CHAPTER 11

VASCULAR ACCESS TYPE AND ALL CAUSES OF MORTALITY

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Introduction

The native arteriovenous fistula (AVF) is the vascular access of first choice for haemodialysis. The overall prevalence of AVF use in Australia and New Zealand during 1999-2000 was 73%. However an assessment of patients who first entered the registry within one month of commencing haemodialysis (a surrogate of vascular access used at first dialysis treatment) reveals an AVF prevalence of only 43%, with the majority of patients (50%) commencing haemodialysis with an central venous catheter (CVC).

The reliance on the use of CVC may come at a high cost, with the possible association of CVC and AVG use and an increased total mortality. However these studies are, by their very nature observational, and thus are prone to significant selection bias. Any causal relationship is best answered by a randomised study but this would be unethical to perform.

The use of propensity scores is a statistical technique that reduces bias resulting from the non-random nature of treatment assignment. Models are developed for the prediction of access type based on patient demographics and comorbidity. We developed a propensity score model which describes the probability for each patient, based on their characteristics, to receive an AVF versus an CVC or AVF versus an AVG. The model was utilised in two separate ways: Firstly as an additional covariate in multivariable model and secondly to derive two smaller cohorts by matching patients based on their propensity to receive an AVF where, for example, one received an AVF while the other received a CVC.

The aims of the analysis were therefore two fold. To investigate the relationship between vascular access type and all cause mortality in new

Figure 11.1

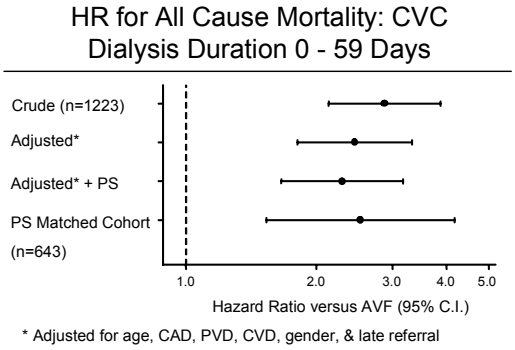


Figure 11.2

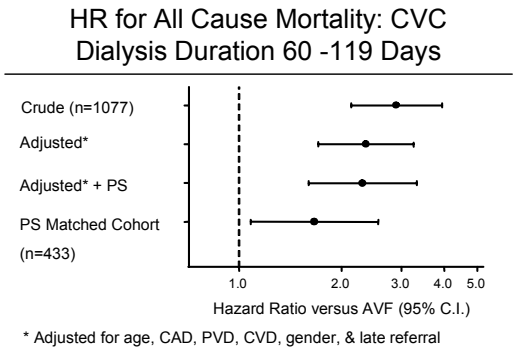


Figure 11.3

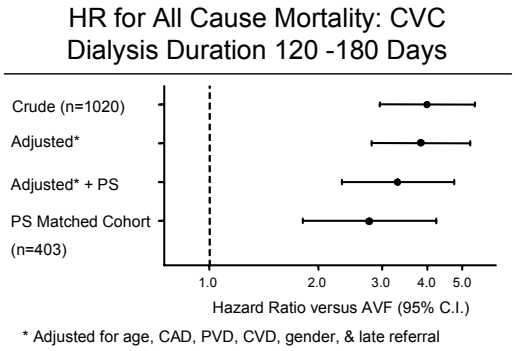
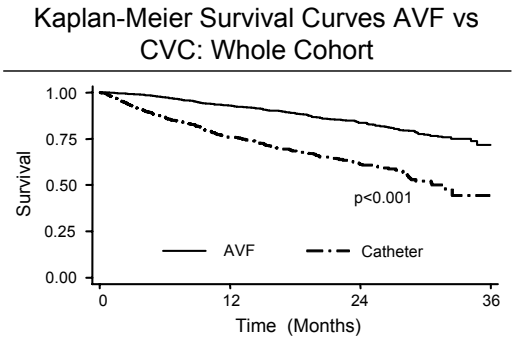


Figure 11.4



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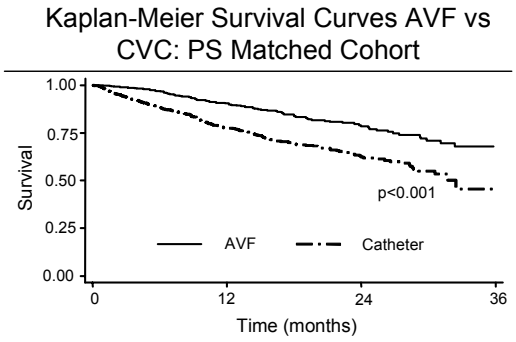
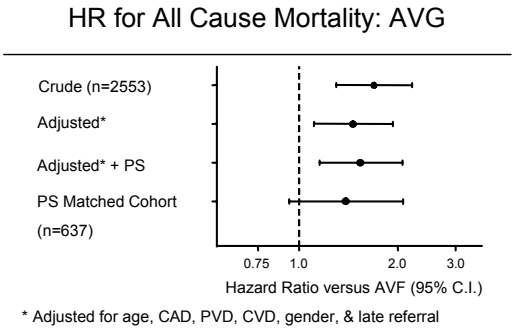


Figure 11.6



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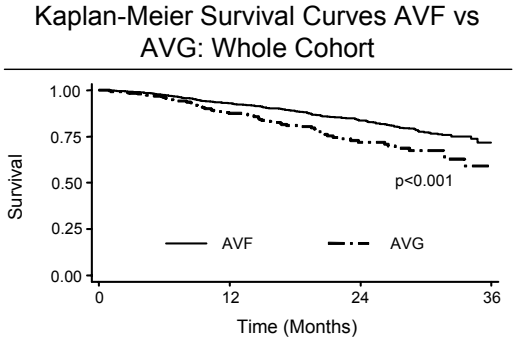
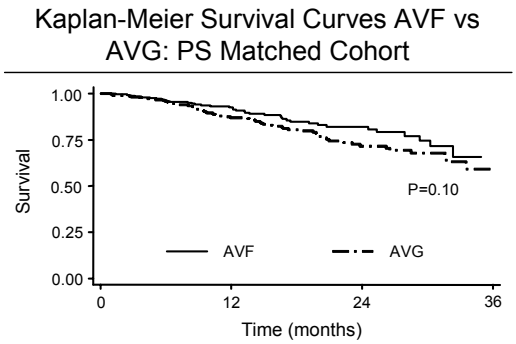


Figure 11.8



ERSD patients commencing haemodialysis in Australia and New Zealand 1999-2002 and to construct propensity scores for the allocation of AVF versus CVC and AVF versus AVG in order to reduce selection bias resulting from the non-random nature of treatment (vascular access) assignment.

Results

Incident haemodialysis patients who used a CVC during the first six months of their haemodialysis treatment had a two to three increased risk of death compared to patients with an AVF (fig 11.1, 11.2 and 11.3). This risk remained constant in all crude, adjusted and propensity score models. Corresponding Kaplan-meier survival curves for both the whole and propensity score matched cohort are shown in Figures 11.4 and 11.5.

Incident haemodialysis patients who used a AVG during the first six months of their haemodialysis treatment had a 50% increased risk of death compared to patients with an AVF (fig 11.6). This risk remained constant in all crude, adjusted and propensity score models although it was not significant in the propensity score matched cohort. Corresponding Kaplan-Meier survival curves for both the whole and propensity score matched cohort are shown in Figures 11.7 and 11.8.

Discussion

The use of and CVC or AVG in the first six months of dialysis places patients at an increased risk of death compared to those with an AVF. Risk is likely to be mediated via multiple factors including increased infectious risk, reduced dialysis efficient and optimal pre-ESRD care. Reducing CVC use by ensuring timely pre-ESRD care may be the single most effective intervention to reduce mortality in haemodialysis patients in Australia and New Zealand.