

Successful Liver and Kidney Transplantation From Cadaveric Donors With Left-Sided Bacterial Endocarditis

Francisco Caballero^{a,*}, Antonio Lopez-Navidad^a, Milagrosa Perea^b, Catiana Cabrer^b, Lluís Guirado^c, and Ricard Solà^c

^aHospital de la Santa Creu i Sant Pau, Organ and Tissue Procurement for Transplantation, Barcelona, Spain

^bHospital Clínic, Organ and Tissue Procurement for Transplantation, Barcelona, Spain

^cFundación Puigvert, Kidney Transplantation Unit, Barcelona, Spain

* Corresponding author: Francisco Caballero, fcaballero@hsp.santpau.es

Bacterial infections are frequent in cadaveric organ donors and can be transmitted to the transplantation recipient, which could have devastating consequences for the recipients if adequate preventive measures are not adopted.

From the 355 consecutive brain dead cadaveric organ donors procured at our center in the last four years, 2000–2003, four of them (1.1%) had bacterial endocarditis as cause of death. The bacteria responsible for the endocarditis were *Staphylococcus epidermidis*, coagulase-negative *Staphylococcus*, *Staphylococcus hominis* and *Streptococcus viridans*, respectively. We performed five kidney and two liver transplantations on seven recipients. All donors and recipients received antibiotic treatment against the germ causing the respective endocarditis.

Infection by the bacteria responsible for the endocarditis in the respective donors was not transmitted to any of the recipients. Six of the seven recipients were alive with normal-functioning grafts after between 13 and 24 months' follow-up. Transplantectomy was performed on one kidney recipient due to thrombosis of the renal vein of the graft not related to the endocarditis.

Liver and kidney transplantation from donors dying from bacterial endocarditis can be performed without causing the transmission of infection to the recipient or the dysfunction of the graft.

Key words: Bacterial endocarditis, brain death, kidney transplantation, liver transplantation, organ donor

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Introduction

The shortage of organs is the greatest transplantation limiting factor. Over recent years attempts have been made to mitigate this shortage of organs for transplantation by extending donor acceptance criteria, including donors with infections which had classically been considered as an absolute contraindication for organ donation, such as bacteremias, meningitis and bacterial endocarditis (1–6). Adequate antibiotic treatment in the donor and/or in the recipient prevents infection in the latter (1–8). Actuarial survival of the graft and recipient is similar to that presented by the recipients of organs from donors without infections (1,4,9–11).

Seven years ago our group reported the first, and unique to date, case of a successful liver and kidney transplantation from a donor who died of endocarditis, in this case from *Enterococcus faecalis* (5). We here present the results of seven organ transplantations, five kidney and two liver grafts, performed on seven recipients, from four donors who died with bacterial endocarditis, three cases due to coagulase-negative *Staphylococcus* and one to *Streptococcus viridans*.

Clinical Cases

Donor 1. Organ donor with endocarditis due to *Staphylococcus epidermidis*

61-year-old male with a background of rheumatic mitroaortic insufficiency diagnosed in childhood. Carrier of a normal-functioning aortic mechanical prosthesis for 16 years. Admitted due to mitral insufficiency which required a third prosthetic change in a year. The post-surgery transesophageal echocardiographic check-ups showed a correct biventricular contractility without valvular insufficiency or stenosis. In the immediate post-operative period he presented cardiac arrest secondary to pulmonary hemorrhage recovered with advanced cardiopulmonary reanimation techniques. The neurological evolution was unfavorable. He presented fever from the 5th to the 7th day

post-surgery. *Staphylococcus epidermidis* sensitive to teicoplanin was isolated in two blood cultures and in two cultures from tip of central catheters taken coinciding with the fever. No germs were isolated in the urine cultures. The patient had been under treatment with imipenem (500 mg/6 h/iv) from the 2nd to the 10th day of admission and teicoplanin (400 mg/12 h/iv) was added on the 9th and 10th day. The patient evolved to brain death ten days after hospital admission. He was assessed as an organ donor (Table 1).

Liver and kidneys were retrieved for transplantation twelve hours after death. The liver and the left kidney were discarded for transplantation due to severe structural lesions. The liver was micronodular and steatotic and presented a diffuse and scattered hemorrhage. In the left kidney there were foci of interstitial nephritis, old infarctions and nephrosclerosis.

The right kidney was transplanted in a 50-year-old patient with a background of chronic renal failure (CRF) of unknown etiology and vesical schistosomiasis. The cold ischemia time was 16 hours. He received immunosuppressive treatment with tacrolimus, mycophenolate and prednisone and prophylactic antibiotic treatment for seven days with cloxacillin (500 mg/6 h/iv). Two years from transplantation the clinical state of the recipient was normal and he had a creatinemia of 165 $\mu\text{mol/L}$ (Table 2).

Donor 2. Organ donor with endocarditis due to coagulase-negative *Staphylococcus*

43-year-old woman with a background of chronic alcoholism who was admitted to the hospital due to cephalgia and coma. The brain computerized tomography (CT) showed a hemorrhage in protuberance and IV ventricle and diffuse brain edema. The first day of admission she presented fever and received 2 g of ceftriaxone. Prior to ceftriaxone treatment, two blood cultures were performed. Coagulase-negative *Staphylococcus* was isolated in both blood cultures two days later. She evolved to brain death 36 hours after hospital admission. She was assessed as an organ donor (Table 1). The transthoracic echocardiograph showed a double aortic lesion, stenosis plus aortic insufficiency, with severe swelling of 0.4 \times 0.4 cms of the non-coronary sigmoid valve which protruded in the ascending aorta.

The kidneys were retrieved for transplantation eight hours after death. The liver was discarded for transplantation because of a severe alcoholic steatosis. One of the kidneys belonged to the AB blood group and as there was no recipient candidate at our hospital it was sent to another transplantation team who rejected it when the suspected bacterial endocarditis was confirmed by the pathological study of the donor heart.

The left kidney was transplanted in a 22-year-old patient with a background of Ig A nephropathy and a first renal transplantation nine years previously which had had an un-

favorable evolution due to withdrawal of the immunosuppressive treatment. The cold ischemia time was 16 hours. The renal vein of the graft was short and had to be reconstructed before the transplantation, and during implant at its connection with the host's iliac vein, it suffered multiple episodes of bleeding and was profusely manipulated. In the immediate post-operative period, the patient presented thrombosis of this vein and subsequent massive hemorrhagic infarction of the graft. A nephrectomy was performed 48 hours after transplantation. The pathological study of the graft demonstrated a diffuse necrosis with additional hemorrhage and without purulent foci. We did not take a culture of the graft. The recipient had neither fever nor leukocytosis in the first two weeks after transplant, and she did not receive antibiotic treatment when the kidney graft was removed.

Donor 3. Organ donor with endocarditis due to *Streptococcus viridans*

66-year-old male with a background of double aortic lesion and ischemic cardiopathy who was admitted due to non-complicated acute infarction of myocardium. One week before admission he presented fever following dental extraction. *Streptococcus viridans* susceptible to penicillin (CIM < 0.03 $\mu\text{g/mL}$) and teicoplanin (CIM < 4 $\mu\text{g/mL}$) were isolated in two blood cultures taken on the second and third day of admission. There was a bilateral alveolar pattern in the chest X-ray. The transesophageal echocardiograph demonstrated a tricuspid aortic valve and aortic pedunculated vegetation of 8 mm. The patient received treatment with penicillin G sodium (3 \times 10⁶ U/4 h/iv) and gentamicin (80 mg/8 h/iv) from the tenth to the fourteenth day of admission. Five days after the beginning of antibiotic therapy he presented a sudden reduction in the level of consciousness, left hemiplegia and anisocoria. The brain CT showed a right intraventricular parieto-temporal hemorrhage. He evolved to brain death 14 days after hospital admission. He was assessed as an organ donor (Table 1).

Liver and kidneys were retrieved for transplantation twelve hours after death and were macroscopically normal. The liver was transplanted in a 39-year-old patient with fulminant hepatitis of unknown etiology who had been 24 hours on the waiting list for urgent liver transplantation. He received immunosuppression with mycophenolate and tacrolimus, and prophylactic antibiotic treatment only on the first day post-transplantation with teicoplanin (800 mg/iv) and cefepime (4 g/iv). He did not present infectious complications during the 26 days of admission. Twenty-one months after transplantation the hepatic function and the clinical state of the recipient were normal (Table 2).

The kidneys were transplanted to two patients, a 63-year-old and a 69-year-old, with CRF due to chronic pyelonephritis and non-affiliated etiology, respectively. Both recipients received immunosuppression with tacrolimus, mycophenolate and prednisone, and prophylactic antibiotic

Table 1: Clinical characteristics and antibiotic treatment of the organ donors with left-sided bacterial endocarditis

Donor/ Bacterium	Involved valve/ Prior pathology of the valve	Age (yr)/ sex/ cause of BD	Diagnosis of BE before organ retrieval: Definite versus suspected	Clinical heart failure/ Inotropic drugs before organ retrieval (µg/kg/min)	Days from hospital admission to BD/ Number of positive blood cultures before BD: timing of culture	Antibiotic therapy before organ retrieval (days/total doses)	Blood/Urine cultures immediately before organ retrieval: results	Liver biochemistry (AST,ALT, GGT,AF,TB) Liver ultrasound/ biopsy after retrieval	Serum creatinine, µmol/L/ Kidney ultrasound/ biopsy after retrieval	Pathology of donor heart
<i>Donor 1/ Staphylococcus epidermidis</i>	Prosthetic mitral valve/ rheumatic mitroaortic valvulopathy	61/M/BA	Suspected*	No/ Dopamine (2) plus adrenaline (0.11)	10/ 2: 5 th and 7 th days	Imipenem (9/18 g) plus teicoplanin (2/1, 6 g)	Positive for <i>Staphylococcus epidermidis</i> / Negative	Normal/ Steatosis	105/Normal/ left kidney with old infarctions	Foci of active endocarditis in the mitral mechanical prosthesis
<i>Donor 2/ coagulase- negative Staphylococcus</i>	Native aortic valve/ stenosis plus insufficiency	43/F/ICH	Suspected**	No/ Dopamine (7)	1.5/ 2: 1 st day	Ceftriaxone (1/2 g)	Negative/ Negative	ND, 52, 15, 120, 7/ Hepatomegal/ Steatosis	53/ Normal/ND	Active endocarditis in the aortic valve and thrombus of 0.8 cm in diameter
<i>Donor 3/ Streptococcus viridans</i>	Native aortic valve/ stenosis plus insufficiency	66/M/ICH	Definite	No/ Dopamine (3)	14/ 2: 2 nd and 3 rd days	Penicillin G (5/90 × 10 ⁶ U) plus gentamicin (5/1, 2 g)	Negative/ Negative	15, 32, 30, 64, 12/ Normal/ND	84/Normal/ND	Foci of active endocarditis in the aortic valve and acute infarction
<i>Donor 4/ Staphylococcus hominis</i>	Native mitral valve/ prolapse	47/F/SAH	Definite	Yes, cardiogenic acute lung edema/ Dopamine (5)	7/ 2: 1 st day	Cloxacillin (7/ 84 g)	Negative/ Negative	15, 8, 40, 56, 10/ Normal/ND	62/normal/ Interstitial fibrosis plus slight tubular atrophy	Mitral valve with foci of active endocarditis and bacterial colonies
<i>Ref. (5/ Enterococcus faecalis</i>	Native mitral valve/ none	29/M/BI	Definite	No/ Dopamine (5)	4/ 1: 1 st day	Amoxicillin- clavulanate (3/6 g) plus imipenem (2/4 g)	Negative/ Negative	9, 11, 23, 160, 13/ Normal/ND	76/Normal/ND	Three vegetations of the mitral valve

AF = alkaline phosphatase; ALT = alanine aminotransferase; AST = aspartate aminotransferase; BA = brain anoxia; BD = brain death; BE = bacterial endocarditis; BI = brain infarction; g = gram; GGT = gamma glutamyl-transpeptidase; ICH = intracerebral hemorrhage; ND = not done; SAH = subarachnoid hemorrhage; TB = total bilirubin; Tx = transplant.

*Possible BE based on three minor diagnostic criteria (12): mechanical prosthetic cardiac valves, fever (temperature >38°C) and *S. epidermidis* isolated in two blood cultures.

**Possible BE based on three minor diagnostic criteria (12): fever (temperature >38°C), spontaneous intracranial hemorrhage and stenosis plus insufficiency of the aortic valve.

treatment with amoxicillin-clavulanate (500 mg/8 h/iv) for seven days post-transplantation. Neither of the recipients presented infectious complications. Twenty-one months after transplantation the clinical state of the two recipients was normal (Table 2).

Donor 4. Organ donor with endocarditis due to *Staphylococcus hominis*

47-year-old woman with a background of arterial hypertension and mitral prolapse who was admitted due to fever and dyspnea of four days' evolution and recent right hemiplegia. There was an infarction of left basal ganglia in the brain CT. The transthoracic echocardiograph demonstrated mitral vegetation with severe mitral insufficiency and pulmonary hypertension. A *Staphylococcus hominis* susceptible to cloxacillin was isolated in two blood cultures on the first day of admission. The patient received treatment with cloxacillin for seven days. On the sixth day of admission she presented sudden cephalgia and coma. The brain CT demonstrated a massive subarachnoid hemorrhage with hydrocephalus. She evolved to brain death one week after admission. She was assessed as an organ donor (Table 1). There was an infiltrate in the right lung in the chest X-ray.

The liver and both kidneys were retrieved ten hours after death and were macroscopically normal. The right kidney suffered iatrogenic contamination due to inadequate handling after retrieval and was discarded for transplantation.

The liver was transplanted in a 29-year-old patient with familial amyloid polyneuropathy. He received immunosuppression with cyclosporin, mycophenolate and prednisone, and post-transplantation antibiotic treatment for four days with aztreonam (1 g/8 h/iv) associated with vancomycin (500 mg/6 h/iv) during the first two days (Table 2). In the first 72 hours post-transplantation he presented a maximum ALT of 162 U/L and a maximum INR of 1. The recipient did not present infectious complications during the nine days of hospital admission. Thirteen months after the transplantation the clinical state was normal, he had an INR of 0.99 and a discrete cholestasis without cytolysis.

The left kidney was transplanted in a 46-year-old patient with a background of two previous renal transplantations due to Ig A nephropathy. The cold ischemia time was 19 hours. A pre-transplantation renal biopsy demonstrated interstitial fibrosis and slight tubular atrophy. He received immunosuppressive treatment with tacrolimus, mycophenolate, prednisone and daclizumab, and prophylactic antibiotic therapy for three days post-transplantation with amoxicillin-clavulanate (1 g/8 h/iv) and aztreonam (1 g/day/iv). The recipient did not present infectious complications during the 14 days of hospital admission. The creatinemia one month from transplantation was 153 μmol/L. Thirteen months from transplantation the clinical state of the recipient was normal (Table 2).

Table 2: Liver and kidney recipients from donors with left-sided bacterial endocarditis: Antibiotic treatment and follow-up

Bacterium	Organ Recipients (Age/sex/number of Tx)	Primary Pathology	Antibiotic prophylaxis to recipients post-Tx (days/total doses)	Total days of specific antibiotic treatment [donor plus recipient]	Follow-up/graft function (last SCr, in μmol/L)	Transmission infection donor-recipients
<i>Staphylococcus epidermidis</i>	R. Kidney: 50/M/1 st	Non-affiliated nephropathy	Cloxacillin (7/14 g)	16 [9 + 7]	2 y/Preserved [165]	No
	L. Kidney: 22/F/2 nd	Ig A nephropathy	Cloxacillin (2/4 g)	2 [0 + 2]	2 d/Loss (renal vein graft thrombosis)	No
<i>Streptococcus viridans</i>	Liver: 39/M/1 st	Fulminant hepatitis	Cefepime (1/4 g) plus teicoplanin (1/0.8 g)	6 [5 + 1]	21 m/Preserved	No
	L. Kidney: 63/M/1 st	Chronic pyelonephritis	Amoxicillin-clavulanate (7/10.5 g)	12 [5 + 7]	21 m/Preserved [161]	No
<i>Staphylococcus hominis</i>	R. Kidney: 69/M/1 st	Non-affiliated nephropathy	Amoxicillin-clavulanate (7/10.5 g)	12 [5 + 7]	21 m/Preserved [136]	No
	Liver: 29/M/1 st	Familial amyloid polyneuropathy	Aztreonam (4/12 g) plus vancomycin (2/4 g)	11 [7 + 4]	13 m/Preserved	No
<i>Enterococcus faecalis</i> Ref. (5)	L. Kidney: 46/M/3 rd	Ig A nephropathy	Amoxicillin-clavulanate (3/9 g) plus aztreonam (3/3 g)	10 [7 + 3]	13 m/Preserved [170]	No
	Liver: 51/M/1 st	HCV cirrhosis	Aztreonam (10/30 g) plus vancomycin (10/20 g)	13 [3 + 10]	7 y/Preserved	No
	L. Kidney: 24/F/1 st	Chronic pyelonephritis	Meropenem (10/20 g)	13 [3 + 10]	7 y/Preserved [101]	No
	R. Kidney: 31/M/1 st	Chronic pyelonephritis	Meropenem (10/20 g)	13 [3 + 10]	7 y/Preserved [177]	No

d = day; F = female; g = gram; HCV = hepatitis C virus; L = left; M = male; m = month; R = right; SCr = serum creatinine; Tx = transplant; y = year.

Discussion

In the last decade the number of cadaveric organ donors per million population has remained relatively stagnant in most western countries, while there has been a simultaneous increase in the number of patients on the transplantation waiting list (1). The need for viable organs for transplantation has led many transplanting groups to extend the donor acceptance criteria, including those who die due to systemic bacterial infectious diseases such as meningitis and endocarditis (1–5). In the medical literature there is a report of the successful transplantation of a liver and two kidneys from a cadaveric donor with endocarditis due to *Enterococcus faecalis*, published by our group (5). The donor received specific antibiotic treatment against *Enterococcus faecalis* for three days before multiorgan retrieval and the three recipients also received specific antibiotic treatment prophylactically for ten days post-transplantation. No bacterial infection was transmitted with the grafts in any of the three recipients. Seven years after the transplantations, all three recipients had normal-functioning grafts (Tables 1 and 2).

The cases presented herein followed an identical course to that described by our group in 1998 (5) (Table 2). All four brain dead organ donors had definite bacterial endocarditis confirmed by pathological criteria (Table 1) (12). All presented a subacute course, in contrast with the case described in reference 5, and only donor 4 had heart failure. In the four donors, endocarditis occurred on left-sided heart valves. Left-sided endocarditis has the capacity to cause systemic septic metastasis. The function and ultrasound structure of all grafts were normal. The diagnostic accuracy of ultrasound to rule out septic emboli in abdominal organs, liver and kidneys, can be evidenced with hypoechoic lesions greater than 3 mm in diameter, strongly suggestive of septic metastasis in this setting. At the time of multiorgan retrieval, there were no signs of sepsis in any of the donors and no parenchymal or vascular hepatorenal complications were observed in any of the organs extracted for transplantation. All transplant team members knew the diagnosis of definite endocarditis prior to transplantation, and all the organs were transplanted electively except for one liver which was transplanted in a recipient in urgent medical need. The duration of antimicrobial treatment in all four donors before organ retrieval ranged from one to nine days. Post-transplantation prophylactic antibiotic treatment against the causal germ was carried out in all seven recipients and ranged from one to seven days. The election and duration of the antibiotic treatment was decided by the heads of the transplant units, all of whom were aware of the antibiotic susceptibility pattern of isolated microorganisms. In no case did the antibiotic in a donor coincide with their respective recipients (Tables 1 and 2). Infection by the germ responsible for the endocarditis in the respective donors was not transmitted to any of the seven recipients and none of the hepatorenal

complications described in patients with bacterial endocarditis were observed. Four of the five kidney recipients were alive with normal-functioning grafts during the follow-up period of between 13 and 24 months. The loss of one of the renal grafts in the immediate post-operative period in one of the recipients was not related to the endocarditis of the donor. Neither the removed kidney nor the recipient had signs of infection. Both liver recipients were alive and with normal-functioning grafts during the follow-up of 13 and 21 months, respectively.

Our criteria to assess and accept livers and kidneys from donors with known bacterial endocarditis were based on donor history, liver and kidney function, structural organ study by ultrasound, and macroscopic examination of these organs at the time of organ retrieval: correct function and structure of the transplantable organ together with absence of abscess. In addition, the microorganism responsible for the endocarditis had to be a non-multi-resistant non-virulent bacteria.

Although additional blood cultures were taken in all donors immediately before retrieval, the results were not known until after transplantation. We considered it was not necessary to perform blood cultures during maintenance while the donors were under adequate treatment because a negative blood culture was not mandatory to validate the donor and perform transplants. In addition, we did not prolong the antimicrobial therapy in any of the four donors. Organ retrieval was always prepared after the diagnosis of brain death, as is our practice with standard donors, without considering to add extra-time for antibiotic treatment (Figure 1).

Following transplantation, antimicrobial therapy was maintained in all recipients. All the antibiotics used had proven adequate for the sensitivity pattern anti-causal bacteria. Control of liver and kidney recipients did not change with respect to the standard protocol. All kidney recipients had a daily blood leukocyte count and formula, twice weekly urine culture, graft ultrasound days 1, 7 and 14 post-transplant, and serial blood culture in cases of fever. The control was similar for liver recipients: daily blood leukocyte count and formula, liver ultrasound days 1, 7 and the day before the patient was discharged (Figure 1). As none of the seven recipients had fever, no blood culture was carried out.

Bacterial endocarditis is not an absolute contraindication for the donation of organs for transplantation (5). Endocarditis may invalidate the heart for transplantation but not the other organs from the same donor. On assessing these donors it is important to know the causal bacterium, its virulence, and its sensitivity to antimicrobial treatment. The most frequent cause of bacterial endocarditis is gram-positive cocci, mainly streptococci and staphylococci (13,14). The virulence of these germs is not

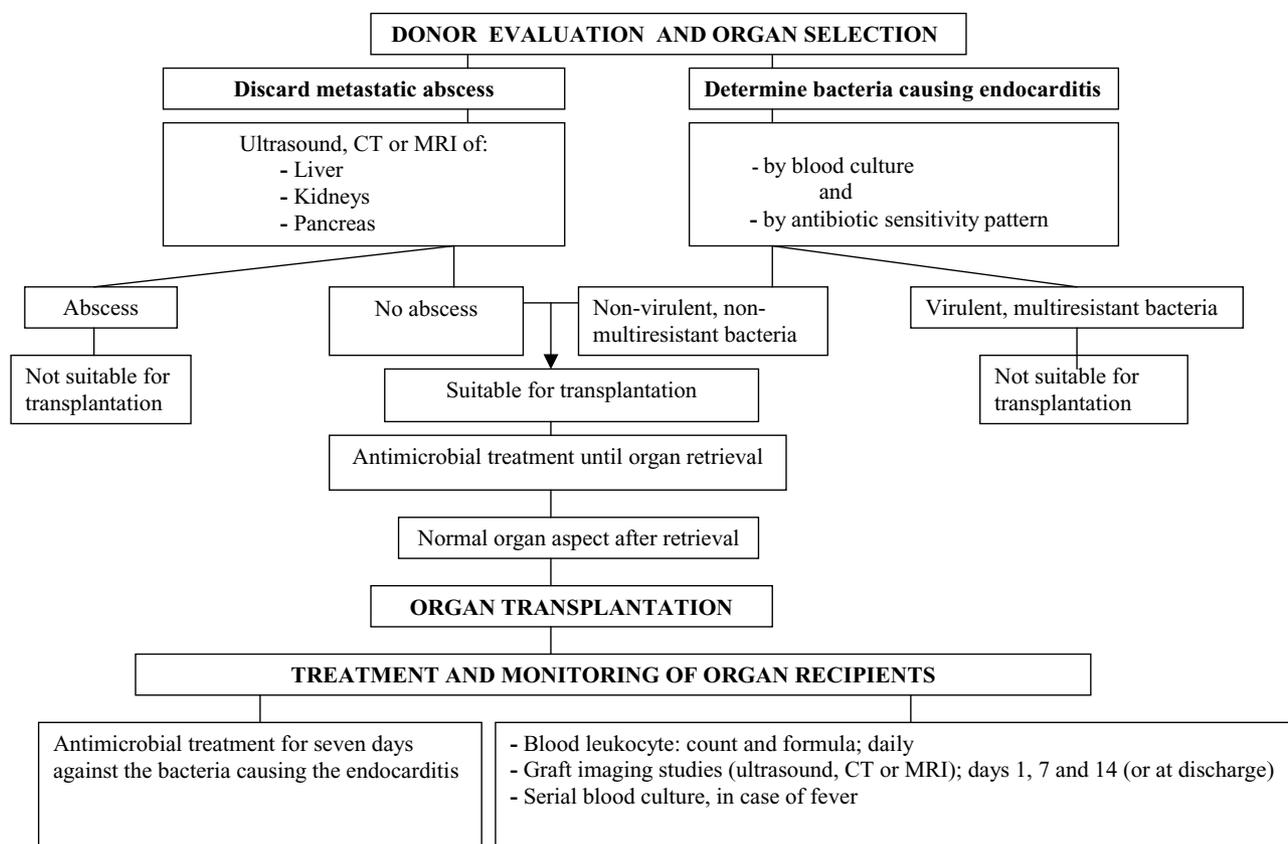


Figure 1: Algorithm of evaluation, selection and treatment of the organ donors with left-sided bacterial endocarditis. Treatment and monitoring of organ recipients.

identical and in particular the pathogens responsible for the endocarditis in the donors that we present, coagulase-negative *Staphylococcus* sensitive to methicillin and *Streptococcus viridans*, are not very virulent, in relative terms, and the documented risk of transmission of infection due to gram-positive bacteria with the grafts is low (15,16). The antibiotic treatment for endocarditis due to these bacteria tends to be effective: cloxacillin and aminoglycosides against staphylococci sensitive to methicillin and β -lactams and aminoglycosides against *Streptococcus viridans* (14). Bacteremia in bacterial endocarditis is generally continuous and of scarce significance: 80% of cases have less than 100 colony-forming units/mL of blood (17). Embolisms and systemic septic metastasis can occur in patients with left-sided bacterial endocarditis. There is a considerable risk of embolism in mitral valve endocarditis, when a vegetation is greater than 1 cm, and when endocarditis is caused by *Staphylococcus* species, specially *S. aureus* (18–21). In our hospital in 2000, one 54-year-old patient died of aortic endocarditis (unidentified microorganism in native aortic valve) and brain death with multiple systemic septic metastases (brain, liver, kidneys and spleen) and was rejected as an organ donor. The prevalence of nephrologic lesions has notably decreased thanks to antibiotic treatment (18,19,22–24). Between 10% and 33% of patients with bacterial en-

docarditis may have acute renal failure of multifactorial etiology: low cardiac output, sepsis, glomerulonephritis, renal infarction and nephrotoxic antibiotics (22,24). Chronic renal failure secondary to glomerulonephritis in patients with bacterial endocarditis is exceptional (25). Hepatic complications, abscesses and mycotic aneurysms in the hepatic artery are exceptional (19,23).

The most frequent causes of death in patients with bacterial endocarditis are structural lesions of the central nervous system and septic complications (20). The incidence of neurological complications ranges from 20%-40%, generally infarctions or intracranial hemorrhages, with a mortality rate of 50%-90% (20,26,27). These lesions are generally localized in the territory of the left middle cerebral artery and are more frequent in mitroaortic endocarditis caused by virulent bacteria such as *Staphylococcus aureus* (27). Some patients with bacterial endocarditis, such as the four donors presented herein, die due to brain death although the incidence is unknown. Over the last four years in our centre, the rate of patients who died with brain death due to bacterial endocarditis was 1.9%.

The incidence of bacteremia in cadaveric organ donors ranges from 5%-10% (1,9,10). Gram-positive bacteria tend

to be the most frequent cause of bacteremia, with a predominance of *Staphylococcus aureus* (9,10). The incidence of donor-recipient bacterial transmission with organ transplantation when antibacterial treatment was performed was 0% (1,9,10). Graft and recipient survival was similar with the transplantation of organs from donors with or without bacteremia at 30 (9) and 60 days (10). In Freeman *et al's* series (9), the 95 donors with bacteremia were treated with adequate antibiotics against the bacterium isolated in the blood cultures and 91% of the recipients received specific antibiotic therapy for an average of 3.8 days. Bacterial or fungal infection or colonization may be present in almost 60% of cadaveric donors and it is mainly localized in the respiratory and urinary tracts. Some 15% present pneumonia, as seen by chest X-ray, and 10% have a positive blood culture, mainly gram-positive bacteria: *Staphylococcus epidermidis* or coagulase-negative *Staphylococcus* (1). In 1993 in our hospital we established a protocol for the treatment and prophylaxis of bacterial and mycotic infection in the organ donor (1). From 1994 to 1998, 622 organs were obtained from 199 effective actual organ donors, and were transplanted in 596 recipients, and 60% of the donors had had at least one positive culture for bacteria or fungi. In our experience, the incidence of transmission of infection from donor to recipient with these grafts was 0% [unpublished data].

To summarize, we can conclude that with adequate antibiotic therapy, organs without structural lesions from donors with bacterial endocarditis can be transplanted without adding additional risks of infection transmission or graft dysfunction in the recipients. In our experience with 10 organ transplantations, seven kidneys and three livers from five cadaveric donors with bacterial endocarditis, nine of the 10 organ recipients were alive during the follow-up period of between 13 months and seven years with normal-functioning graft (Table 2). Short- and long-term graft and recipient survival with organ transplantation from donors with bacterial endocarditis can be similar to that of standard donors.

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