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Renal transplantation in HIV-infected patients in Spain

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SUMMARY

HIV infection has experienced dramatic improvement in morbidity and mortality with the highly active antiretroviral therapy (HAART). This prompted a reevaluation of organ-solid transplantation as a treatment option for HIV-infected patients. Some trials in the United States have shown that one- and 2-year graft and patient survival is comparable to HIV-negative transplant population. In Europe the experience is still scarce. The aim of this study is to analyse the outcome and the clinical characteristics of HIV-infected patients who received kidney transplantation in Spain in the HAART era. Ten patients were transplanted in our country since 2001. Only one patient was black. The main cause of end-stage renal disease reported was glomerulonephritis. Six of the recipients were coinfected by hepatitis C virus. Inclusion criteria included undetectable HIV viral load and CD4 counts greater than 200/µL. Immunosuppression consisted of steroids, tacrolimus and mycophenolate mofetil, with antibody induction in 4 cases. The median and mean follow-up was 11 and 16.3 ± 15.6 (3-46) months, respectively. One recipient lost his graft because of early renal venous thrombosis. The remaining patients are functioning graft with mean serum creatinina level of 1.5 ± 0.5 mg/dl. Biopsy-proven acute rejection was diagnosed in 4 recipients and was reversed in all cases with antirejection treatment. The plasma HIV RNA levels have remained controlled and CD4 counts have been stable in excess of 200 cell/µL. None of patients have developed AIDS complications. Recipients receiving protease inhibitor-based HAART regimens required significant dosing modification to maintain appropriate tacrolimus levels. Our results show that renal transplantation can be a safe and effective treatment in select HIV-infected patients. Like other series, the acute rejection rate was higher than in non-HIV recipients. The reasons of this rejection incidence remain unknown.

Key words: ***Renal transplantation. HIV infection. Antiretroviral therapy. Immunosuppression.***

TRASPLANTE RENAL EN PACIENTES CON INFECCIÓN VIH EN ESPAÑA

RESUMEN

El pronóstico de la infección VIH ha mejorado de forma espectacular con el empleo de la terapia antirretroviral de gran actividad (TARGA). Esto ha llevado a

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considerar el trasplante de órgano sólido como una alternativa terapéutica en estos pacientes. La experiencia en Estados Unidos ha puesto de manifiesto que la supervivencia a medio plazo del trasplante renal es similar a la observada en pacientes no infectados. En Europa se han comunicado sólo casos aislados. El objetivo de este estudio ha sido analizar la evolución de los pacientes con infección VIH que han recibido trasplante renal en nuestro país en la era TARGA. Desde el año 2001 se han realizado en España 10 trasplantes renales. Seis de ellos presentan coinfección por el virus de la hepatitis C. Los criterios de selección incluían carga viral del VIH indetectable y recuento de linfocitos CD4 > 200 cél/µL. Un paciente sufrió precozmente trombosis de la vena renal realizándose trasplantectomía. Los restantes receptores mantienen el injerto renal funcionante con creatinina plasmática de 1,5 ± 0,5 mg/dl, tras 11 ± 15,6 (3-46) meses de seguimiento. Cuatro pacientes desarrollaron rechazo agudo con buena respuesta al tratamiento. No hemos observado progresión de la infección VIH manteniéndose la carga viral controlada y la cifra de linfocitos CD4 superior a 200 cél/µL. En los 4 casos tratados con inhibidores de la proteasa se produjo una marcada interacción con tacrolimus que obligó a disminuir la dosis del inmunosupresor y/o modificar el TARGA. Nuestros resultados muestran que el trasplante renal puede ser un tratamiento eficaz y seguro en pacientes con infección VIH adecuadamente seleccionados. Como en otras series, hemos observado una alta tasa de rechazo agudo cuyas causas no son aún conocidas.

Palabras clave: ***Trasplante renal. Infección VIH. Tratamiento antirretroviral. Inmunosupresión.***

INTRODUCTION

The human immunodeficiency virus (HIV) infection has been considered until recently an absolute contraindication for sold organ transplantation because of the fear that immunosuppressive therapy could accelerate the disease progression to AIDS. On the other hand, the short life expectancy that these patients had, together with organ shortage for transplantation, justified that decision[1]. The existent experience, however, is scarce. It accounted for non-diagnosed patients at the time of transplantation or that acquired infection after transplantation. Besides, recipients had not received appropriate antiretroviral therapy and some pre-transplantation data, such as CD4 lymphocytes count and viral load, fundamental to know the infection long-term prognosis, were unknown. Transplantation outcomes were worse than for non-infected patients, although absolutely disappointing. Thus, in a significant number of cases, post-transplantation survival has been prolonged[2,3].

Since 1996, with the use of new and more powerful antiretroviral drugs (the so-called highly active antiretroviral therapy (HAART)), the disease prognosis has dramatically improved.[4] Since that time, an important decrease in morbimortality rates by opportunistic infections and by AIDS-associated neoplasms is observed. This improvement in long-term survival has determined a parallel increase of deaths for several organs end-stage disease (especially, liver disease)[2-6].

The change in the natural history of HIV infection during what has been called the HAART era, has lead, in recent years, to consider sold organ transplantation as a therapeutic alternative in these patients.[2,3,5,6] For the time being, isolate cases or reduced number of cases of renal transplantation in HIV-infected patients have been reported.[3,7-9] Several months ago, an American group already reported a larger series of 40 cases, with good outcomes.[10] In Europe, however, experience in renal transplantation still remains very scant[7,8].

Recently, the data on liver transplantation in our country have been presented.[11] The aim of this study is to analyze the characteristics and course of HIV-infected patients that have received renal transplantation in Spain within the HAART era. The very short-term course of one of these transplanted patients has already been published[7].

PATIENTS AND METHODS

On May 2001, The American Society of Transplantation establishes on a consensus document a number of criteria that HIV-infected patients should verify in order to be eligible for transplantation.[12] This same year, the first renal transplantation within the HAART era are performed in Spain. Since then, 10 patients have been transplanted in our country, in five hospital centers: 3 at Puerta del Mar Hospital (Cadiz); 3 at Ramón y Cajal Hospital (Madrid), 2 at Hospital Central de Asturias (Oviedo), and 1 each at Carlos Haya Hospital (Malaga) and Clinic Hospital (Barcelona). Besides general selection criteria for transplantation, the following were also required: CD4 lymphocytes count > 200/μL for more than 6 months, HIV viral load undetectable for longer than 3 months prior to transplantation, stable antiretroviral therapy (in case of indicated) for longer than 3 months, and no presence of definite AIDS complications. Within the last months, according to what has been published by the more experienced American groups and to what is stated in consensus documents elaborated in Spain[13,14] inclusion criteria have been broaden to patients with a history of particular opportunistic infections.

Recipients' characteristics are summarized in Table I. All met the above-mentioned criteria.

In 6 patients, the etiology of end-stage chronic renal failure (ES-CRF) could not be ascertained. In 2 of these 6 six cases, clinical and laboratory results were suspicious of glomerulonephritis (GN) (likely rapidly progressing GN with anti-BGM antibodies and likely associated to cryoglobulinemia. A third patient of this group with unknown origin ES-CRF was of black origin, from a Central Africa country and arrived to our country with already established and anuric. The immunological study was negative and he showed small size atrophic kidneys on ultrasound. In this case, although biopsy was not possible and there were not enough clinical data, due the patient's ethnic origin, HIV-related nephropathy could be ruled out as being the cause for his ES-CRF.

Intravenous drug use as risk factor for transmission of HIV infection was present in five patients. In patients with a history of drug abuse, a prolonged abstinence was required in order to be included in the transplantation waiting list. Similarly to what is recommended for liver transplantation,[11] patients on maintenance methadone program have not been excluded. Thus, one patient was on a stable treatment with this drug.

All patients but two received HAART pre-transplantation. Those 2 patients had no indication for HAART since they kept an undetectable viral load and CD4 count > 200/μL. Four had previously had opportunistic infections (3 cases of tuberculosis, one case of *Pneumocystis jerovici* pneumonia, and one case of oropharyngeal candidiasis). One female patient was treated from cervical dysplasia and condyloma accuminata before being included in the waiting list.

Six patients had hepatitis C virus (HCV) co-infection with positive pre-transplantation HCV-RNA in five. None of them had liver biopsy done, although none of them had ultrasound images suggesting portal hypertension. Only in two cases, pre-transplantation treatment for liver disease was tried. Both received pegilated interferon and ribavirin that had to be interrupted in both of them for serious adverse events (erythropoietin-resistant anemia, and pancreatitis).

According to cytotoxic antibodies level, no patient could be considered as hyperimmunized. Immuno-

Table I. Characteristics of transplanted patients

	n	Median	Mean ± SD (range)
Age (years)		42	42.5 ± 8.2 (26-57)
Gender male/female	5/5		
Race Caucasian/black	9/1		
Time on fialysis (years)*		6	7.6 ± 6.6 (1-22)
RRT with HD/PD	9/1		
ES-CRF etiology:			
Unknown	6		
IgA-MGN	1		
MPGN	1		
FSG	1		
Nephroangioesclerosis	1		
Time since HIV diagnosis (year)*		10.5	10.6 ± 6.9 (2-19)
HCV co-infection	6		
HBV co-infection	0		
Risks for HIV:			
IVDU	5		
Sexual intercourse	3		
Transfusion and/or HD	2		
Pre-Tx HAART:			
d4T + 3TC	1		
d4T + TDF + ABV	1		
d4T + 3TC + NFV	1		
AZT + dDI + NFV	1		
3TC + ABV + RTV	1		
d4T + 3TC + RTV+SQV	1		
d4T + 3TC + NVP	1		
d4T + 3TC + EFV	1		

*Time on dialysis until transplantation; **Time since HIV diagnosis until transplantation; SD: standard deviation; RRT: renal replacement therapy; HD: hemodialysis; PD: peritoneal dialysis; IgA-MGN: IgA mesangial glomerulonephritis; MPGN: membranous and proliferative glomerulonephritis; FSG: focal and segmentary glomerulosclerosis; IVDU: intravenous drug user; Tx: transplantation; d4T: stavudine; 3TC: lamivudine; TDF: tenofovir; ABV: abacavir; NFV: nelfinavir; AZZT: zidovudine; RTV: ritonavir; SQV: saquinavir; NVP: nevirapine; EFV: efavirenz.

suppressive therapy included steroids, tacrolimus, and mycofenolate mofetil in all, with additional thymoglobulin in one case, and anti-CD25 in another 3 (always according to the usual practice of centers for non-HIV infected patients).

After transplantation, all recipients were put on *Pneumocystis* prophylaxis with trimethoprim / sulfamethoxazole. Two centers considered appropriate to do prophylaxis against fungal infections with oral nystatin and fluconazole (five patients in total). Cytomegalovirus prophylaxis was indicated according to local protocols for transplanted non-HIV infected patients.

Pre- and post-transplantation follow-up, as well as assessment for inclusion in the waiting list, has been carried out jointly by specialists in HIV infection and nephrologist specialized in renal transplantation. Consultation to other medical specialists (especially urologists and/or psychiatrists) for pre- and post-transplantation assessment was done following similar criteria to the ones used in seronegative patients.

Results are expressed as median and mean _ standard deviation for quantitative variables, and as absolute and/or relative frequency for qualitative variables.

RESULTS

Table II summarizes post-transplantation course. The median of follow-up after renal transplantation is 11 ± 15.6 (3-46) months. All recipients received grafts from the general cadaver donor pool.

One patient suffered early from renal vein thrombosis receiving transplantectomy the 4th day post-transplantation. Chronic hemodialysis therapy was re-started with no further complications. Four patients (40%) had an acute rejection episode, all diagnosed through biopsy. They were treated with methyl-prednisolone pulses, with good outcome in 3 of them. The 4th case had C4d deposits in peritubular capillaries at the biopsy. Not responding to steroids, we was treated with plasmapheresis sessions and by increasing tacrolimus dose. In the following days, renal function was progressively improving keeping to date, at 3 months post-transplantation, serum creatinine (sCr) of 2 mg/dL.

Mean sCr value at the last follow-up visit is 1.5 ± 0.5 mg/dL. Three patients have sCr ≥ 2 mg/dL. One of them, with a very short course yet, is the one previously described that had a steroid-resistant acute rejection episode. In another recipient, investigators have not performed biopsy and believe that donor-dependent factors would justify the greater sCr level. The third patient that did not reach an optimal post-transplantation renal function has been diagnosed with stage I chronic nephropathy by means of biopsy within 2 years from transplantation. To date, no case of glomerulonephritis or HIV-related nephropathy has been suspected in the graft.

Table II. Post-transplantation course

	n	Median	Mean ± ED (range)
Time post-Tx (months)		11	16.3 ± 15.6 (3-46)
Donor age (years)		46.5	44.7 ± 8.9 (30-59)
HLA incompatibility		4	4 ± 0.9 (2-5)
Acute rejection:	4		
Borderline	1		
Ia	1		
IIa	2		
sCr (mg/dL)		1.5	1.5 ± 0.5 (0.9-2.6)
Proteinuria (mg/day)		120	194 ± 183 (0-510)
Latest CD4 count (cells/μL)		500	670 ± 481 (221-1,811)

Time post-Tx: post-transplantation follow-up time.

Once transplanted, patients remained on HAART that were previously receiving. In one of the 2 recipients that did not received antiretroviral therapy, the medical team considered it was convenient to start on HAART after transplantation. In the four cases treated with protease inhibitors (PIs), a marked interaction with tacrolimus was found, which obliged to dramatically decrease the dose of immunosuppressant. In 3 of them, the post-transplantation course warranted the change of PIs for non-nucleoside analogues reverse transcriptase inhibitors (NNARTI) (nevirapine or efavirenz) to prevent unwanted side effects (essentially, hepatotoxicity or new acute rejection episodes).

Two patients, with 13 and 46 months of post-transplantation follow-up, have occasionally had low viral load levels (< 10,000 copies/mL), while keeping elevated CD4 (600-1100/μL). One of them has never received HAART and the other one is on a two-antiretroviral drugs regimen treatment. Due to their good clinical state and stability of immunological and viral controls, their treating physicians have not considered indicated to start on or modify HAART. The remaining patients have kept an undetectable viral load and stable CD4 lymphocytes count, greater than 200/μL. There have been 3 cases of pulmonary bacterial infection (by *Escherichia coli*, *Streptococcus pneumoniae* and unknown bug), resolved with antibiotic treatment. Another patient, with a good immunological condition at the time of the episode, had herpes zoster infection, also cured with medical treatment. The 6 patients with HIV/HCV co-infection have not presented to date liver function worsening or liver disease-related complications.

DISCUSSION

For the last 10 years, survival of HIV-infected patients has dramatically improved[2-6]. This same course has been observed with dialysis. The results from a recent analysis of the American Registry (USRDS) by Ahuja *et al.* have shown that a marked increase in survival rates has occurred since 1997. This likely reflects the beneficial effect of HAART also in this ES-CRF population[15]. Thus, in this setting, the thought of contraindicating transplantation to these patients because of a poor survival was not longer justified and was challenged within the last year of the past decade[2,3,5,6]. Another controversial issue was the deleterious effect of immunosuppressive therapy on disease progression. However, we know that activation of the immune system plays a key role in the pathogenesis of this infection so that immunosuppressive drugs could even have a positive effect[3]. In this way, there is evidence of how immunosuppressants such as cyclosporin, tacrolimus, mycofenolate mofetil, and rapamycin may have antiretroviral properties by reducing target cells for the virus, by a direct antiretroviral effect or by enhancing the action of some antiretroviral drugs[3,16].

These advances in HIV infection knowledge and the substantial improvement observed in its prognosis have determined an attitude change towards transplantation among the scientific community. At the beginning of the present decade, the first reports on solid organ transplantation done on HIV-infected patients show up[3]. In the year 2001, the American Society for Transplantation explicitly states on a consensus document the selection criteria that these patients have to meet to have access to transplantation[12]. According to these guidelines, in 2002, at the World AIDS Conference, Roland y cols. present the first series with an important number of cases.[3,9] It included 26 renal transplantations performed at several US hospitals. Very recently, Kumar y cols., have published their experience with 40 renal transplantations, with a mean follow-up of 20 months.[10] In both series, the outcomes are satisfactory and similar to those obtained in non-HIV-infected patients.

In Europe, some groups have also been pioneers in liver transplantation,[17] however the reported experience on renal transplantation is almost inexistent[7,8]. The study here presented gathers the first series of renal transplantation in a European country. The first transplantations in Spain were done at 2 centers in the year 2001, with similar selection criteria used by the American groups, and not knowing yet the results of the above-mentioned studies. However, most of transplantations in our country (8 cases) have been performed from 2004. That year, the Spanish Society of Nephrology published a clinical guideline in which renal transplantation is considered as a therapeutic option in HIV-infected patients meeting specific requisites.[13] It is likely that this has prompted other groups to include these patients in the waiting list and transplant them. Thus, we are only able to present the outcomes in the short and intermediate term. The course has been good so far, however, in agreement to what has been published in the U.S. We have not observed progression of HIV infection, and viral load and CD4 lymphocyte count has been kept under control with HAART. As in other series, in ours selection criteria have been broaden including patients with specific opportunistic infections that later on presented an appropriate immunological reconstitution. The infectious conditions observed do not differ from those described in transplanted patients without HIV infection, appropriately responding to treatment. No patient has developed any AIDS-defining event.

Renal transplantation recipients in Spain present some particular characteristics that make them different from those in the American population and that potentially could influence on graft progression. Contrary to Afro-American patients preponderance in the United States, which have a greater predisposition to developing acute rejection, almost all of our patients were Caucasians. On the other hand, it is also well know that the spectrum of HIV infection-related renal diseases in these two ethnic groups is different[18,19]. HIV-related nephropathy, the main cause of renal failure in black patients, is closely related to the disease progression, so that its recurrence in the grafted organ is unlikely if HIV infection is adequately controlled. The prevalent pathology in Caucasians, mainly GN, as seen in our patients, viral suppression and antiretroviral drugs use has not been associated with a beneficial effect on renal function. Thus, we must keep in mind that this fact, together with the high HCV co-infection rates, might favor the development of post-transplantation glomerulopathies. We have not observed, so far, any complication in this sense.

Another highly relevant issue is the frequent drug interactions that may occur between antiretroviral and immunosuppressive drugs. PIs and NNARTI use for their metabolism the P450 cytochrome enzymatic system, having a known capability of acting both as inducers or inhibitors of a number of drugs. The use of PIs with cyclosporin, tacrolimus, or sirolimus conditions a marked interaction between them, much higher to that observed, for instance, between immunosuppressants and antibiotics, with a marked increase of plasma levels of immunosuppressants[20]. Roland y cols., have performed studies of

pharmacokinetics of nelfinavir (a PI), nevirapine (a NNARTI), and cyclosporin in their transplanted patients. Antiretroviral drugs were kept within the therapeutic range with a significant increase in cyclosporin levels when the latter was administered with nelfinavir but not with nevirapine. Efavirenz, another NNARTI, reduces plasma levels of anti-calcineurin drugs[14,20]. These interactions may, thus, make difficult post-transplantation follow-up, with a close monitoring of immunosuppressants in order to avoid serious adverse events. In our experience, 3 out of 4 patients that received PIs, the post-transplantation course warranted a change in HAART. One of them had HBV co-infection, so the use of a NNARTI was considered safer in order to avoid a further liver toxicity by tacrolimus. The other two patients had presented an acute rejection episode. Although wee could not ascertain a relationship between rejection and sub-therapeutic levels of immunosuppressant, it was finally decided to switch the antiretroviral drug to obtain more stable levels of tacrolimus. In dialysis patients that will be included into the waiting list, there is no experience to advice one or the other antiretroviral therapy[9,14]. Besides, these patients may have difficulties in obtaining a correct treatment due to the need of dose adjustment for many antiretroviral drugs in renal insufficiency conditions. Thus, independently of the possible difficulties in post-transplantation follow-up, we should always select the HAART that allows for an adequate suppression of the viral load and that is well tolerated by the patient. In case of obtaining an good control of HIV infection with regimens devoid of PIs or other specially nephrotoxic drugs, we do have to consider that this condition may make easier dose adjustment of immunosuppressants and it will likely decrease the risk for potential post-transplantation adverse events.

In two large American studies published so far, an unexpectedly high incidence rate of acute rejection has been observed. Roland *et al.* have reported a 38% rejection rate and Kumar *et al.* of 22% that reaches 29% when analyzing the protocol biopsies.[3,9,10] Several hypotheses have been considered to explain it. It may reflect that HIV infection in these patients, rather than a destruction of the immune system, it would produce an immunological dysregulation that may favor the development of acute rejection. In some cases, specially in the first transplantations performed, the treating physicians decided to reduce the immunosuppressive dose in front of the uncertainty of the effect of immunosuppression on the disease course.[9] The preponderance of black ethnicity in that population has also been proposed as a cause, although in our experience, with a clear preponderance of Caucasian patients, the results have been similar. Patients transplanted in Spain did not have either a particular immunological risk, according to the parameters that apply to non-HIV recipients, and regimens of immunosuppressants were as usual. In any case, what does seem evident is that these patients preserve their ability to start an immune response against the graft and that their optimal treatment is yet to be defined. The different regimens used so far have highlighted that it is possible to achieve an adequate control of HIV infection with all of them. However, patients needing thymoglobulin therapy had a greater decrease of CD4 with a slow recovery thereafter.[3] In light of the high acute rejection rate, and in order to avoid the possible use of these anti-rejection therapies, the more experienced groups are using antibody induction therapies, especially with interleukin-2 receptor inhibitors.[9,10,21] In spite of all this, the outcomes obtained are good, with a graft survival rate similar to that of non-HIV patients and with adequate renal function levels.

HCV infection prevalence among the HIV-infected population is very high.[3,14] Data published in France about dialysis patients show a co-infection rate of 25%.[22] In our series, 60% of the recipients have a positive serology for HCV, which is in agreement with the results from the recent survey reported by Barril *et al.* on the characteristics of dialyzed HIV patients in Spain.[23] We know that immunosuppressive treatment may worsen liver disease progression and activate HCV replication.[24] However, other studies have shown that HCV-infected patients that undergo transplantation have a better survival than those remaining on dialysis.[25] Thus, HCV infection is not a contraindication for transplantation but in the setting of advanced liver disease.[1] Pre-transplantation clearance of HCV RNA seems to improve the later course of liver disease.[13] Because of this, and because interferon therapy is contraindicated in renal transplantation for the risk of inducing acute rejection, it is recommended to treat patients while they are in the waiting list.[1,13] However, the efficacy of current treatments is limited and their secondary effects considerable, particularly in ES-CRF patients. This has led some groups to recommend, although not demand, treatment for HCV infection in HIV/HCV co-infected patients to include them in the waiting list.[26] In our patients, only in two cases anti-HCV therapy was unsuccessfully tried and with serious adverse events. We do not know whether the post-transplantation course in these co-infected patients may be worse. The only experience with a significant number of cases is that reported by Kumar *et al.*.[27] In their series, they carry out a comparison within one year of transplantation between 19 only

HIV-infected patients and 19 con-infected patients, and they did not find any differences in patient or graft survival rates. The outcomes of transplanted patients in Spain are also good, although a more prolonged follow-up is required.

The number of renal transplantations performed in our country so far is limited in spite of the high transplantation rate. This fact, together with the concentration of patients in few hospitals, seems to reflect that the therapy is not yet routinely indicated. Some studies from several countries have analyzed the prevalence of infection on dialysis and the number of existent possible candidates for transplantation. Data vary according to the geographical area. The percentage of ES-CRF patients in the United States has become stable within the last few years around 1.4-1.5%.[28] In France, with a setting more similar to ours, prevalence has increased from 0.38% in 1997 to 0.67% in 2002 as a result of the longer patient's survival and the increase of immigrant patients coming from Africa.[22] In the recently published survey from Spain, the calculated prevalence for the year 2004 was 1.5%.[23] As the authors mention, the value is likely overestimated and the real value would be also below 1%, since most of the participant centers were hospital units where almost all of these patients have their renal replacements therapy. When analyzing the number of patients that could be transplanted in Italy, with very restrictive criteria, only tow potential candidates are found.[24] In Spain, in the study by Barril *et al.*, 9 cases would met the criteria to be included in the waiting list. Besides, it is likely that in our country a prevalence increase is also occurring, as has happened in France. For all of this, and although the number of transplantations may possibly be not very high, it would be expected, perhaps, to be higher than the current one if all centers would apply the guidelines published by the different scientific societies.[12-14]

There are no data yet on the long-term possible effect that prolonged immunosuppression may have on these patients. However, the cumulated experience in the United States and the one here presented highlight that renal transplantation in appropriately selected HIV-infected patients is a safe therapy in the short and intermediate terms, providing a survival rate at least similar to that of other risk groups. The disease has been kept under control and no patient has developed AIDS-related infections or neoplasms. Post-transplantation management may be, in some cases, more complicated than in non-infected recipients. Thus, it is of high relevance, for the sake of a correct follow-up, the existence of a multidisciplinary group that allows for an adequate assessment of transplantation complications, of HIV infection itself, and of the frequent drug interactions. In Spain, the number of grafted organs is still very low, the bulk of the activity concentrating in few centers. At the present time, however, we believe that HIV seropositivity can no longer be, *per se*, a contraindication to have access to renal transplantation and that these patients, as others with special risk, have to be assessed for their possible inclusion into the waiting list.

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