Clin Kidney J (2013) 6: 90–92
doi: 10.1093/ckj/sfs175
Advance Access publication 4 January 2013

Clinical Report

CKJ

Dialysis by the book? Treatment of renal failure in a 101-year-old patient

Ezra Gabbay[1], Moshe Hersch[2], Linda Shavit[1], Lev Shmuelevitz[2], Yigal Helviz[2], Henry Shapiro[2] and Itzchak Slotki[1]

[1]Department of Adult Nephrology, Shaare Zedek Medical Center, Jerusalem, Israel and [2]Intensive Care Unit, Shaare Zedek Medical Center, Jerusalem, Israel

Correspondence and offprint requests to: Ezra Gabbay; E-mail: egabbay@szmc.org.il

Abstract
While dialysis historically began as treatment intended for younger patients, it has, over time, increasingly been extended to treat elderly patients with a high comorbidity burden. Data on the outcomes of dialysis in these patients show that in some cases it confers no benefit and may be associated with functional decline. We describe a 101-year-old male patient with chronic kidney disease (CKD), admitted to the intensive care unit (ICU) with exacerbation of heart failure and sepsis. He experienced acute deterioration of renal function, with oliguria and acidosis. The patient's healthcare proxy insisted that dialysis be initiated despite his extremely advanced age, citing the patient's devout religious beliefs. He underwent 56 dialysis treatments over the course of ∼4 months after which he died as a result of septic and cardiogenic shock. Our case is unique, in that it may represent the oldest individual ever reported to start haemodialysis. It illustrates the ever-growing clinical and ethical challenges posed by the treatment of renal failure in the geriatric population.

Keywords: renal insufficiency; elderly; haemodialysis; medical futility

Cast me not off in the time of old age;
Forsake me not when my strength faileth.

Psalm 71:9, "The Prayer of an Old Man"

Background

Haemodialysis is increasingly utilized to treat end-stage-renal-disease (ESRD) and acute kidney injury (AKI) among elderly patients with significant comorbidities [1]. The benefits for these patients in survival, quality of life, and functional status are, at best, uncertain, [2, 3]. Nevertheless, withholding or withdrawing dialysis based on age remains problematic, particularly when the patient and healthcare proxy insist that it be performed. We describe a 101-year-old patient, who developed AKI in the intensive care unit (ICU). His legally appointed healthcare proxy insisted that dialysis be initiated, based on the patient's wishes, values and religious belief. We discuss the historical, clinical, ethical, legal and cultural context in which the decision to dialyze this patient was made, the outcome of dialysis in this case, and the implications for patients and clinicians.

Case report

A 101-year-old Ashkenazi Jewish male patient was admitted with pulmonary oedema requiring mechanical ventilation. Attempts at weaning from mechanical ventilation were unsuccessful and a tracheostomy was performed. He subsequently developed gram-negative bacteraemia and sepsis with ensuing haemodynamic instability. After 5 weeks of hospitalization, he became oliguric and acidemic, with concurrent rise in the creatinine level from a baseline of ∼177 micromole/L to 335 micromole/L.

Past medical history was remarkable for an abdominal aortic aneurysm, ischaemic heart disease, tricuspid regurgitation, pulmonary hypertension, congestive heart failure, pacemaker insertion and chronic kidney disease (CKD) (attributed to diabetes and cardiorenal syndrome). His intellectual capacity was preserved until the hospitalization and he was an active rabbi and teacher despite his very advanced age.

At the time of worsening kidney function, the patient was extremely frail and unable to speak because of the tracheostomy tube (respiratory instability precluded the use of a speech valve). Subsequently his level of consciousness was decreased, possibly due to uraemic

encephalopathy. It was, therefore, impossible to directly elicit his wishes regarding treatment. However, based on the discussions with his family including his legally appointed healthcare proxy, it was very clear that the patient's beliefs and values were strongly consistent with maximal efforts with life-prolonging therapy regardless of age. It was, therefore, decided to proceed with haemodialysis and a cuffed, tunneled catheter was placed in the right internal jugular vein for that purpose. Dialysis was initiated ∼1 month before his 102nd birthday. He underwent 56 haemodialysis treatments over ∼4 months, until his death. The patient's extreme frailty made a quantitative assessment of his quality of life impossible. However, there were times after dialysis was initiated, when he was alert and even attended public prayers in the hospital's synagogue. The patient spent the entire time between the initiation of dialysis and his death in the hospital. He expired likely as a result of worsening heart failure and recurrent sepsis.

Discussion

Historically, haemodialysis was originally conceived as a treatment for young patients with AKI or ESRD, whose prognosis was otherwise promising. The first organized dialysis programme, which began to operate in Seattle in the 1960s, formally excluded patients over 45 years old [4]. In the 1970s, the United States Congress debated extending Medicare coverage for dialysis for ESRD. In 1971, a patient appeared before the House Committee on Ways and Means, and briefly received haemodialysis treatment during a hearing. The fact that he was a young family man with potential for rehabilitation and return to gainful employment is thought to have influenced the decision to approve Medicare coverage for dialysis in the USA [5]. In the following decades, however, dialysis has increasingly been given to elderly patients with significant comorbidities. The average age of dialysis patients has gradually risen to over 60 [6] and the rate of octogenarians and nonagenarians starting dialysis increased dramatically as well [1]. It was noted that 'in the 21st century, nephrologists will be forced to practice mainly geriatric medicine as amateur geriatricians, having only limited knowledge of the special challenges posed by the elderly' [7].

Studies of outcomes in elderly patients starting haemodialysis showed mixed results. In one study, survival of patients ≥80 years of age with ESRD who started haemodialysis showed a 1-year mortality rate of 46%. Predictors of mortality included older age, non-ambulatory status, and comorbid conditions [1]. Others found that independent predictors of death within 1 year on dialysis in patients over 80 were poor nutritional status, late referral, and functional dependence [8]. A study of outcomes in elderly patients with ESRD showed that in those with a high comorbidity score, dialysis did not confer a survival advantage over conservative management [2]. Among elderly nursing home patients, initiation of haemodialysis was associated with a 58% mortality rate in the first year, and a sharp decline in the functional status [3].

Our patient experienced acute on chronic renal failure and started dialysis in the ICU. Prognostic prediction in this setting is difficult. The impact of age is strongly influenced by covariates, e.g. multi organ failure, preexisting CKD and comorbidity [9].

To our knowledge, our patient was the oldest individual ever reported to start haemodialysis, at least in the acute setting. One report from 2004 described a 100-year-old nursing home resident who started haemodialysis for uraemia, resulting in improved quality of life and mental status [10].

The decision to start haemodialysis in this patient was a very difficult one. From a strictly clinical perspective, it was clear that his advanced age, poor functional status and comorbidities would greatly decrease the objective benefit of dialysis. As medical science continues to advance, physicians face demands for aggressive treatments that are technically feasible but often seem inappropriate when the overall prognosis is very poor. In an attempt to resolve this issue, some have tried to empirically define futile treatments [11], but this approach has not resulted in a solid foundation for medical decision-making [12].

The Renal Physicians Association and the American Society of Nephrology guidelines, *Shared Decision-Making in the Appropriate Initiation of and Withdrawal from Dialysis,* address situations (such as the elderly patient with comorbidities and poor functional status) where clinicians should consider to forgo dialysis, particularly when the expected benefits do not justify the risks. However, the guidelines state that it is preferable to avoid unilateral decisions, whenever possible, through conflict resolution processes and other alternatives such as time limited trials of dialysis [13]. The law in most jurisdictions (with the notable exception of the Texas Advance Directive Act of 1999) [14] does not provide physicians with authority to deny life-saving treatments when the patient or proxy asks for it. In some cases, a court decision even permitted the dialysis of a patient in a chronic vegetative state [15].

In Israel, the legal framework for end-of-life decisions is the 'Dying Patient Act' of 2005. This legislation allows physicians to withhold life-sustaining treatments for patients with an expected survival of <6 months, if, and only if, the patient or healthcare proxy clearly wishes that treatment be withheld. The spirit of this law is to strike a balance between the value of life and patient autonomy and to avoid excessive suffering in the final stages of life. However, the law denies physicians the authority to withhold treatment when the patient or proxy clearly wishes it to be given, unless treatment is deemed to be harmful to the patient [16].

In our patient, it was reasonable to assume that dialysis could provide a modest prolongation of life (as it in fact did). The principal reason for starting dialysis, however, was to comply with the patient's wishes. He was a devout adherent of Ultra-Orthodox Judaism, and believed firmly in the supreme sanctity of human life. While there is some nuance in the application of this principle in the treatment of patients with poor prognosis, most Ultra-Orthodox rabbis have argued that all technically plausible interventions that can significantly prolong life without undue suffering should be considered, even when the chance of success is uncertain [17]. This was also the conviction of our patient himself. The additional 4 months of our patient's life, attributable to dialysis, were therefore highly significant in this context. His dialysis did not result in excessive pain and suffering, and resource utilization (treatment costs, allocation of nursing and technician staff and time in ICU) was considerable but not prohibitive.

In conclusion, clinicians considering dialysis in very elderly patients should remember that it often fails to

provide measurable benefit. However, the outcome of our patient, likely the oldest individual ever reported to start haemodialysis in the acute setting, illustrates that it is sometimes possible to achieve at least modest gains in survival or quality of life. This outcome may be highly significant from the patient's perspective, particularly in the context of a belief system that places supreme value on the preservation of human life. Many physicians may have understandable misgivings about aggressive treatments in very elderly, chronically ill patients. However, neither empirical evidence, nor professional guidelines, nor the law in most countries, allow physicians unlimited discretion to override the patient's wishes and deny life-prolonging treatment. These dilemmas concerning dialysis in elderly, chronically ill people, pose an ever-growing challenge to patients, families, and physicians, and validate the impression of bioethicist Albert Jonsen that it was dialysis that gave birth to bioethics [18].

Conflict of interest statement. None declared.

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Received for publication: 21.11.12; Accepted in revised form: 26.11.12