



Review

DIALYSIS METHODS AND RENAL TRANSPLANTATION – A FAIR COMPARISON

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ABSTRACT

PURPOSE of the article is to present a medical and financial comparison between dialysis modalities (hemo- and peritoneal dialysis) and kidney transplantation since public opinion is sometimes formed in misleading and erroneous way. METHODS include interpretation of existing literature on the topic with examples of contradictory views and results presented RESULTS favor kidney transplantation as a more physiological method, which secures a total compensation of renal function, while dialysis although a lifesaving treatment is a compromise with the state of chronic renal insufficiency. Shortage of available kidney donors does not allow a high percent of patients to receive a kidney transplant. CONCLUSION There is still a large potential for progress in the field of transplantation. Some basic medical discoveries (the unveiling of the human genome, cell bioengineering) and technical equipment elaboration (artificial heart) keep the faith alive, that in next decades totally artificial implantable kidneys and other vital organs will be available.

Key words: hemodialysis, peritoneal dialysis, renal transplantation, financial effectiveness, quality of life, organ donation shortage

INTRODUCTION

Dialysis treatment modalities (DT) and renal transplantation (RT) had saved and prolonged million human lives after the start of their application in the second half of the twentieth century. Initial successful dialysis treatments of acute renal failure (ARF) are dated back to 1945, while the first successful renal transplantation in twin brothers was announced 10 years later. Although, there are some publications dating back to 1968, which state that “the 2 techniques are interdependent and complimentary rather than competitive” (1); these two alternative methods of treatment in the advanced stages of chronic kidney disease (CKD) are often opposed.

Media coverage of this problem sometimes form the erroneous impression that the only method, which creates opportunities for a decent life is kidney transplantation and all efforts must be pointed in this direction. Hence, patients in medical conditions requiring start of the treatment, sometimes prolong the time to take that decision and finally commence dialysis in a poor state and endure a long period of adaptation.

MEDICAL COMPARISONS

In general, medical comparisons favor renal transplantation as the more physiological method to treat CKD, which secures diminished mortality and better quality of life.

ERA-EDTA data in 2006 for patients on both methods of renal replacement therapy, showed much lower expected remaining lifetimes compared to general population, with those on

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dialysis even more reduced than transplant recipients (2).

A recent systematic review of 110 identified eligible studies on this topic with 1 922 300 participants gives sufficient back-up of this thesis. Tonelli M. and coworkers in 77 reviewed studies with 1 800 119 participants found out in 76% of them significantly lower mortality risk in RT patients and in 7% significantly lower risks of death associated with dialysis (3). In the same representative and based on vast sources of information review, other morbidity parameters including myocardial infarction, brain stroke, heart failure, infection-related hospitalizations were also less frequent in the cohorts of kidney transplants.

The quality of life (QoL) comparisons between dialysis and kidney transplanted patients often favor the latter category. Avramovic M estimates a depression prevalence of 20-30% in dialysis patients, which not only has a negative impact on QoL, but also serves as a factor that can significantly affect morbidity and mortality in ESRD patients (4).

Alvares and coworkers used Short form health survey questionnaire (SF-36) to interview 3,036 patients as a representative sample of the dialysis units and transplant centers in Brazil (5). The conclusion was that renal transplant patients had the best mean score in the physical component of quality of life and socioeconomic class position had also influence on quality of life.

Contrary to the already cited opinions on QoL, Sayin and coworkers studied a small cohort of 75 hemodialysis, 41 peritoneal dialysis and 20 transplant patients and concluded that the three forms of renal replacement therapy did not differ with regard to QoL. (6)

In the systematic review of 110 identified eligible studies presented by Tonelli and coworkers, the analysis of quality of life using SF-36 questionnaire between the alternative therapies, was significantly in favor of transplantation over dialysis (3).

FINANCIAL COMPARISONS

Most of the comparisons between therapies require also financial effectiveness analysis, which in the times of managed care medicine is

most crucial and facilitates the decisions. The treatment expenditures for the transplanted patients are also less and from economical point of view RT is again more attractive compared to DT. The differences in the costs for the treatment modalities may vary between the countries. In the USA, United States Renal Data System (USRDS) 2011 shows average figures of 82 285 USD costs for a year on hemodialysis; 61 588 USD for a year on peritoneal dialysis and 29 983 USD transplant care costs per year (operation excluded) (7). Thus, RT patient expenditures are on the average close to 100% less compared to peritoneal dialysis and nearly 175% lower compared to hemodialysis.

In Europe, the German healthcare system provides reimbursement for dialysis therapy, independent of the mode of treatment at a weekly flat rate of 580 Euro. With the medical fees for the personal added, the average patient on dialysis costs a total of 53 613 Euro per year for the system. The renal transplanted patient costs an average of 88 932 for the first year (operation included) and afterwards the expenditures radically drop to 9 250 (8).

Similarly to Germany, in Sweden expenditures are less in kidney transplanted patients compared to those on dialysis. CKD treatment protocol is focused on transplantation, with approximately 52% of the ESRD patients living with a functioning transplant (9).

A Belgian calculation of annual dialysis and transplant recipients cost of treatment revealed even higher difference between DT and RT with figures of 78 000 and 45 000 Euro per year for haemo- and peritoneal dialysis respectively and 12 810 for the first postoperative year and 6 078 Euro for the next subsequent years after RT (10). Such a great variation of expenditures between treatment modalities surpassing 1 000%, although hard to explain, may be considered as very impressive.

THE SOCIAL IMPORTANCE OF CHRONIC KIDNEY DISEASE – A NEGLECTED PROBLEM

However, although RT is medically superior and financially cheaper, global statistics reveal, that more than 2 000 000 patients are on dialysis treatment and the number of transplanted

surpasses 500 000. Figures, even in countries with most active kidney transplant programs, show a trend of diminished ratio of transplanted versus patients on DT. These facts, although somewhat surprising in the context of the issues already discussed, have their explanation – the rising number (epidemic) of new cases of CKD in stages requiring renal replacement therapy (RRT) and the limited availability of donor kidneys.

In 2005, the World Health Organization proclaimed chronic diseases as its priority issue. The funds for campaigns aiming at prevention and reduction of psychiatric, oncology, cardiologic diseases and diabetes are constantly increasing, while at the same time nephrology diseases are underestimated. Several breaks through this tendency of neglecting renal diseases can be discussed – the USA program “Healthy people 2020”, where a decrease of approximately 10% of incident CKD-ESRF patients (from 355 to 318.5/p.m.p.) and 20% in mortality rate of treated patients (from 232 to 190.8 deaths per 1000 patient/years) are considered an important goal. In the European union, in the last three-year survey on health status of the union, a chapter on CKD stages 3 to 5 is dedicated, raising the awareness of the medical and social burden imposed by the chronic renal failure epidemic (11).

INCIDENT AND PREVALENCE OF ADVANCED STAGES OF CKD

Global figures for the incidence of CKD stage 5 vary a lot between countries, reflecting the level and type of healthcare system, financial resources, existing screening and preventive programs, geographical region and a great number of other contributing factors.

In general, a wide range of one hundred to four hundred incident cases per million populations are expected annually in most countries, where such a statistic is presented. A look at the kidney transplantation figures will prove the fact, that the highest annual number of RT - 17 736 are announced in USRDS 2011, which is an increase of 323 cases compared to the previous year (7). This very high transplant activity of 57.7/p.m.p. compared with the figure of the incident patients in USA for the same year – 371/p.m.p. results in a decrease of transplanted/dialysis patients.

Hence, in two years time, the number of dialysis patients in the period 2007-2009 rose from 367 604 to 397 796 (30 000 new DT patients), while the figures for RT increased with less than half of the new dialysis patients number - from 158 739 to 172 553. This resulted in elongation of the waiting list for RT in this period with a number close to 9 000 – from 73 554 to 82 536 (7).

The rising expenditures for RRT in view of the CKD epidemic become a threat for the financial ability of the society and the healthcare system in particular to pay for the expensive treatment of millions of people.

Several steps in the treatment of chronic kidney disease patients, which form the methodology of the nephrology doctrine, proved to be medically and financially justified (12):

- Timely referral;
- Slowing down the rate of progression;
- Management of the co-morbidities (CV risks mainly included);
- Timely preparation for renal replacement treatment;
- Timely initiation of RRT

When renal replacement therapy is initiated, in-center hemodialysis is the most widely experienced modality and the most expensive at the same time. The concept of “integrated care”, based on optimal distribution of treatment modalities, is an attempt to set a balance between methods. Home methods such as CAPD, APD and home hemodialysis, which are more cost effective, should be encouraged(13). Renal transplantation is a preferred method in “integrated care” concept and preemptive RT is the best solution – 2 759 such transplantations in USA for 2009, which is nearly 16% of all 17 736 done.

CONCLUSION

As a conclusion, dialysis treatment modalities although imperfect, are a great achievement of modern medicine and should be considered as complimentary and not competitive. Renal transplantation is a preferred method to treat advanced stages of Chronic Kidney Disease with medical and financial advantages, but shortage of donor organs, limits its` application.

REFERENCES

1. Rubini, M. E.; Goldman, R.; Agre, K. L. et al. Dialysis and Transplantation: Some Interactions and Comparisons. *Transactions - American Society for Artificial Internal Organs*. 14(1):355-360, April 1968.
2. Stel V. S., A. Kramer, C. Zoccali, K. J. Jager. The 2006 ERA-EDTA Registry annual report: a précis. *Journal Nephrol*; 22: 1-12, 2009.
3. Tonelli M, N. Wiebe, G. Knoll et al Systematic Review: Kidney Transplantation Compared With Dialysis in Clinically Relevant Outcomes. *American Journal of Transplantation*; 11: 2093–2109, 2011.
4. Avramovic M, Stefanovic V. Health-Related Quality of Life in Different Stages of Renal Failure. *Artif Organs*. Mar 16. doi: 10.1111/j.1525-1594.2011.01429.x. [Epub ahead of print], 2012.
5. Alvares J, Cesar CC, de Assis Acurcio F et al. Quality of life of patients in renal replacement therapy in Brazil: comparison of treatment modalities. *Qual Life Res*. Sep 22. [Epub ahead of print], 2011.
6. Sayin A, Mutluay R, Sindel S. Quality of life in hemodialysis, peritoneal dialysis, and transplantation patients. *Transplant Proc*. Dec;39(10):3047-53, 2007.
7. United States Renal Data System. 2011 Atlas of CKD&ESRD. Last accessed on 30.05.2012 at <http://www.usrds.org/atlas.aspx>
8. Kleophas W, Reichel H. International study of health care organization and financing: development of renal replacement therapy in Germany *Int J Health Care Finance Econ* 7(2-3):185-200, 2007.
9. Wikström B, Fored M, Eichleay M The financing and organization of medical care for patients with end-stage renal disease in Sweden. *Int J Health Care Finance Econ*7(4):269-281, 2007.
10. Van Biesen W., Lameire N., Peeters P., Vanholder R. Belgium's mixed private/public health care system and its impact on the cost of end-stage renal disease. *Int J Health Care Finance Econ* 7(2-3):133-148, 2007.
11. Zoccali C, A. Kramer, K. J. Jager. Epidemiology of CKD in Europe: an uncertain scenario *Nephrol. Dial. Transplant*. 25 (6): 1731-1733, 2010.
12. Nesrallah G., Blake P., Mendelssohn D. Modality options for end-stage renal disease care. In: "Chronic Kidney Disease, Dialysis & Transplantation. Companion to Brenner and Rector's The Kidney" (Eds. Pereira B.J.G., Sayegh M. H., Blake P.G.) Copyright 2005 by Elsevier inc. pp. 279-306
13. Mendelssohn DC, Pieratos A: Reformulating the integrated care concept for the new millennium. *Perit Dial Int*; 22(1):5-8, 2002.