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A COMPARATIVE STUDY BETWEEN DIALYSIS AND KIDNEY TRANSPLANTATION REGARDING THE CAUSES AND SURVIVAL PERIOD OF THE PATIENTS IN WESTERN AREA, LIBYA

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Abstract

As the number of renal failure patients in Libya reached to 3,700 patients (kindly provided by Libyan Ministry of Health), this study aimed to help Libyan people suffering from renal failure to making a wisdom decision about choice of renal transplantation or treatment with dialysis. This study found the main causes of renal failure among people in western area of Libya, due to ages and survival time between patient undergoing dialysis and kidney transplantation. Out of 140 patients' files that were collected from different hospital and specialized centers in western Libya, 98(70%) patients were treated with dialysis while the rest 42 patients (30%) underwent kidney transplantation. The result also revealed that the mean survival time for those who planted the kidneys was (7.1 years) significantly longer than those treated with dialysis (3.7 years). The mean ages of patients underwent transplantation was (53.4 years) younger than those who were treated with dialysis (44.6). Diabetes and blood pressure complications were the most common diseases associated among both groups while multiple microbial inflammation of kidney was higher among kidney transplanted group. Also, gastrointestinal bacteria and protozoa played a marked role.

Keywords: Libya, kidney failure, dialysis, kidney transplantation.

Introduction

Chronic renal failure is the commonest final pathway of a number of renal diseases. Three choices for patients reached to the point where renal function was insufficient to sustain life are chronic dialysis treatments, renal transplantation, or death (Levey, 2007; Mozaffar *et al*, 2016). With renal failure, there are many physiologic derangements. Homeostasis of water and minerals (sodium, potassium, calcium, chloride, phosphorus, sulfate, magnesium), and excretion of daily metabolic load of fixed hydrogen ions was no longer possible (Seggewiss and Einsele, 2010). Toxic end-products of nitrogen metabolism (creatinine, urea, uric acid, among others) accumulated in blood and tissue. Then, kidneys were no longer able to function as endocrine organs in production of erythropoietin and 1, 25-dihydroxychole-calciferol or calcitriol (Daugirdas *et al*, 2007). Dialysis procedures remove nitrogenous end-products of catabolism and begin the correction of the salt, water, and acid-base derangements associated with renal failure (Vujicić *et al*, 2013). Dialysis is an imperfect treatment for the myriad abnormalities that occur in renal failure, as it does not correct the endocrine functions of the kidney. Indications for starting dialysis for chronic renal failure were empiric and vary among physicians. Some begin dialysis when residual glomerular filtration rate falls below 10 ml/min /1.73m^2 body surface area 15ml/min/1.73m^2 in diabetics (El-Tawdy *et al*, 2016). Others institute treatment when the patient loses the stamina to sustain normal daily work and activity. In symptoms (nausea, vomiting, anorexia, fatigability, diminished sensorium) and signs (pericardial friction rub, refractory pulmonary edema, metabolic acidosis, foot or wrist drop, asterixis) of uremia, dialysis treatment is a must (Cameron, 2016). Available treatments for end-stage renal disease include dialysis and kidney transplantation. The increasing

prevalence of end-stage renal disease ESRD, together with stable or decreasing rates of organ donation have led to a shortage of kidneys available for transplantation (Onuigbo and Agbasi, 2014). Antonucci *et al*. (2012) in Italy reported that older patients, patients with peripheral vascular disease, and those with neoplasia were less frequently taken off peritoneal dialysis to receive a transplant, an event occurring more frequently, however, in patients with hypertension. Death is dependent on age, on the presence of peripheral vascular disease and is less frequent in hypertensives. As was the case for peritoneal dialysis, the natural history of kidney transplant can have two competing outcomes: return to dialysis and death. The risk factors associated with return to dialysis are the presence of peripheral vascular disease, hypertension and infections; risk factors associated with death include age, the presence of cerebral vascular disease and neoplasia. From 1998 to 2007, the prevalence of HCV-antibody-positive patients decreased by almost one third. The number of antigen-positive hepatitis B patients is declining slowly, but the levels remain in any case very low. The association between the two infections is disappearing: already at very low levels in 1998, that figure was halved by 2007. Mortality and survival: the mortality of uremic patients on renal replacement therapy was calculated both as a cumulative incidence, expressed as the number of deaths over patients at risk (alive at the beginning of the study year) and as a mortality rate, expressed as the number of deaths per patients/year. The figure was constant over the years, at around 10%. The mortality of males was no different from that of females; this finding differs from what is observed in the general population where male mortality is markedly higher than that of females. The mortality rate was dependent on the age group of the patient at start of treatment and shows an upward trend that is growing exponentially. The mortality rate in hemodialysis patients remained stable at 15% between 2000 and 2007, while the mortality rate in peritoneal dialysis patients gradually decreased down to 13%. The mortality rate for transplant patients was low and constant, at fewer than 2%. The trend for the various causes of death is stable over the years and shows that the main cause of death is cardiac, accounting for between 30% and 35%, while mortality due to vascular, neoplastic, infection or cachexia-related causes are all roughly at the same rate, between 10% and 15%.Axelrod *et al*. (2014) stated that the provision of effective surgical care for end-stage renal disease (ESRD) requires efficient evaluation and transplantation. Prior assessments of transplant access have focused primarily on waitlisted patients rather than the overall populations served by accountable providers of transplant services. They concluded that the residence in a Novel transplant referral region (TRR) with care delivery systems that increase access to transplant services is associated with significant, risk-adjusted decreases in ESRD-related mortality. Transplant centers should continue to focus on improving access to care within the communities they serve. Ingelfinger *et al*. (2016) in Belgium stated that World Kidney Day 2016 focuses on kidney disease in childhood and the antecedents of adult kidney disease that can begin in earliest childhood. Chronic kidney disease (CKD) in childhood differs from that in adults, as the largest diagnostic group among children includes congenital anomalies and inherited disorders, with glomerulopathies and kidney disease in the setting of diabetes being relatively uncommon. In addition, many children with acute kidney injury will ultimately develop sequelae that may lead to hypertension and CKD in later childhood or in adult life. Children born early, or who are small-for-date newborns, have a relatively increased risk for the development of CKD later in life. Persons with a high-risk birth and early childhood history should be watched closely in order to help detect early signs of kidney disease in time to provide

effective prevention or treatment. Successful therapy is feasible for advanced CKD in childhood; there was evidence that children fare better than adults if they receive kidney replacement therapy including dialysis and transplantation, while only a minority of children may require this ultimate intervention. Because there were disparities in access to care, effort was needed so that those children with kidney disease, wherever they live, may be treated effectively, irrespective of their geographic or economic circumstances

This study aimed to help Libyan people suffering from renal failure to make a correct decision. The study also aimed to find main causes of renal failure in western area of Libya, and compared between the ages of patients treated with dialysis and those underwent kidney transplantation as well as the period of survival of patients after beginning dialysis or renal transplantation.

Patients, Materials and Methods

Official communication with mangers of hospitals and specialized centers concerned in renal failure diseases in some Libyan cities has been done. A retrospective study and historical data about 140 patients who already died. 98 out of them underwent dialysis while the rest (42 patients) underwent Data of the patients were obtained from Al-Zahra Center for Renal Diseases, Tripoli Central Hospital, Nalout Central Hospital and Gharyan General Hospital. The collected data were tabulated and analyzed using SPSS 20 Pearson chi square, T-test and F test were estimated. The 0.05 cut-off value was used as a criterion for statistical significance and all statistical tests were interpreted in a two-tailed fashion (Altman, 1992).

Results

Table 1: Renal failure patients treated with renal dialysis or kidney transplantation.

Complications		Dialysis	Kidney transplantation	total
Diabetes Mellitus	No	45	9	54
	%	45.9%	21.4%	38.6%
Blood Pressure	No	15	8	23
	%	15.3%	19%	16.4%
Genetic factors	No	5	0	5
	%	5.1%	0.0%	3.6%
Renal atrophy	No	9	0	9
	%	8.9%	0.0%	6.4%
Renal cysts	No	4	0	4
	%	4.1%	0.0%	2.9%
Renal tumor	No	1	0	1
	%	1.0%	0.0%	0.7%
Severe cold	No	4	4	8
	%	4.1%	9.5%	5.7%
Renal microbial inflammation	No	6	8	14
	%	6.1%	19.0%	10.0%
Medical error	No	2	7	9
	%	2.0%	16.7%	6.4%
Renal calcus	No	2	1	3
	%	2.0%	2.4%	2.1%
Lake of drug	No	0	3	3
	%	0.0%	7.1%	2.1%
Unknown reasons	No	5	2	7
	%	5.1%	4.8%	5.0%
Total	No	98	42	140
	%	100.0%	100.0%	100.0%

Chi- square = 46.1, P<0.01

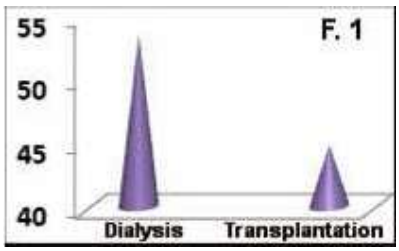

Fig.1: A comparison between average of patients ages under renal dialysis and underwent kidney transplant in years.

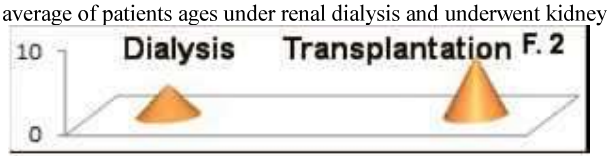

Fig. 2: Average of survival time after kidney transplantation and from beginning of dialysis.

Table 2: Average of kidney failure patients' ages treated with renal dialysis and kidney transplantation.

Age	No.	Mean	Std. Deviation	Std. Error Mean
Dialysis	98	53.49	15.268	1.542
Kidney transplantation	42	44.64	14.802	2.284

T value = 3.1, P< 0.01

Table 3: Average of survival time after kidney transplantation and from beginning of dialysis.

Survival after operation	No.	Mean	Std. Deviation	Std. Error Mean
Dialysis	98	3.73	3.254	0.329
Kidney transplantation	42	7.17	6.227	0.961

T value = 4.2, P< 0.01

Discussion

The study revealed that of 140 patients' files that were collected from different hospital and specialized centers in western Libya, 98 (70%) patients were treated with dialysis while 42 patients (30%) underwent kidney transplantation. The trend words renal dialysis may reflect the economic status of the patients where renal transplantation were carried out abroad requiring budget for travelling and suitable kidney donor .It was noted that the mean ages of patients who was treated with dialysis (53.4 years) was older than those who underwent transplantation (44.6). Most of young renal failure patients preferred kidney transplantation process and that result may explain the longer survival period after transplantation of these group (Ojo *et al*, 2000). The result also revealed that the mean survival time for those who planted the kidneys was (7.1 years) significantly longer than those who were treated with dialysis (3.7 years). The results agreed with studies recorded the higher longevity of patients after transplantation (Wolfe and Ashby, 1999). In USA, it was documented that kidney transplantation is associated with decrease in mortality rate and improvement in quality of life compared with chronic dialysis treatment (USRDS, 2015). Most studies also found that the risk of cardiovascular events was significantly reduced among transplant recipients. Quality of life was significantly and substantially better among transplant recipients. Despite increases in age and comorbidity of contemporary transplant recipients, the relative benefits of transplantation seem to be increasing over time. These findings validate current attempts to increase the number of people worldwide that benefit from kidney transplantation (Tonelli, 2011)

De Cosmo *et al*. (2016) in Italy stated that the antihypertensive treatment and blood pressure (BP) reduction are known to retard the progression of diabetic kidney disease (DKD) in type 2 diabetes mellitus (T2DM) but long-term real-life clinical data on the incidence of DKD are lacking. In this observational, prospective cohort study, we investigated the association between achievement and maintenance of recommended BP values and the incidence of DKD and its components over a 4-year follow-up in patients

with T2DM and hypertension from the Italian Medical Diabetologists registry. Generally speaking, the diabetes and blood pressure complications were the most common diseases associated among patients of both groups while multiple microbial inflammation of kidney was higher among kidney transplanted patients, National Institute of Diabetics and Digestive and Kidney Diseases recoded that diabetes and blood pressure complications were the main causes of renal failure disease (USRDS, 2015). Multiple microbial inflammation of kidney among kidney transplanted group may reflect low immunity of the transplanted patients due to medication with corticosteroids drug after operation. Lee *et al*. (2015) in USA characterized bacterial composition in the fecal specimens by deep sequencing of the PCR amplified 16S rRNA V4-V5 region and investigated the hypothesis that gut microbial composition was associated with tacrolimus dosing requirements. Initial tacrolimus dosing was similar in the dose escalation group and in the stable group (4.2±1.1 mg/day vs. 3.8±0.8 mg/day, respectively, p=0.61, two-way between-group ANOVA using contrasts) but became higher in the dose escalation group than in the dose stable group by the end of the first transplantation month (9.6±2.4 mg/day vs. 3.3±1.5 mg/day, respectively, p<0.001). The characterization of gut microbial composition identified that fecal Faecalibacterium prausnitzii abundance in the first week of transplantation was 11.8% in the dose escalation group and 0.8% in the Dose Stable Group (P=0.002, Wilcoxon Rank Sum test, P<0.05 after Benjamini-Hochberg correction for multiple hypotheses). Fecal Faecalibacterium prausnitzii abundance in the first week of transplantation was positively correlated with future tacrolimus dosing at 1 month (R=0.57, P=0.01) and had a coefficient±standard error of 1.0±0.6 (P=0.08) after multivariable linear regression. As to intestinal parasites, Hawash *et al*. (2015) tested the presence of protozoa in kidney diseased patients with a matched case-control study to determine their diarrhea associated symptoms among 50 patients with CRF (cases) from Taif, western Saudi Arabia. Fifty diarrheal patients without CRF were recruited in the study as controls. Participants were interviewed by a structured questionnaire and stool samples were collected. Samples were thoroughly examined with microscopy and three coproantigens detection kits. Enteric protozoa were detected in 21 cases and 14 controls. *Blastocystis hominis* were the most predominant parasite (16% in cases versus 8% in controls), followed by *Giardia duodenalis* (10% in cases vs. 12% in controls) and Cryptosporidium spp. (10% in cases vs. 6% in controls). *Cyclospora cayetanensis* was identified in two cases, while *Entamoeba histolytica* was in one case and one control. Intestinal parasitism was positively associated with the male gender, urban residence, and travel history. Clinical symptoms of nausea/vomiting and abdominal pain were significantly varied between patients and controls (P value ≤ 0.05).

Conclusion

The duration of remaining survival after operation of kidney transplantation is longer than that after beginning of dialysis operation. The most important causes of the renal failure disease are diabetes, hypertension in addition to other various disease and reasons. Ages of the patients who underwent the dialysis are older than those patients who underwent transplantation. Anti–rejection medications decrease body's natural immune response to a foreign substance (transplanted kidney). They suppress immune system and prevent body from rejecting new kidney. At same time probability of microbial infection increases. Also, gastrointestinal microbes and protozoa must be in mind.

Recommendations

Prompt treatment and follow up of diabetic and blood pressure patients should be done to avoid such renal complications. Early diagnosis and checkup to discover genetic diseases that causes renal failure. That study

encourages the trend of kidney transplantation due to the longer survival time after that operation. Standards of quality should be applied in medical centers and hospital to decrease the high percentage of medical error recorded in that study. At research level, more immunological studies should be carried out on the patients who undergo kidney transplantation for elongation the survival time after transplantation. At governmental level Libya should establish specialized centers for kidney transplantation and bring highly qualified specialists of that field.

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