Factors Predictive of Remission in Steroid Resistant Nephrotic Syndrome in Children: A Multivariate Analysis

There are very few trials that have evaluated outcomes in SRNS(1). The underlying histpathology is another important prognostic marker(2). The type of steroid resistance primary (INR) vs secondary (SNR) has been reported to influence outcome(1,3). There is 110 study which has evaluated the confounding effect of histopathology i.e. whether children with MCD and INR have a better outcome than children with FSGS and SNR(4). Hence we conducted a multivariate analysis on subjects where data we have published earlier(2) to identify factors predictive of outcome in terms of remission in response to immunosuppressive agents.

Children with SRNS were treated with one or more of the following therapeutic protocols as described in our earlier study(2). After a mean follow up of 46 (8-148 months) months. 63/128 (49.3%) children attained a remission (Gp I) while 65 (50.7%) continued to have proteinuria (Gp II). On comparing the patients in the two groups, we observed that the mean age of onset of nephrotic syndrome was significantly higher in Gp II ($p = 0.0008$). Children who had SNR were more likely to attain remission as compared to children who were INR ($p = 0.05$). Moreover children who had MCD were significantly more likely to attain remission as compared to non-MCD ($p = <0.0000l$). Children who had received cyclophosphamide (CP) (intravenous or oral) were significantly more likely to achieve a remission, as compared to those who had not received CP ($P <0.00001$). Also there was a trend towards higher remission rates in those who had received intravenous CP (46/63) as compared to those who had received oral CP (13/25) ($p = 0.07$).

On multivariate analysis we observed that the only factors that correlated with remission were (1) histopathologic evidence of MCD ($p = 0.0005$), (2) CP therapy ($p = 0.0002$) (R^2 value for the model 0.640) (*Table I*). As expected, children in Groupp I on follow-up had a significantly lower total protein ($p = 0.05$), lower serum albumin ($p = 0.002$), lower GFR ($p <0.00001$) and a significantly higher serum creatinine ($p = 0.002$). Further, we observed that CP increased the number of children with SRNS who achieved complete remission regardless of the underlying renal pathology.

In conclusion evidence of MCD on histo-pathology was perhaps the most important predictive factor. CP therapy appears to be beneficial in inducing a remission in these patients regardless of underlying histopathology. This analysis substantiates the observations in earlier studies(2,5). Well-designed trials are needed to assess the benefits and adverse effects of various therapeutic regimens in treating children with SRNS.

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TABLE I–*Multivariate Analysis for Factors Predictive of Remission*

Predictor	Unstandardized coefficient *b*	Wald	P value	95%CI Lower	95% CI Upper
Constant	–2.7528	4.6639	0.0308		
Histopathology	3.5305		0.0005	4.70	248.0
Cyclophosphamide					
IVCP	2.4819	17.0380	0.0000	3.6946	38.7443
OCP	1.9054	7.3365	0.0068	1.6932	26.6871
Dependent variable remission R^2 value for the model 0.640					

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