

# Influência da Técnica Anestésica nas Alterações Hemodinâmicas no Transplante Renal. Estudo Retrospectivo\*

## *Influence of the Anesthetic Technique on the Hemodynamic Changes in Renal Transplantation. A Retrospective Study*

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### RESUMO

Hirata ES, Baghin MF, Pereira RIC, Alves Filho G, Udelsmann A — Influência da Técnica Anestésica nas Alterações Hemodinâmicas no Transplante Renal. Estudo Retrospectivo.

**JUSTIFICATIVA E OBJETIVOS:** Sucesso no transplante renal (Tx) depende do tipo de doador, da duração da isquemia fria e de parâmetros hemodinâmicos na reperfusão. O objetivo desta pesquisa foi analisar a técnica anestésica, a incidência de alterações cardiovasculares e a ocorrência de diurese no período perioperatório dos Tx realizados na UNICAMP.

**MÉTODO:** Avaliou-se retrospectivamente Tx de adultos realizados entre janeiro de 2005 e abril de 2006. Consideraram-se dados demográficos, exames laboratoriais pré-operatórios, técnicas e agentes anestésicos, hidratação, parâmetros hemodinâmicos, emprego de aminas vasoativas, presença de diurese e complicações intra-operatórias, com análise comparativa entre os subgrupos formados conforme a técnica anestésica empregada. Foram usados na análise estatística o teste t de Student (paramétricos), Mann-Whitney (não paramétricos), teste do Qui-quadrado e Exato de Fisher para comparação de proporções e análise multivariada.

**RESULTADOS:** Estudaram-se 92 pacientes, 59 com anestesia geral (AG) e 33 anestesia geral associada à peridural (AG + Peri), 42 receberam rim de doadores vivos e 50 de falecidos. Não houve diferença ( $p > 0,05$ ) na maioria dos parâmetros pré-operatórios estudados, exceção feita à origem do enxerto (82% AG + Peri receberam rins de doador falecido). A alteração cardiovascular mais frequente foi hipotensão arterial (30% AG e 48% AG + Peri,  $p < 0,05$ ). Regime de hidratação não diferiu entre os grupos ( $86,7 \pm 30,2$  mL.kg<sup>-1</sup> AG e  $94,8 \pm 21,8$  mL.kg<sup>-1</sup> AG+Peri,  $p = 0,38$ ). Enxerto de doador falecido correlacionou-se a maior instabilidade hemodinâmica e pior prognóstico para função imediata do enxerto,  $p < 0,01$  e  $0,01$ , respectivamente. Volume de hidratação de 80 mL.kg<sup>-1</sup> associou-se à diurese (OR = 2,94, IC95% 1,00-8,32).

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**CONCLUSÕES:** A técnica anestésica empregada foi anestesia geral, associada ou não à peridural. Alteração hemodinâmica mais comum foi hipotensão arterial. Mostraram-se benéficos em relação à diurese ser receptor de doador vivo e receber hidratação de 80 mL.kg<sup>-1</sup> de solução fisiológica a 0,9%.

**Unitermos:** CIRURGIA, Urológica: transplante renal; COMPLICAÇÕES: hemodinâmicas, função imediata do enxerto, diurese.

### SUMMARY

Hirata ES, Baghin MF, Pereira RIC, Alves Filho G, Udelsmann A — Influence of the Anesthetic Technique on the Hemodynamic Changes of Renal Transplantation. A Retrospective Study.

**BACKGROUND AND OBJECTIVES:** The success of renal transplantation (Tx) depends on the type of donor, length of cold ischemia, and hemodynamic parameters on reperfusion. The objective of this study was to analyze the anesthetic technique, the incidence of cardiovascular changes, and the presence of postoperative diuresis of Tx performed at UNICAMP.

**METHODS:** Renal transplantation of adults performed from January 2005 and April 2006 were evaluated retrospectively. Demographic data, preoperative laboratorial exams, anesthetic techniques and agents, hydration, hemodynamic parameters, use of vasoactive amines, presence of a diuresis, and intraoperative complications were evaluated, and comparative analysis between the subgroups, formed according to the anesthetic technique, was undertaken. The Student t test (parametric), Mann-Whitney test (non-parametric), Chi-square test and Fisher Exact test for comparison of proportions and multivariate analysis were used.

**RESULTS:** Ninety-two patients were evaluated; 59 underwent general anesthesia (GA) and 33 underwent general anesthesia associated with epidural block (GA + Epi); 42 patients received live-donor transplants and 50 from dead donors. Most preoperative parameters analyzed did not show statistically significant differences ( $p > 0.05$ ), except for the origin of the graft (82% of GA + Epi received dead donor kidneys). Hypotension (30% GA and 48% GA + Epi,  $p < 0.05$ ) was the most frequent cardiovascular change. The hydration regimen did not differ between both groups ( $86.7 \pm 30.2$  mL.kg<sup>-1</sup> GA and  $94.8 \pm 21.8$  mL.kg<sup>-1</sup> GA+Epi,  $p = 0.38$ ). Dead donor grafts were more commonly associated with hemodynamic instability and worse prognosis for the immediate function of the graft,  $p < 0.01$  and  $0.01$ , respectively. Hydration of 80 mL.kg<sup>-1</sup> was associated with the presence of diuresis (OR = 2.94, CI 95% 1.00-8.32).

**CONCLUSIONS:** General anesthesia associated or not with epidural block was the anesthetic technique used. Hypotension was the most common hemodynamic change. Live-donor graft and volume of hydration of 80 mL.kg<sup>-1</sup> of NS favored diuresis.

**Key Words:** COMPLICATIONS: hemodynamic, immediate graft function, diuresis; SURGERY, Urologic: renal transplantation.

Outra medida que encontra amparo na literatura é a manutenção da PVC elevada no momento da reperfusão do enxerto. Valores variando de 10 até 15 cm de H<sub>2</sub>O são descritos como adequados<sup>25</sup>. Na atual casuística, procurou-se manter a PVC acima de 12 cm de água, à custa de hidratação com solução fisiológica a 0,9% em volumes elevados, 86,7 a 94,8 mL.kg<sup>-1</sup>. Estes volumes podem estar associados a complicações e a recomendação é o acompanhamento clínico por meio de ações simples como medida da pressão arterial e da PVC e controle de aparecimento de edemas<sup>24</sup>. A necessidade de adequada manutenção do volume intravascular pode ser comprovada pela análise multivariada dos parâmetros com diferença estatística significativa na análise bivariada. Elegendo-se um regime de hidratação intermediário entre os valores recomendados na literatura (70 a 90 mL.kg<sup>-1</sup>), pode-se observar aumento na probabilidade de ocorrência de diurese precoce<sup>26,27</sup>. Este resultado, porém, deve ser interpretado com cautela, uma vez que a diurese apresentou um baixo poder estatístico, evidenciado pelos grandes intervalos de confiança.

A técnica anestésica utilizada na anestesia para transplante renal, no período considerado, foi geral venosa e inalatória, associada em 33 (35,86%) pacientes à anestesia peridural simples.

A alteração hemodinâmica mais frequente nessa casuística foi hipotensão arterial, maior entre os pacientes que receberam rim de cadáver, independentemente da técnica anestésica empregada.

Dois fatores podem ser considerados de bom prognóstico em relação à função renal imediata do enxerto: ser receptor de doador vivo relacionado e receber hidratação de pelo menos 80 mL.kg<sup>-1</sup> de solução eletrolítica.

## ***Influence of the Anesthetic Technique on the Hemodynamic Changes in Renal Transplantation. A Retrospective Study***

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### **INTRODUCTION**

Renal transplantations (Tx) have been performed since 1906; however, only after 1960, with the development of new immunosuppressive agents<sup>1</sup>, especially calcineurin inhibitors, recognition of brain death, and adequate selection of the binomium donor-receptor<sup>2</sup>, Tx became the treatment of choice for patients with end-stage renal disease<sup>3</sup>.

Renal transplantations are associated with better quality of life, better cost/benefit ratio, and possibly longer survival<sup>3</sup>.

In children, early transplantation promotes better growth and development<sup>4</sup>.

The first transplantations were done under spinal block, since very few agents were available for general anesthesia at the time. With the advent of neuromuscular blockers with low urinary excretion<sup>5</sup> and volatile anesthetics with a low percentage of biotransformation<sup>6</sup>, general anesthesia became a better option for those patients. Among the advantages of general anesthesia, one should mention the absolute immobility at the time of vascular anastomosis and adequate control of ventilation and perfusion in patients debilitated by uremia<sup>7</sup>. However, the success of renal transplantations depends on other factors: type of donor, length of cold ischemia, and maintenance of adequate hemodynamic parameters at the time of reperfusion. It has been observed that good cardiovascular performance, related with the administration of large volumes of crystalloids, is associated with early graft function<sup>8</sup> and lower incidence of acute tubular necrosis<sup>9</sup>.

Our objective was to study retrospectively the technique and anesthetic agents used in anesthesia for Tx in adults at the Hospital das Clínicas da UNICAMP, focusing mainly on hemodynamic changes and diuresis.

### **METHODS**

All live and dead donor renal transplantations performed from January 2005 and April 2006 at the Hospital das Clínicas da UNICAMP were analyzed.

Age, gender, weight, height, physical status (ASA), hemoglobin, hematocrit, and plasma potassium, urea, and creatinine were obtained from the pre-anesthetic evaluation records. All other parameters were obtained from the anesthesia chart, including those related with the intraoperative monitoring. Data from the medical charts were used whenever necessary.

Besides hemodynamic parameters, the anesthetic agents, hydration, and complications during anesthesia were also analyzed. Hypotension or hypertension was defined as changes in systolic or mean arterial pressure greater than 30% of baseline levels for 15 minutes or more and/or administration of vasoactive drugs to increase or reduce the blood pressure, respectively. Bradycardia was defined as heart rate below 50 bpm, and tachycardia was defined as a heart rate greater than 120 bpm. Central venous pressure (CVP) between 2 and 12 cmH<sub>2</sub>O was considered normal.

Categorical parameters were reported as the percentage distribution, while continuous parameters as mean and standard deviation. Fisher Exact test and Chi-square test ( $\chi^2$ ) were used to compare categorical parameters, and the Student *t* test and Mann-Whitney test were used to compare means. The size of the study population was determined by the number of subjects found during the study time, and the power of the test was evaluated after data collection, considering a type I error of 5%. Multiple logistic regression was used to study the magnitude of the risk factors studied and their relationship; diuresis was considered a de-

pendent parameter. It was determined a level of significance of 5%; the software SAS version 8.2 was used for the analysis.

## RESULTS

During the study period, 98 patients underwent renal transplantation. Two patients were excluded from the study because their information was incomplete, and four were excluded due to their age (14 years). In four patients, the medical chart had to be consulted to complete the information. Out of 92 patients, 59 underwent general anesthesia (GA) and 33 underwent general anesthesia associated with epidural block (GA+Epi). As for the origin of the graft, 42 patients received live donor grafts and 50 received dead donor grafts. Patients were subdivided in two groups according to the anesthetic technique. Age, gender, weight, and height, as well as preoperative exams, were similar in both groups ( $p > 0.05$ ), but the same does not apply to the

origin of the graft, since a predominance of dead donor grafts was seen in the GA+Epi (82%) ( $p < 0.01$ ) (Table I). The general anesthesia and GA+Epi groups were also compatible regarding the presence of associated diseases and, among them, hypertension ( $p = 0.36$ ), metabolic acidosis ( $p = 0.13$ ), and anemia ( $p = 0.24$ ) were the most frequent.

Intraoperative monitoring consisted of: cardioscope, pulse oximetry, central venous pressure, non-invasive systolic blood pressure or mean arterial pressure by catheterizing the radial artery, and urinary catheter.

All patients underwent balanced, intravenous and inhalational, general anesthesia with mechanical ventilation with CO<sub>2</sub> reabsorption system in both groups, and in the GA+Epi group, it was associated with epidural block. The inhalational agent used, 0.5 to 1.0% isoflurane, was vaporized in a mixture with oxygen and nitrous oxide at 50%. Intravenous anesthetics used more often were fentanyl, sufentanil, propofol, and atracurium. Table II shows the mean anesthetic consumption with the standard deviation for both techni-

Table I – General Characteristics of the Groups and Mean Exams Values According to the Anesthetic Technique.

Anesthetic Technique	GA (n = 59)	GA + Epi (n = 33)	P
Age (years) *	36.1 ± 13.2	40.6 ± 11.1	0.10 <sup>#</sup>
Weight (kg) *	62.4 ± 13.9	63.5 ± 13.5	0.72 <sup>#</sup>
Height (cm) *	164.6 ± 10.4	163.4 ± 9.1	0.63 <sup>#</sup>
BMI (kg.m <sup>-2</sup> ) *	23.5 ± 4.4	23.1 ± 4.5	0.72 <sup>#</sup>
Gender (M / F)	37 / 22	21 / 12	0.93 <sup>°</sup>
Physical status (ASA III / IV)	56 / 3	29 / 4	0.25 <sup>°°</sup>
Live Donor/Dead Donor	36 / 23	6 / 27	< 0.01 <sup>°</sup>
Laboratory exams			
Creatinine (mg%) *	12.0 ± 9.9	9.0 ± 3.0	0.05 <sup>##</sup>
Potassium (mEq) *	4.7 ± 0.9	4.5 ± 0.7	0.27 <sup>#</sup>
Hemoglobin (mg%) *	12.0 ± 2.0	12.3 ± 2.5	0.44 <sup>##</sup>

\*Results expressed as Mean ± SD

<sup>°</sup>  $\chi^2$  test; <sup>°°</sup> Fisher Exact test; <sup>#</sup> Student *t* test; <sup>##</sup> Mann-Whitney test

BMI — body mass index

Table II – Anesthetic Consumption in the Different Study Groups.

	GA (n = 59)	GA + Epi (n = 33)	p
Fentanyl (µg.kg <sup>-1</sup> )	9.0 ± 6.3	12.9 ± 8.2	0.27 <sup>#</sup>
Sufentanil (µg.kg <sup>-1</sup> )	3.0 ± 2.9	1.4 ± 0.7	0.05
Propofol (mg.kg <sup>-1</sup> )	4.4 ± 0.5	1.8 ± 2.2	0.81 <sup>#</sup>
Atracurium (mg.kg <sup>-1</sup> )	1.3 ± 0.7	1.1 ± 0.3	0.52 <sup>#</sup>
NS (mL.kg <sup>-1</sup> )	86.7 ± 30.2	94.8 ± 21.8	0.38

Results expressed as Mean ± SD.

NS – normal saline.

Student *t* test; <sup>#</sup> Mann-Whitney test.

ques, which did not show statistically significant differences between both groups.

Patients were hydrated with NS at  $86.7 \pm 30.2 \text{ mL.kg}^{-1}$  in the GA group, and  $94.8 \pm 21.8 \text{ mL.kg}^{-1}$  in the GA+Epi group ( $p = 0.38$ ). Blood products were transfused when hemoglobin levels were lower than  $8 \text{ g.dL}^{-1}$  and showed no differences between both groups.

All patients received furosemide  $0.5$  to  $1.0 \text{ mg.kg}^{-1}$  during vascular anastomosis, and all, except for three, received the usual doses of atropine and neostigmine and were extubated at the end of the surgery. Postoperative analgesia in the group that received epidural block consisted of the association of  $0.25\%$  bupivacaine ( $32.5$  to  $50 \text{ mg}$ ) and morphine  $0.03 \text{ mg.kg}^{-1}$ . In the GA group (59 patients), analgesia consisted of subcutaneous morphine  $0.1 \text{ mg.kg}^{-1}$  associated with infiltration of the surgical wound with  $100 \text{ mg}$  of  $0.5\%$  bupivacaine. All patients were transferred to the intensive care unit (ICU) in the immediate postoperative period.

As for the perioperative cardiovascular changes, the objective of the present study, hypotension was seen in 34 patients, 17 (29%) in the GA group and 17 (51%) in the GA+Epi group ( $p = 0.03$ ), and  $\text{PVC} \geq 12 \text{ cmH}_2\text{O}$  was seen in 60 patients, 42 (71%) in the GA group and 18 (54%) in the GA+Epi group ( $p = 0.11$ ). Diuresis was seen in 67 patients at the end of the surgery, 44 (74.57%) in the GA group and 23 (69.69%) in the GA+Epi group, as shown in table III. The incidence of the use of vasoactive drugs was similar to that of hypotension. Patients did not develop hypertension, two developed tachycardia, and one had bradycardia.

The origin of the graft was associated with greater hemodynamic instability and worse prognosis for the immediate function of the organ. The study of the associations among the following parameters: anesthetic technique, hypotension, CVP, and presence of diuresis, according to the type of donor, demonstrated that patients who received dead donor grafts had a greater frequency of hypotension ( $p < 0.01$ ) and lower CVP than patients who received live donor grafts. The presence of diuresis was more frequent in patients who received live donor grafts ( $p = 0.01$ ) (Table IV).

Logistic regression of the parameters studied and the presence of diuresis indicated that the origin of the graft and the volume of hydration were important factors (Figure 1). The power of the test, shown in tables III and IV, was approximately 60% and 80%, respectively, except for  $\text{CVP} \geq 12$ , which had a power of 37%, for the association with the anesthetic technique, and 55%, for the type of donor. Diuresis had the lowest power (10%) in its association with the anesthetic technique.

Other common perioperative complications included metabolic acidosis, anemia, and hyperkalemia. Significant differences between both groups were not observed. Patients who develop metabolic acidosis were treated with the infusion of sodium bicarbonate. Hyperkalemia was treated with the administration of polarized solution and/or calcium chloride. Ten patients received intraoperative blood transfusion. Three patients were intubated when they were transferred to the ICU: two for bronchospasm and one for hemodynamic instability. Less frequent complications included coagulation disorders and cutaneous rash.

Table III – Hemodynamic Parameters and Diuresis According to the Anesthetic Technique

	GA (n = 59)	GA + Epi (n = 33)	n	p
Live Donor/ Dead Donor	36 / 23	6 / 27	92	< 0.001
Hypotension	17	17	34	0.03
$\text{CVP} \geq 12 \text{ cmH}_2\text{O}$	42	18	60	0.11
Diuresis (+)	44	23	67	0.62

$\chi^2$  test.

Table IV – Hemodynamic Parameters, Anesthetic Technique, and Diuresis According to Graft Origin

	Live Donor (n = 42)	Dead Donor (n = 50)	n	p
GA / GA+Epi	36 / 6	23 / 27	92	< 0.001
Hypotension	9	25	34	< 0.01
$\text{CVP} \geq 12 \text{ cmH}_2\text{O}$	32	28	60	0.04
Diuresis (+)	36	31	67	0.01

$\chi^2$  test.

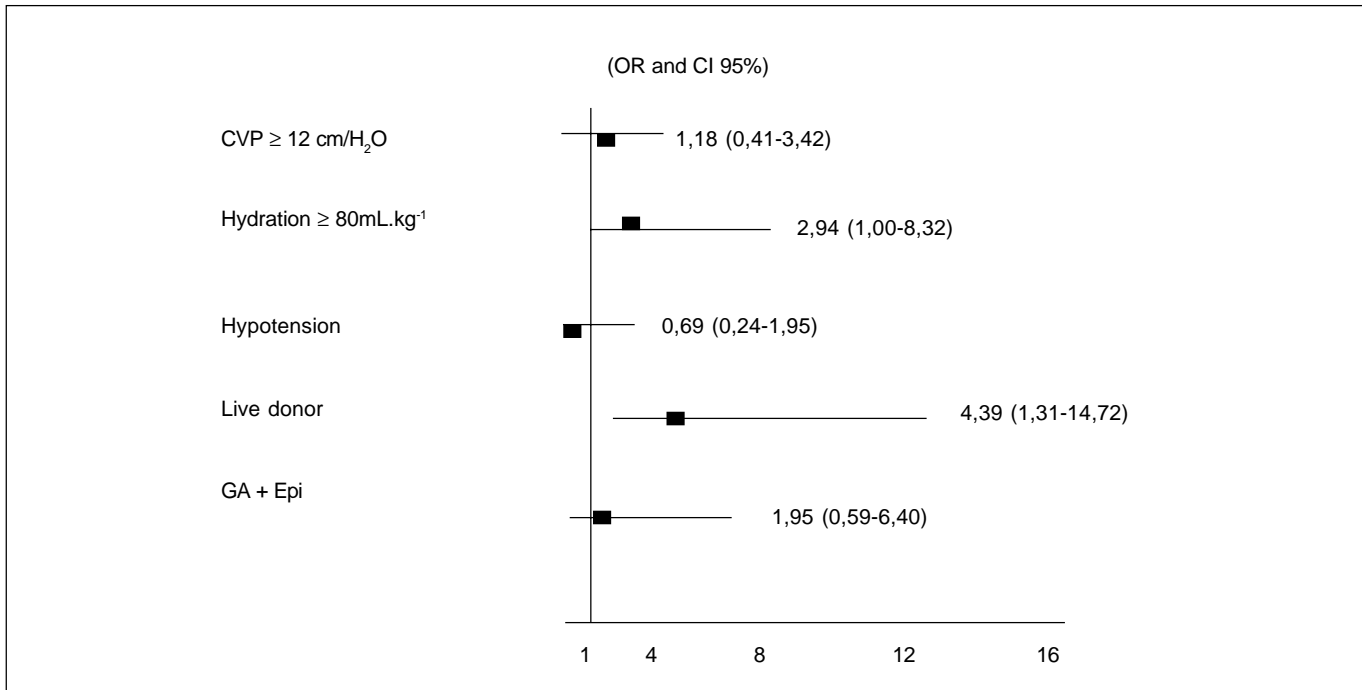


Figure 1 – Factors Associated with Diuresis at the End of the Procedure

## DISCUSSION

General anesthesia, with intravenous and inhalational agents, associated with mechanical ventilation is the most common technique used in renal transplantations <sup>7,10</sup>. A consensus on the anesthetic agents used, sodium thiopental and more recently propofol associated with fentanyl exists. Intubation is facilitated by the administration of atracurium, and maintenance is accomplished with isoflurane associated or not with nitrous oxide <sup>10</sup>. Postoperative pain has been treated, more often, with patient-controlled analgesia (PCA) with opioids <sup>11</sup>, fentanyl, or morphine, despite the accumulation of active metabolites seen with morphine <sup>12</sup>.

The results of the present study regarding anesthetic techniques and agents are similar to those found in the literature. All patients received balanced general anesthesia. Propofol in 97.83% of the patients, and atracurium in 96.74% were used for induction. Isoflurane, vaporized in a mixture of O<sub>2</sub> and NO<sub>2</sub> at 1:1, was used for maintenance in all patients; fentanyl (53.26%) and sufentanil (46.74%) were the opioids of choice; no differences were seen between both groups. The consumption of anesthetics was similar in both study groups, despite the association of epidural block in 35.87% of the patients.

Although the studies in literature indicate general anesthesia as the technique of choice in Tx, several studies demonstrate that regional blocks can be successfully used in this type of surgery. According to Akpek et al. <sup>13</sup> and Hadimiaglee et al. <sup>14</sup>, continuous epidural block and combined spinal-

epidural block are as effective as general anesthesia regarding cardiovascular stability and complications, with the advantage of providing good postoperative analgesia.

However, uremic patients are especially susceptible to some complications secondary to spinal block. Studies have even reported epidural hematoma leading to neurological lesion <sup>15</sup>. There are several reasons for this: residual effects of heparin used in dialysis; and thrombocytopenia and platelet dysfunction are common in end-stage renal disease. Even the presence of normal exams, such as INR and R, do not exclude the most common change seen in those patients, platelet dysfunction <sup>16</sup>. Despite the small number of patients in the present study, this type of complication was not observed.

Besides those complications, spinal blocks also induce hypotension and a reduction in central venous pressure (CVP) by reducing venous return to the heart. They also cause bradycardia, which, depending on the severity, can lead to a reduction in cardiac output and blood pressure. In special circumstances, they can lead to severe bradyarrhythmias with AV block <sup>17</sup>. All those effects are considered deleterious because they lead to the opposite of the recommendations of Carlie et al. <sup>8</sup> and Luciani et al <sup>9</sup>. Those authors showed the importance of maximal hydration and adequate hemodynamic parameters at the time of reperfusion for the development of early diuresis and prophylaxis of acute tubular necrosis in the immediate postoperative period <sup>18</sup>. Hypotension is a relatively common complication in uremic patients. The reasons for this include: severe dehydration due to

recent dialysis, excessive doses of anesthetic agents, and/or long-term treatment with angiotensin-converting enzyme inhibitors<sup>19</sup>. In the present study, the incidence of hypotension was significantly higher among patients receiving dead donor organ. Two factors could explain this complication in this group of patients: inadequate preparation, due to the relative urgency of this type of surgery, and predominance of transplantations of dead donor grafts under general anesthesia associated with epidural block (81.82%). The sympathetic blockade could also explain the significantly higher use of vasopressors observed in patients who underwent general anesthesia associated with epidural block. Although dopamine is the most indicated vasopressor for the treatment of hypotension, and it was indeed the vasopressor used more often in the present study, one should use it cautiously because, besides its lack of effects in the kidneys, its use is associated with complications, such as tachyarrhythmias<sup>20</sup>.

Early diuresis is important in Tx as a good prognostic factor. It is associated with longer graft survival and lower mortality<sup>21</sup>. Early diuresis is commonly observed in live donor grafts and it was present in this study. In dead donor grafts, diuresis is less frequent due to the variable period of kidney ischemia and their storage at low temperatures in electrolyte solutions until they are implanted<sup>22</sup>. Some measures, such as the administration of large volumes of liquids and mannitol, have been advocated to obtain diuresis at the end of the surgery<sup>23</sup>, discouraging the systematic use of dopamine and high doses of furosemide<sup>24</sup>.

Maintenance of an elevated CVP at the time of graft reperfusion is another measure supported by the literature. Levels ranging from 10 to 15 cmH<sub>2</sub>O have been described as adequate<sup>25</sup>. In the present study, the goal was to maintain the CVP above 12 cmH<sub>2</sub>O by the administration of high volumes of NS, 86.7 to 94.8 mL.kg<sup>-1</sup>. Those volumes can be associated with complications, and clinical follow-up by simple measures, such as blood pressure, CVP, and the control of edema formation, are recommended<sup>24</sup>. The need to maintain adequate intravascular volume can be shown by the multivariate analysis of the parameters, with statistically significant differences in the bivariate analysis. The hydration regimen chosen, which is intermediate of those recommended in the literature (70 to 90 mL.kg<sup>-1</sup>), was associated with an increase in the probability of early diuresis<sup>26,27</sup>. However, this result should be interpreted with caution, since this parameter had low statistical power, demonstrated by the large confidence interval.

Intravenous and inhalational general anesthesia associated with epidural block in 33 patients (35.86%) was the anesthetic technique used for the renal transplantation during the study period.

Hypotension, more frequent in patients who received dead donor grafts, independent of the anesthetic technique used, was the most common hemodynamic change.

Two factors can be considered as indication of a good prognosis for the immediate function of the graft: to receive a live donor graft and hydration of at least 80 mL.kg<sup>-1</sup> of electrolytic solution.

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## RESUMEN

Hirata ES, Baghin MF, Pereira RIC, Alves Filho G, Udelsmann A — Influencia de la Técnica Anestésica en las Alteraciones Hemodinámicas en el Transplante Renal. Estudio Retrospectivo.

**JUSTIFICATIVA Y OBJETIVOS:** El éxito en el transplante renal (Tx) depende del tipo de donador, de la duración de la isquemia fría y de los parámetros hemodinámicos en la reperfusión. El objetivo de esta investigación fue analizar la técnica anestésica, la incidencia

de alteraciones cardiovasculares y el apareamiento de diuresis en el período perioperatorio de los Tx realizados en la UNICAMP.

**MÉTODO:** Se evaluó retrospectivamente Tx de adultos realizados entre enero de 2005 y abril de 2006. Se tuvieron en cuenta los datos demográficos, los exámenes laboratoriales preoperatorios, técnicas y agentes anestésicos, hidratación, parámetros hemodinámicos, el uso de aminas vasoactivas, la presencia de diuresis y complicaciones intraoperatorias, con análisis comparativo entre los subgrupos formados conforme a la técnica anestésica empleada. Se usaron en el análisis estadístico el test t de Student (paramétricos), Mann-Whitney (no paramétricos), test del Qui-cuadrado y Exacto de Fisher para la comparación de proporciones y análisis multivariada.

**RESULTADOS:** Se estudiaron 92 pacientes, 59 con anestesia general (AG) y 33 anestesia general asociada a la epidural (AG + Peri), 42 recibieron riñones de donantes vivos y 50 de fallecidos. No hubo diferencia ( $p < 0,05$ ) en la mayoría de los parámetros preoperatorios estudiados, con excepción del origen del injerto (82% AG + Peri recibieron riñones de donante fallecido). La alteración cardiovascular más frecuente fue la hipotensión arterial (30% AG y 48% AG + Peri,  $p < 0,05$ ). El régimen de hidratación no fue diferente entre los grupos ( $86,7 \pm 30,2 \text{ mL.kg}^{-1}$  AG y  $94,8 \pm 21,8 \text{ mL.kg}^{-1}$  AG+Peri,  $p = 0,38$ ). El injerto del donante fallecido se correlacionó con una mayor inestabilidad hemodinámica y con un peor pronóstico para la función inmediata del injerto,  $p < 0,01$  y  $0,01$  respectivamente. Un volumen de hidratación de  $80 \text{ mL.kg}^{-1}$  se asoció a la diuresis (OR = 2,94, IC95% 1,00-8,32).

**CONCLUSIONES:** La técnica anestésica empleada fue anestesia general, asociada o no a la epidural. La alteración hemodinámica más común fue la hipotensión arterial. Se mostraron benéficos con relación a la diuresis por ser de un receptor de donante vivo y recibir una hidratación de  $80 \text{ mL.kg}^{-1}$  de solución fisiológica a 0,9%.