION

Renal transplantation is considered the most effective renal replacement therapy in the treatment of chronic kidney disease¹ and its success depends on several factors, including the type of donor, living or deceased, and the time of cold ischemia.²

The objective of this study was to evaluate the success of kidney transplantation related to the deceased and living donor and the time of cold ischemia during the transplant process with deceased donor graft in the Renal Therapy Unit of the municipality of Pato Branco, in the years 2010 to 2015, through a quantitative study of the retrospective documentary cohort, in order to allow the recognition of the factors that influence the failure of transplantation and to raise the discussion about measures that can be solved, in addition to providing up-to-date information and provide bases for new behaviors aiming at the frequent success in renal transplantation.

It is known that the kidneys are responsible for organic homeostasis, elimination of blood impurities, blood pressure regulation, hormone production, participation in bone formation and maintenance, and ultimately stimulate the production of red blood cells. They become thus the essential kidneys to keep the body in balance.¹

It is added that renal function is measured and evaluated by the glomerular filtration rate (GFR) ³ and "its decrease is observed in chronic kidney disease".¹ It is reported that, when reaching values below 60ml / min / 1.73m², there is an expressive loss of 50% of the normal renal function and, when the GFR is far below, less than 15ml / min / 1.73m², the kidneys begin to establish renal functional failure, the stage five, the last one in relation to the loss progressive functional disorder observed in chronic kidney disease.^{1,4}

Chronic kidney disease is characterized by progressive and irreversible loss of renal function for a period equal to or greater than three months or in relation to the level of GFR.⁵⁻⁶ Chronic kidney disease is linked to a wide variety of diseases, both systemic and intrinsic, resulting in loss of renal function, and the main causes of chronic kidney disease in Brazil are systemic arterial hypertension and Diabetes Mellitus.⁵⁻⁶

It is noted that the number of patients with chronic kidney disease has been increasing considerably in Brazil. This disease is treated as a public health problem that affects 330 people diagnosed in every million people in

Latin America, not counting people who have not yet been diagnosed and do not belong to the data recorded.⁷

Two treatment alternatives are offered to patients with chronic kidney disease: drug and dietary measures for less severe cases, and renal function replacement in more severe cases by chronic dialysis or renal transplantation.⁸⁻⁹ Peritoneal dialysis, hemodialysis and renal transplantation are available as possible substitutive devices to prolong the life of the chronic renal patient, especially of patients in the terminal stage of renal disease.¹⁰

It is explained that renal transplantation is a surgical procedure aimed at transferring the organ from one individual to another in order to compensate for or replace a lost function. This new kidney will perform the functions that the diseased kidneys could no longer maintain.⁸ It is exposed that in Paraná, in the year 2017, there was a waiting list of 1,134 patients waiting for renal transplantation, however, the number of effective donors in the system was only 427.¹¹

One can perform this procedure with a live or deceased donor graft, and studies show that the number of transplants performed with live donors has been increasing, however, the prevalence in Brazil is of transplantation with grafts from deceased donors.¹²

In Brazil, according to data from the year 2017, 5,929 kidney transplants were performed, 595 of them in Paraná, 77.8% of which were renal transplants from a deceased donor.¹¹

After receiving the renal transplantation, the receptors are at high risk for developing complications such as: cancer, cardiovascular diseases, diabetes and infection, complications that contribute to the high morbidity and premature mortality of patients.¹²

By renal transplantation, compared with other literature, kidney transplantation achieves better results when performed with a living donor graft than with a deceased donor.⁸ This is because the living donor organ suffers less or no time of cold ischemia, patient experiences less dialysis time and there is better compatibility between donor and recipient.¹³

It is explained that during the surgical removal of the organ from the renal transplant there is a time called cold ischemia in which "the removed kidney is transferred to and maintained in a preserved cold cell preservation solution".^{14:207} It is very

important, for the success of surgery and graft survival, that this process does not last more than 30 hours.^{10,15}

It depends on several factors related to the success of kidney transplantation and allograft survival, among them, the donor and recipient, type of graft and time of ischemia. The time of cold ischemia is related to the late function of the deceased donor graft, decreasing its survival after renal transplantation, and is linked to the incidence of infectious events.¹⁶⁻⁷

It is emphasized that factors such as the postoperative period are also of great importance for graft and recipient survival, since, during this period, treatment with immunosuppressive drugs is necessary in order to prevent graft rejection and several other complications of an immunological, infectious or surgical nature.^{18:32}

It is aided by the application of therapeutic procedures and immunopharmacology in the treatment of patients after renal transplantation, reducing the mortality rate and rejection of organs.¹⁹

OBJECTIVE

- To evaluate the success of renal transplantation in relation to donor and recipient variables, graft type, age, complications and infections, and duration of ischemic time.

METHOD

It is a quantitative study, of retrospective documentary cohort type. The variables expressed in the form of numerical data were analyzed in this study, exploring medical records of the Transplant Unit in the city of Pato Branco. Statistical resources and techniques were used in the data collection to classify and analyze the variables, such as percentage, mean and standard deviation.

A total of 282 records of patients attended by the Renal Therapy Unit, located at the Pato Branco Polyclinic Institute, in the city of Pato Branco (PR), were analyzed. The information was collected by consulting the physical and electronic medical records provided by the Renal Therapy Unit, and included in the study the medical records of patients older than 18 years and who underwent renal transplantation from January 2010 to December Medical records were excluded from patients who performed more than one kidney transplant in that period and / or incomplete medical records that did not

contain the data necessary to achieve the research objectives.

This research was developed in terms of ethical aspects, according to NHC Resolution 466/2012, of the Ministry of Health, and is submitted for the approval of the Research Ethics Committee. The study was approved by the ethics committee of the Teaching Union of the Southwest of Paraná - UNISEP, under the n. 2,507,594, on February 22, 2018. All the protective measures were adopted regarding the anonymity of the participants, guaranteeing that the information should be used only for the purposes of scientific research.

RESULTS

It should be noted that the research showed that the mean age of the transplanted patients was 42.6 ± 13.9 years and 87.9% of the patients were 59 years of age or younger. It is shown from the transplants carried out 100 were with live donor kidney and 182 with deceased donor kidney.

The results are presented in table 1, according to the variables of the transplanted patients.

Table 1. Variables of transplanted patients in the period from 2010 to 2015. Pato Branco (PR), Brazil, 2015.

Variables	Deaths	No death Total
Sex		
Male	35	130
Female	20	165
		97
		117
Age		
≥ 60 years	11	23
< 59 years	44	34
		204
		248
Type of donor		
Live	18	82
Deceased	37	100
		145
		180
Infection		
Yes	18	02
No	37	20
		225
		262
Complications after TX		
Yes	45	49
No	10	94
		178
		188

18 patients who received live donor kidneys and 37 who received deceased donor kidneys as shown in table 2 were shown to have died, mean cold ischemia time was 25.9 hours for organs of deceased donors, of the patients

who received these grafts and died in the years of 2010 and 2014; the cold ischemia time was over 20 hours, showing itself as a factor influencing the success of renal transplantation.

Table 2. Number of deaths after renal transplantation, from 2010 to 2015, in relation to the time of cold ischemia. Pato Branco (PR), Brazil, 2015.

	2010	2011	2012	2013	2014	2015
Number of transplants with deceased donor graft	13	19	41	50	21	40
Mean time of cold ischemia	32h	24h28	24h19	24h	20h29	25h25
Percentage of deaths	38.46%	17.64%	15.38%	22.9%	29.41%	10.52%
Deaths in relation to the time of ischemia above 20h	100%	66.66%	83.3%	63.63%	100%	75%

It is understood that the largest number of patients who developed infections and

complications were those who received graft from a deceased donor.

Figure 1. Number of transplanted patients with deceased and alive donor graft in the group of infections and complications, from 2010 to 2015. Pato Branco (PR), Brazil, 2015.

DISCUSSION

A total of 282 patient records were evaluated between January 2010 and December 2015 at the Renal Transplant Unit located at Pato Branco Polyclinic.

According to the data analyzed, age was one of the risk factors in the development of metabolic and cardiovascular diseases after organ transplantation, but not with surgery failure, graft loss or patient survival.

It is observed that the preference for joviality is related to the life expectancy being greater for the graft and the recipient and, above all, for the predisposition of the family donors.¹⁰

Patients with grafts from living and deceased donors were transplanted in Pato Branco. In living donor graft transplantation, the HLA (human leukocyte antigen) compatibility between recipient and donor is of utmost importance, with one-year graft survival being observed in 95%; for haploidenics, in 85% and for distinct HLA, in 75%.¹⁹

It is observed, with data collected in the Renal Transplant Unit, an expressive number of deceased donor graft used in renal transplants, in the time space from 2010 to 2015.

It is noticed that with the technological advance in Medicine, this significant increase in relation to the use of renal graft from deceased donor, in relation to the use of live donor graft, is of great value. Based on these data, the Renal Transplant Unit, in Pato Branco, is above the national average compared to the 75% presented by the Brazilian Association of Organ Transplantation.²⁰ The numbers in this study differ from the results of another study,¹⁶ which showed a much lower number of transplants performed with a deceased donor graft, with only 29.05%.

It is revealed that the deceased donor kidney recipients, according to the data in the analyzed charts, were, for the most part, the group that presented complications, such as fistula and rupture, and infections (Figure 1). These complications may also be related to factors that are independent of the type of graft. In another study, 338 recipients, corresponding to 41.2% of deceased donor graft transplants, presented some infection, since it is repeated in studies.^{2,16} The authors verified that "the deceased donor was a risk factor of 2.65 for the endpoint infection in renal transplant patients".^{2:512} These receptors also presented a greater risk to

develop infections of 20% in front of the other transplanted ones with kidney of live donor.

It is emphasized that the kidneys of deceased donors have a certain advantage when used in transplants compared to other organs, and this is due to factors such as: the possibility of being withdrawn from donors without heart beats and by accepting a longer cold ischemia time, and can reach 36 hours.²⁰ O tempo de isquemia fria faz parte do procedimento de transporte do órgão até seu efetivo implante.¹³ Kidneys for transplantation, regardless of whether the donor is alive or deceased, are sensitive to ischemia.¹⁴ During this process, the kidney undergoes some aggressions called, collectively, ischemia / reperfusion injury.¹³

It is concluded that the average time of cold ischemia, in transplants performed with organs of deceased donor in White Duck, was 25.9 hours, ranging from 15 to 42 hours. Prolonged cold ischemia was present in patients' charts indicating complications such as graft loss, delayed function and post-transplant infections, as well as in other studies² in which the various conditions related to ischemia time are factors in the development of infections, and also in another study,¹⁴ which states that ischemia is associated with a decrease in graft survival, confirming the results of the research in question, in which the average cold ischemia time among patients (35) was 25.7h, ranging from 17h to 36h, justifying that the longer the preservation time in cold ischemia, the less the tissue will be viable.¹⁴

It is noteworthy in other studies that²¹ graft function delay (GFD) is the most common complication in the post-transplant period with a deceased donor, reaching 50% in Brazil. The survival of the deceased donor graft is lower in relation to live donor grafts, but higher in relation to the kidneys treated with dialysis.¹⁷

Table 2 shows the number of deaths with renal donor after renal transplantation in Pato Branco, from 2010 to 2015, in relation to the time of cold ischemia. One author in their study on the incidence and risk factors for infectious complications in the first year after kidney transplantation noted that "the time of cold ischemia and the use of deceased donor kidneys were risk factors for successful transplants".^{16:77}

CONCLUSION

It is concluded that the live donor kidney presents better and longer graft survival at the recipient, after all, it suffers no or

minimal cold ischemia time, unlike the deceased donor organ, which spends more time in the cold preservation solution, which allows the major development of some infection or complication. It is thus verified that cold ischemia is a factor influencing the success of renal transplantation.

It is thought that, thus, reducing cold ischemia time and correct graft handling may yield even more positive results for successful kidney transplantation. The success or failure of a transplant is given by a set of results in which the nurse is a very important active member and who can actively promote actions to optimize the process, from the conversation with the family to the capture of organs, in the case of a deceased donor, to the correct and agile filling of the necessary documentation, making rooms and staff available in the surgical center for abstraction. It is added that, at the time of receiving the organ, the correct conference and receipt, as well as the same availability of surgical room and tissue reimplantation team, can reduce the time of cold ischemia and raise the success rates of transplantation.

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