

CASE REPORT

Clinical and dialysis-related characteristics of extremely long-term hemodialysis survivors: Three case reports

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Abstract

More than 40-year hemodialysis survivors are living evidence of the achievements of hemodialysis therapy. We present the case reports of three patients treated by chronic hemodialysis for 47 (Patient 1), 43 (Patient 2), and 42 years (Patient 3) from a single center. These patients possess characteristics that were already shown to be associated with improved long-term survival: initiation of hemodialysis at a young age, absence of diabetes, and a relatively low and stable body weight with good nutritional status. Although all of them underwent complications of long-term hemodialysis treatment, they lived (Patient 3), or are still living (Patients 1 and 2), an independent and full life. Their hemodialysis prescriptions included long sessions with a moderate blood flow rate, state-of-the-art hemodialysis technology, vascular access surgeries and care provided by nephrologists, good overall management of chronic kidney disease, and preventive measures and/or immediate action in case of cardiovascular disease.

KEYWORDS

end-stage renal disease, hemodialysis, long-term survival

INTRODUCTION

Hemodialysis techniques have improved remarkably and the survival rates of hemodialysis patients are increasing.¹ Moreover, long-term survival does occur and several patients have been described as having survival periods of more than 30 years.^{2–5}

We present three extremely long-term hemodialysis survivors who were on maintenance hemodialysis at the University Medical Center Ljubljana for 42 years or more. Sociodemographic data, medical history, and dialysis-related information were retrospectively collected from hospital charts, and interviews with the patients were performed according to a local standardized questionnaire for long-term

renal replacement therapy survivors. Written informed consent was obtained from all three patients for publication of this case series and the accompanying images. Clinical characteristics that may have influenced the patients' survival and well-being are emphasized and discussed.

CASE REPORTS

Patient 1

A 77-year-old Caucasian female with chronic glomerulonephritis has been treated with hemodialysis for 47 years. She started chronic hemodialysis in January 1973, at the

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age of 30. She has coronary heart disease, arterial hypertension, hyperlipidemia, and peripheral artery disease. She has had hemodialysis three times weekly for 4.5 hours with an average blood flow of 250 ml/min. Throughout this period her body weight was low: her current body weight is 51.5 kg and body mass index 18.9 kg/m². Her mean serum albumin in the past year was 35.5 g/L. She is on epoetin therapy and receives intravenous iron.

In the past, she had four arteriovenous fistulas on both forearms and upper arms. Her first native radiocephalic arteriovenous fistula on the left forearm lasted for 35 years, having been cannulated by the patient herself for many years. Due to thrombosis of her last arteriovenous fistula in 2015, she has since been dialyzed through two single-lumen precurved jugular noncuffed central venous catheters locked with citrate, with no catheter-related bloodstream infections. She refused to receive calcium-containing phosphate binders despite often being mildly hypocalcemic but instead used aluminum hydroxide as a phosphate binder for decades.



FIGURE 1 Patient 2: After 43 years of hemodialysis, he is still perfectly fit, managing a small ski resort and regularly skiing

She suffered from many burdens of long-term hemodialysis: she developed β_2 -microglobulin-associated amyloidosis with spinal canal stenosis and carpal tunnel syndrome and underwent total parathyroidectomy because of refractory hyperparathyroidism. Nonetheless, she worked as a dentist for decades. At present, she is confined to a wheelchair because of spinal stenosis, but still living alone in her home.

Patient 2

wa 57-year-old Caucasian male with chronic glomerulonephritis has been on hemodialysis for 43 years. Due to malignant hypertension, a bilateral nephrectomy was done in 1977, and he was subsequently placed on hemodialysis in April 1977 at the age of 14. At the age of 29, he received a deceased donor kidney transplant. However, only 1 week later, a transplantectomy was performed due to primary nonfunction (renal artery thrombosis). He has coronary heart disease and hyperlipidemia. In the past, he had hemodialysis three times weekly for 6 hours, but for the last 11 years, he has had nocturnal dialysis (8 hours, three times per week) with an average blood flow of 200 ml/min. His body weight has been low for the entire period of his hemodialysis treatment: his current body weight is 60 kg and body mass index 21.3 kg/m². His mean serum albumin in the past year was 39.5 g/L. He receives intravenous iron and epoetin.

Thus far, he has had two arteriovenous fistulas on the left upper arm and a radiocephalic arteriovenous fistula on the right forearm, which thrombosed and was abandoned in 2014. A polytetrafluoroethylene stretch graft was then created on his right upper arm, which to date has undergone seven surgical thrombectomies performed by a nephrologist, and remains in function.

Regarding complications of long-term hemodialysis, he underwent a parathyroidectomy due to refractory hyperparathyroidism, and developed β_2 -microglobulin-associated amyloidosis with carpal tunnel syndrome.

He has always been a bit stubborn when it comes to adjusting his lifestyle to hemodialysis, but this turned out to be useful in some cases: when he started hemodialysis treatment, there was a common belief that regular workout was not recommended for such patients, but he has nonetheless always been physically active. He even attempted to climb Mt. Triglav (2864 m), Slovenia's highest peak, with significant anemia (hemoglobin value 49 g/L). For him the introduction of recombinant human epoetin therapy thus represented a giant step toward a better quality of life. At present, he is perfectly fit and has an active lifestyle while running a small ski resort (Figure 1).

Patient 3

A 73-year-old Caucasian male with postinfectious glomerulonephritis was treated with hemodialysis for 42 years. He began hemodialysis in March 1978, at the age of 31. He died in April 2020 due to coronavirus disease 2019. He had coronary heart disease, arterial hypertension, and hyperlipidemia. His hemodialysis regimen included three sessions per week for 4–5 hours (nocturnal for many years), with an average blood flow of 230 ml/min. Overall, his body weight was low: his last checked body weight was 54 kg and body mass index 20.6 kg/m². His mean serum albumin in the last year was 36.5 g/L. He did not receive any iron supplements or epoetin in the last year of life.

He had nine arteriovenous fistulas on the forearm and upper arm regions on both sides, and a polytetrafluoroethylene stretch graft in the right femoral region, created in 2004. We endeavored to retain the functioning of this graft for as long as possible: four successful thrombectomies were performed. Following an unsuccessful thrombectomy in 2009, one single-lumen nontunneled precurved central venous catheter in the left jugular vein (arterial line) and a peripheral vein (venous line) were used as vascular access, without any catheter-related bloodstream infections.

Despite high-quality hemodialysis, the patient had to undergo a total parathyroidectomy because of refractory hyperparathyroidism. He also developed β 2-microglobulin-associated amyloidosis with spinal canal stenosis and carpal tunnel syndrome. Nevertheless, he lived a full life working as a carpenter.

DISCUSSION

More than 40-year hemodialysis survivors are living evidence of the achievements of hemodialysis therapy.⁶ The presented patients possess characteristics that were already shown to be associated with improved long-term survival: initiation of hemodialysis at a young age, absence of diabetes,^{5,7–9} and a relatively low and stable body weight⁸ with good nutritional status.^{5,10}

Reliable vascular access plays a central role in long-term survival, being a prerequisite for effective dialysis.¹¹ Our patients have had well-functioning arteriovenous fistulas for the vast majority of their time on hemodialysis. On the other hand, we have demonstrated that temporary central venous catheter could also be an acceptable long-term vascular access when the placement of an arteriovenous fistula is no longer feasible.¹² Most importantly, all vascular access-related surgeries were performed by nephrologists in the local operating room of

the dialysis center, which enabled the timely creation of vascular access and its state-of-the-art care.

It was shown that stable body weight plays an important role in long-term survival.⁸ Furthermore, nutritional markers are important predictors of mortality in hemodialysis patients: a strong inverse association was observed between the mortality of hemodialysis patients and their serum albumin levels, with the mortality risk being 1.38 times higher in patients with serum albumin concentrations below 35 g/L.¹³ This is in accordance with our findings: all three presented patients had serum albumin concentrations above 35 g/L despite their low body mass indexes.

Long-term hemodialysis survivors suffer from a number of complications, in particular uremic osteodystrophy and β 2-microglobulin-associated amyloidosis with spinal stenosis, carpal tunnel syndrome, bone cysts, and arthropathy. Cardiovascular disease remains the major cause of mortality among patients on chronic hemodialysis.^{14,15} Despite all the preventive measures (closely monitored and well-regulated arterial hypertension and hyperlipidemia, absence of smoking), all three presented patients developed coronary heart disease. Close observation and early detection of cardiovascular disease, along with immediate action in case of an acute cardiovascular event, are therefore a necessity.¹⁶

In conclusion, we believe that the extremely long-term survival in the presented cases has been achieved by long hemodialysis sessions¹⁷ with a moderate blood flow rate, state-of-the-art hemodialysis technology, prompt vascular access surgeries and care provided by nephrologists, good overall management of chronic kidney disease, and preventive measures and/or immediate action in case of cardiovascular disease.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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