mechanical mitral prosthetic valve was implanted. During the immediate postoperative period, the patient recovered sinus rhythm. The subsequent clinical course was favorable and he completed 6 weeks of antibiotic therapy. The results of subsequent blood cultures were negative and echocardiographic follow-up showed no images compatible with IE (Figure 2C and Figure 2D).

Acute coronary syndrome (ACS) is an early and uncommon complication of IE.[1,2] Its incidence is difficult to calculate; in the series reported by Manzano et al.,[1] ACS occurred as a complication of IE in 14 (2.9%) of 586 patients. Among prosthetic valves, the most frequently affected was the aortic valve.[1] The syndrome is acute, developing in the first week in most patients, and is most frequently associated with aortic valve infection, severe valvular regurgitation, large periannular complications, and increased mortality.[1] ACS is not related to any specific microorganism in particular but a high percentage of cases are associated with virulent pathogens such as *Staphylococcus aureus*.[1]

The injured territory is usually anterior or anterolateral,[1] while presentation with ST-segment elevation is rare. The most common cause is extrinsic compression of the coronary arteries secondary to large periannular complications (pseudoaneurysms and abscesses), followed by septic coronary embolism.[1,2] Other reported mechanisms are the ischemia triggered by the systemic inflammatory status, with an increase in the myocardial oxygen demand associated with febrile syndrome, anemia and/or sepsis, as well as the severe aortic regurgitation produced by myocardial ischemia due to the reduction in perfusion pressure and coronary reserve.[1,2]

Fibrinolytic therapy is not recommended if this complication is suspected, as it is related to a higher incidence of intracerebral hemorrhage and mortality.[3,4] It is thought that this may be due to the high prevalence of silent cerebral infarctions and mycotic aneurysms due to septic embolisms, together with the bleeding risk associated with bacteremia.[4] Early surgery significantly reduces embolic events.[5] As a therapeutic strategy, Manzano et al.[1] propose surgical referral–without previous coronary angiography–of all patients with non–ST-elevation ACS due to aortic IE and periannular complications, prior to performing transesophageal echocardiography.[1] In the case of ST-elevation ACS and/or absence of periannular complication, these authors recommend the performance of coronary angiography and, if coronary occlusion is observed, they opt for balloon angioplasty and stent placement, if necessary,[1] with coronary angiographic monitoring at 10 to 15 days, because of the risk of a coronary mycotic aneurysm following stent placement.[1]

However, other authors,[4] including our group, believe that the risk involved in stent placement,[1,6] in a setting of bacteremia and absence of atherosclerotic plaque, supports the benefits of thromboaspiration as the initial strategy–and if successful, the only strategy–for these patients. This approach has the added advantage of allowing the use of antiplatelet monotherapy, thus avoiding the bleeding risk associated with dual antiplatelet therapy after stenting. Finally, for patients with periannular complications and no ST segment elevation, coronary computed tomography angiography could be the alternative of choice in the study of the coronary anatomy prior to any surgical intervention.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.rec.2016.10.003.

Javier Urmeneta Ulloa,* Isabel Molina Borao, Esther Sánchez-Insa, Carmen Aured Guallar, Carlos López Perales, and Juan Sánchez-Rubio

Departamento de Cardiología, Hospital Universitario Miguel Servet, Zaragoza, Spain

*Corresponding author:
E-mail address: javierurmenetaulloa@gmail.com (J. Urmeneta Ulloa).

Available online 11 November 2016

REFERENCES

1. Manzano MC, Vilacosta I, San Román JA, Aragoncillo P, Sarriá C, López D, et al. Síndrome coronario agudo en la endocarditis infecciosa. *Rev Esp Cardiol.* 2007;60:24–31.
2. San Román García E, Morales Pérez LM, Álvarez Plasencia R. Acute coronary syndrome with infective endocarditis. *Rev Fed Arg Cardiol.* 2013;42:222–223.
3. Perera R, Noack S. Acute myocardial infarction due to septic coronary embolism. *N Engl Med.* 2000;342:977–978.
4. Whitaker J, Saha M, Fulmali R, Perera D. Successful treatment of ST elevation myocardial infarction caused by septic embolus with the use of a thrombectomy catheter in infective endocarditis. *BMJ Case Reports.* 2011. http://dx.doi.org/10.1136/bcr.03.2011.4002.
5. Castiñeira-Busto M, Abu-Assi E, Martínez-Monzonis A, Peña-Gil C, Raposeiras-Roubin S, González-Juanatey JR. Predicción del riesgo de embolia sistémica séptica en pacientes con endocarditis infecciosa. *Rev Esp Cardiol.* 2015;68:78–79.
6. Taniike M, Nishino M, Egami Y, Kondo I, Shutta R, Tanaka K, et al. Acute myocardial infarction caused by a septic coronary embolism diagnosed and treated with a thrombectomy catheter. *Heart.* 2005;91:e34.

http://dx.doi.org/10.1016/j.rec.2016.10.003
1885-5857/

Peritoneal Dialysis in Constrictive Pericarditis: A Report of Three Cases

Diálisis peritoneal en pericarditis constrictiva: a propósito de tres casos

To the Editor,

Constrictive pericarditis (CP) usually manifests as systemic congestion and is associated with high morbidity and mortality unless specific maintenance treatment is administered.[1,2] Continuous ambulatory peritoneal dialysis (CAPD) has emerged as a safe and effective alternative treatment in advanced heart failure (HF).[3–5] Here, we describe the outcome in 3 patients with CP included in a CAPD program that changes the dialysis solution (1.36%-2.27% glucose) 2 to 4 times a day. The baseline characteristics of the patients are shown in Table 1.

The first patient was a 74-year-old man with a mechanical mitral valve prosthesis and chronic kidney disease. CP was confirmed with imaging techniques (Figure 1 of the supplementary material). After failed pericardiectomy, he progressed to a state of refractory congestive HF and was therefore included in the CAPD program. At 1 and 6 months from the start of treatment, clinical and biochemical parameters improved, with no deterioration in baseline kidney function (Figure). The patient has experienced no decompensation episodes after 16 months of CAPD. Complications included infection of the catheter opening, which was treated in the outpatient setting, and peritonitis, which required hospital admission and temporary catheter withdrawal.

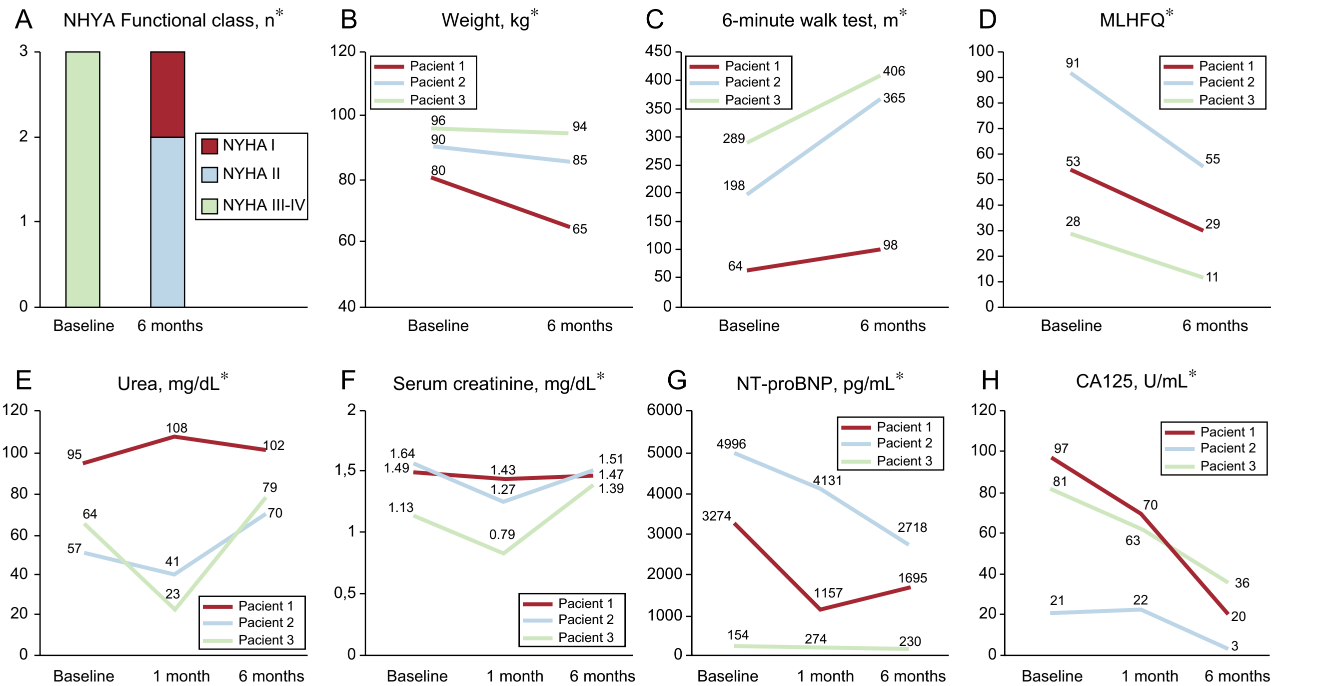

Figure. Laboratory parameters, functional capacity, and quality of life after the start of CAPD over time. CA125, cancer antigen 125; CAPD, continuous outpatient peritoneal dialysis; MLHFQ, Minnesota Living with Heart Failure Questionnaire; NT-proBNP, N-terminal pro-brain natriuretic peptide; NYHA, New York Heart Association functional class. $^{*}P < .05$ for all comparisons.

Table
Baseline Characteristics

	Case 1	Case 2	Case 3
Age, y	74	75	72
Sex	Male	Male	Male
Hypertension	Yes	Yes	No
Diabetes mellitus	No	Yes	No
Dyslipidemia	No	No	No
Ischemic heart disease	No	Yes	No
Chronic obstructive pulmonary disease	No	Yes	No
Rheumatic disease	No	No	Yes
Vital signs			
Systolic blood pressure, mmHg	100	80	120
Diastolic blood pressure, mmHg	50	55	60
Heart rate, bpm	74	60	80
Electrocardiogram and echocardiogram			
Rhythm	AF	AF	Sinus
LVEF, %	52	57	59
LVEDD, mm	50	47	46
LVESD, mm	35	29	30
Septum, mm	13	11	10
Posterior wall, mm	13	11	10
Left ventricular mass, g	152	169	142
E Wave, m/s	2.19	1.32	1.43
A Wave, m/s	—	—	0.58
EDT, ms	268	135	254
E/A ratio	—	—	2.466
Septal e', cm/s	9.46	—	14.9
Lateral e', cm/s	8.09	14.8	—
E/e' ratio	24.9	9	9.6
Mitral valve regurgitation, grade	0	I	I
Tricuspid valve regurgitation, grade	I	III	I
Estimated systolic pulmonary artery pressure, mmHg	45	51	32
LA, mm	70	54	42
LA volume, mL	131	—	126
Indexed LA volume, mL/m^2	—	—	62.69
LA area, cm^2	37	32	—
RA area, cm^2	32	—	26
TAPSE, mm	19	15	21
S', cm/s	8	10.7	8.97
IVC diameter, mm	31	16	31
Inspiratory IVC collapse > 50%	No	No	No
Laboratory parameters			
Hemoglobin, g/dL	10.4	10.4	12.2
Urea, mg/dL	95	77	42
Creatinin, mg/dL	1.36	1.32	0.73
eGFR, mL/min/1,73 m^2	54	56	63
Na, mEq/L	138	139	139
K, mEq/L	3.7	4	4.3
NT-proBNP, pg/mL	4950	3496	101
CA125, U/mL	80	24	81

AF, atrial fibrillation; CA125, carbohydrate antigen 125; EDT, e-wave deceleration time; eGFR, estimated glomerular filtration rate; IVC, inferior vena cava; LA, left atrium; LVEDD, left ventricle end-diastolic diameter; LVESD, left ventricle end-systolic diameter; LVEF, left ventricular ejection fraction; NT-proBNP, N-terminal pro-brain natriuretic protein; RA, right atrium; TAPSE, tricuspid annular plane systolic excursion.

The second patient was a 75-year-old man with chronic kidney disease and chronic ischemic heart disease, who had undergone cardiac surgery for perforation and cardiac tamponade after ablation of ventricular tachycardia. A few weeks after surgery, he was admitted for acute HF with clear signs of systemic congestion. Echocardiography and cardiac magnetic resonance imaging revealed early-stage CP (Figure 2 of the supplementary material). The patient responded slowly but satisfactorily to intensive diuretic therapy but experienced an early clinical relapse after hospital discharge. Pericardiectomy was ruled out and he was included in the CAPD program. As for the previous patient, this patient showed clear improvement in the first few weeks, and a noteworthy improvement in laboratory parameters, quality of life, and functional status at 6 months (Figure). At 36 months after starting CAPD, the patient had not been hospitalized although he had experienced 2 episodes of peritonitis treated in the outpatient setting.

The third patient was a 72-year-old man who was admitted for anasarca. He had a history of rheumatoid arthritis and sleep apnea hypopnea syndrome. Diagnosis of CP was confirmed during his hospital stay (Figure 3 of the supplementary material). After discharge, he experienced early clinical relapse despite intensive diuretic therapy. Surgery was ruled out and he was included in the CAPD program. During follow-up, an improvement in functional class, quality of life, and congestion-related biochemical parameters was observed in the first 6 months (Figure). At 12 months, he remained in New York Heart Association functional class I. During this time, there were no readmissions and no CAPD-related complications.

This is the first series to show that CAPD could be a therapeutic alternative in patients with CP. Observational studies suggest that CAPD is effective in patients with HF, refractory congestion, and a certain degree of concurrent kidney dysfunction.[3–5] These studies have shown a marked decrease in fluid overload and improved functional capacity, quality of life, and prognosis, with an acceptable safety profile and additional cost.[3–5] In addition, this technique has a series of noteworthy additional theoretical and logistic advantages. First, the technique is relatively simple and is used in the outpatient setting. Second, it maintains residual kidney function. Third, it provides a slow and continuous ultrafiltration, which is associated with hemodynamic stability.[3–5]

The present case series shows that implementation of CAPD in patients with HF is feasible. This technique is associated with a substantial decrease in parameters related to the severity of fluid overload (weight and plasma concentrations of cancer antigen 125 and natriuretic peptides) and with improved functional capacity and quality of life.

In view of these preliminary findings, CAPD could be considered as an alternative to pericardiectomy for patients with advanced CP and high surgical risk or as a bridge to surgery after postsurgical relapse. In our series, 2 of the patients had a history of prior cardiac surgery (1 had undergone failed pericardiectomy).

These results should be confirmed with larger series of patients and in a more controlled setting. As in the case of CP, it is particularly important to identify clinical characteristics that may identify patients who *a priori* most stand to benefit from this technique of ultrafiltration.

FUNDING

The present study was partly funded with a grant from the Instituto de Salud Carlos III and FEDER, Red de Investigación Cardiovascular, Program 7 (RD12/0042/0010) and PIE15/00013.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.rec.2016.09.025.

Ingrid Cardells,[a] Ana Payá,[a] Lourdes Bondanza,[a] Gema Miñana,[a] Miguel González,[b] and Julio Núñez[a,*]

[a]*Servicio de Cardiología, Hospital Clínico Universitario, INCLIVA, Universitat de València, Valencia, Spain*
[b]*Servicio de Nefrología, Hospital Clínico Universitario, INCLIVA, Universitat de València, Valencia, Spain*

* Corresponding author:
E-mail address: yulnunez@hotmail.com (J. Núñez).

Available online 1 November 2016

REFERENCES

1. Authors/Task Force Members. Adler Y, Charron P, Imazio M, Badano L, Barón-Esquivias G, et al. 2015 ESC guidelines for the diagnosis and management of pericardial diseases: The Task Force for the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology (ESC), endorsed by: The European Association for Cardio-Thoracic Surgery (EACTS). *Eur Heart J.* 2015;36:2921–2964.
2. Porta-Sánchez A, Sagristà-Sauleda J, Ferreira-González I, Torrents-Fernández A, Roca-Luque I, García-Dorado D. Pericarditis constrictiva: espectro etiológico, presentaciones clínicas, factores pronósticos y seguimiento a largo plazo. *Rev Esp Cardiol.* 2015;68:1092–1100.
3. Lu R, Muciño-Bermejo MJ, Ribeiro LC, Tonini E, Estremadoyro C, Samoni S, et al. Peritoneal dialysis in patients with refractory congestive heart failure: a systematic review. *Cardiorenal Med.* 2015;5:145–156.
4. Núñez J, González M, Miñana G, García-Ramón R, Sanchis J, Bodí V, et al. Continuous ambulatory peritoneal dyalisis as a therapeutic alternative in patients with advanced congestive heart failure. *Eur J Heart Fail.* 2012;14:540–548.
5. Núñez J, González M, Miñana G, Garcia-Ramón R, Sanchis J, Bodí V, et al. Diálisis peritoneal ambulatoria continua y evolución clínica de pacientes con insuficiencia cardiaca congestiva refractaria. *Rev Esp Cardiol.* 2012;65:986–995.

http://dx.doi.org/10.1016/j.rec.2016.09.025
1885-5857/